SMOKY CANYON MINE, PANELS F & G

Draft Environmental Impact Statement

US Department of Agriculture
Forest Service
Caribou-Targhee National Forest

US Department of the Interior
Bureau of Land Management
Pocatello Field Office

Cooperating Agency:
Idaho Department of Environmental Quality

United States Department of the Interior

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TAKE PRIDE IN AMERICA

In Reply Refer To:
3500 (I-27512, I-01441)

Dear Reader:

Enclosed for your review and comment is the DRAFT Environmental Impact Statement (DEIS) for J.R. Simplot Company's Smoky Canyon Mine, Panels F and G proposed mine expansion. The DEIS was prepared by the Bureau of Land Management (BLM) and the U.S. Forest Service with cooperation from Idaho Department of Environmental Quality. It analyzes the effects of a proposal to continue phosphate mining, for another 14 years, using the existing Smoky Canyon Mine infrastructure while expanding pits to the south.

The project is located about 20 miles southwest of Afton, Wyoming, in Caribou County, Idaho. The existing operation has been in place since 1983. The proposed action includes two pits and a haul road to move ore and employees to the existing facilities. Alternatives were formulated from public comments and agency concerns. Six different mining alternatives, a no-mining alternative and eight different transportation alternatives were analyzed.

Following a 60-day public review and comment period, the agencies will analyze the comments, choose a preferred alternative, and prepare the Final EIS. Comments can be sent to:

Smoky Canyon Mine DEIS
C/O The Shipley Group
PO Box 2000
Bountiful, UT 84011-2000
or
scm_deis@contentanalysisgroup.com

Questions can be directed to Bill Stout, BLM Project Manager, (208) 478-6340.

Sincerely,

Philip L. Damon

Philip Damon,
BLM, Pocatello Field Office Manager

DRAFT

ENVIRONMENTAL IMPACT STATEMENT

SMOKY CANYON MINE, PANELS F & G

LEAD AGENCY:	U.S. Department of the Interior Bureau of Land Management Idaho Falls District Pocatello Field Office
JOINT LEAD AGENCY:	U.S. Department of Agriculture Forest Service Caribou-Targhee National Forest
COOPERATING AGENCY:	Idaho Department of Environmental Quality
PROJECT LOCATION:	Caribou County, Idaho
DATE DRAFT EIS FILED WITH EPA:	December 2005
QUESTIONS ON THE DRAFT EIS CAN BE DIRECTED TO:	Bill Stout, EIS Project Manager BLM Pocatello Field Office 4350 Cliffs Drive Pocatello, ID 83204 (208) 478-6340
MAILING AND EMAIL ADDRESSES FOR SUBMITTAL OF COMMENTS ON DEIS:	Smoky Canyon Mine DEIS C/O The Shipley Group P.O. Box 2000 Bountiful, UT 84011-2000 scm_deis@contentanalysisgroup.com

ABSTRACT

This Draft Environmental Impact Statement analyzes impacts related to the development of Panels F and G at the J.R. Simplot Smoky Canyon Mine in southeast Idaho. The Proposed Action includes developing two mine pits, haul roads, and overburden disposal areas. Use of existing support and mill facilities would continue. Alternatives to the Proposed Action are also analyzed and site specific mitigation measures developed. Comments on this EIS must be received by MAR 03 2006

RESPONSIBLE OFFICIAL FOR EIS: Jeffrey Cundick

Acting Pocatello Field Office Manager
Bureau of Land Management

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EXECUTIVE SUMMARY

PROPOSED ACTION

The J.R. Simplot Company (Simplot), Smoky Canyon Mine has proposed an extension of its current open pit phosphate mining operations south into two federal phosphate leases (Manning Creek No. I-27512 – referred to as the Panel F lease area and Deer Creek No. I-01441 – referred to as the Panel G lease area). The leases are administered by the Pocatello Field Office of the Bureau of Land Management (BLM), and the surface of the leases is managed by the United States Forest Service (USFS), Caribou-Targhee National Forest (CTNF) (**Figures 1.0-1** and **1.0-2**). These two federal agencies, plus the Idaho Department of Environmental Quality (IDEQ), have prepared this EIS to review the environmental impacts of the proposed operations and a range of reasonable alternatives. Public scoping for this Project occurred in 2003 and resulted in identification of the issues described in **Section 1.6** of this EIS.

If approved, mining would begin in Panel F in 2006-2007; at the same time mining is being completed in the existing Panel B. The proposed mining would commence in Panel F with mining being initiated in Panel G a few years later. All mining and reclamation activities would be completed in a period of about 16 years. Reclamation monitoring would follow for a period of a few years to ensure reclamation meets agency requirements.

The proposed mining activities are described in **Section 2.4** of this EIS and would first include construction of a new haul/access road that would extend south from the existing Panel E across South Fork Sage Creek to the Manning Lease. Open pit mining operations would commence within this lease and would generally proceed from north to south in the proposed mine Panel F. Overburden removed from the north end of Panel F would initially be hauled north to complete backfilling of 29 acres in Panel E; it would also be placed in a 38-acre external overburden fill. The rest of the overburden would be used as backfill in the Panel F open pit. A total of 138 acres of the southern-most part of Panel F would be located in a lease modification proposed to be added to Lease I-27512 and the northern-most 2 acres of this open pit would be located on another proposed lease modification to the same lease. Disturbance from the Panel F operations would total 592 acres including: 435 acres of pits, 67 acres of roads, 38 acres of external overburden fills, and 52 acres of other disturbance including settling ponds and ditches, topsoil stockpiles, and a power line.

After several years of mining in Panel F, a haul/access road and a power line would be built to connect Panel F and Panel G. A 100 gpm water supply well would be drilled at Panel G. Initial overburden from the open pit at Panel G would be placed in a 74-acre overburden fill southwest of the pit and a 64-acre external overburden fill located east of the pit. The rest of the overburden would be used as pit backfill. Disturbance from the Panel G operations would total 748 acres including: 328 acres of pits, 217 acres of roads, 138 acres of external overburden fills, and 65 acres of other disturbance including settling ponds and ditches, topsoil stockpiles, and power line. Approximately 18 acres of the Panel G East External Overburden Fill would extend off lease and would require the BLM and USFS to issue the appropriate land use authorizations for this disturbance.

Surface disturbance from the entire Proposed Action would total 1,340 acres. Of this total, 38 acres in Panel F, including an open pit and highwalls, and 8 acres of highwall in Panel G would not be reclaimed. Another 25 acres of haul/access road disturbance would not be reclaimed, including small areas of cut and fill in steep terrain that cannot reasonably be regraded, and a portion of the Panel G West Haul/Access road, which would be left for continued use as a new CNF road to replace parts of the existing Wells Canyon (FR 146) and Diamond Creek (FR 1102) roads that would be abandoned and reclaimed.

Measures that would be employed to reduce environmental impacts are described in detail in **Section 2.5** of this EIS and would generally include: topsoil salvage and conservation, implementation of BMPs for control of releases of selenium and other chemicals of potential concern (COPCs), implementation of project-specific road BMPs and storm water pollution prevention measures for runoff and sedimentation control, use of oil spill prevention control and countermeasures, mitigation of wetland impacts, capping all areas of seleniferous overburden with at least 4 feet of chert and 1 to 3 feet of topsoil, concurrent reclamation including revegetation, and various monitoring and reporting programs.

MINING ALTERNATIVES

A total of seven mining alternatives were evaluated in the EIS and are described in **Section 2.6.1**, they include:

- Alternative A - No South and/or North Panel F Lease Modifications,
- Alternative B - No External Seleniferous Overburden Fills,
- Alternative C - No External Overburden Fills at All,
- Alternative D - Infiltration Barriers on Overburden Fills,
- Alternative E - Power Line from Panel F to Panel G Along Haul/Access Roads, and
- Alternative F - Electrical Generators at Panel G.

Three more mining alternatives were also considered and eliminated from further evaluation in this EIS (**Section 2.7.1**).

Alternative A identifies the separate environmental effects of the mining activities on the proposed lease modifications and shows how environmental effects of the Proposed Action would be reduced if the Agencies decide not to grant the lease modifications. The area impacted could be reduced by approximately 140 acres, and the area not reclaimed could be reduced by 29 acres under this alternative compared to the Proposed Action.

Alternative B evaluates the environmental effects that would occur if the Agencies required Simplot to rehandle all seleniferous overburden that would be placed in the external overburden fills and move it into the pits as backfill. This would reduce the potential for environmental effects from leaching of seleniferous overburden by infiltration of water in the external overburden fills. The unreclaimed area in this alternative would be reduced by 8 acres compared to the Proposed Action.

Alternative C is similar to Alternative B except that it would require Simplot to rehandle all overburden placed in external overburden fills and replace it into the open pits. All disturbed areas in the mine panels would be reclaimed under this alternative.

Alternative D evaluates the effects of incorporating an infiltration barrier made of material from the Dinwoody formation within the cap over all areas of seleniferous overburden. The intent of this alternative is to reduce environmental impacts of seepage of water through seleniferous overburden in external fills and pit backfills. The unreclaimed area under this alternative would be the same as the Proposed Action.

Alternative E looks at the differences in environmental effects that would occur if the proposed separate power line corridor would be replaced by routing the power line along the proposed haul/access road corridors.

Alternative F evaluates the differences in environmental effects if the proposed power line to Panel G was replaced by electrical generators at the panel.

TRANSPORTATION ALTERNATIVES

An important component of the Proposed Action is transportation of ore over a number of miles from the proposed mine panels to the existing Smoky Canyon Mine mill. The proposed haul/access roads would also be used for transportation of personnel and materials from the current Smoky Canyon Mine south to the proposed mine panels. The environmental effects of the proposed Panel F and Panel G haul/access roads are evaluated separately in the EIS so they can be compared against a total of eight transportation alternatives that were also evaluated. Nine other transportation alternatives were also considered and eliminated from further evaluation; they are described in **Section 2.7.2**.

The transportation alternatives are described in detail in **Section 2.6.2** and include:

- Alternative 1 - Alternate Panel F Haul/Access Road,
- Alternative 2 - East Haul/Access Road,
- Alternative 3 - Modified East Haul/Access Road,
- Alternative 4 - Middle Haul/Access Road,
- Alternative 5 - Alternate Panel G West Haul/Access Road,
- Alternative 6 - Conveyor from Panel G to Mill,
- Alternative 7 - Crow Creek/Wells Canyon Access Road, and
- Alternative 8 - Middle Access Road.

Alternative 1 would follow an alignment from Panel E to Panel F that would avoid entering the Sage Creek IRA (**Figure 2.6-8a**). Alternative 2 would connect Panel G to the Panel F haul/access road on an alignment down (south) to the mouth of Deer Creek Canyon and then north along the east flank of the Webster Range. Alternative 3 would be similar to Alternative 2 but would avoid crossing private land near the mouth of Deer Creek Canyon. Alternative 4 would connect Panels F and G along an alignment on the east slope of Freeman Ridge. Alternative 5 would be similar to the Proposed Action but would exit the south end of Panel F rather than the middle west side. Alternative 6 would include a conveyor to transport ore from Panel G to the mill and would also require implementation of either Alternative 7 or 8 for access to Panel G. Alternative 7 consists of widening and improving the Crow Creek and Wells Canyon roads to serve as all-season personnel and vendor access to Panel G. Alternative 8 would be an access road only, connecting Panels F and G along the east flank of Freeman Ridge. Alternatives 1 through 5 would be haul/access roads for movement of ore, personnel, and supplies. Alternatives 7 and 8 would only be access roads as ore would be transported by a conveyor (Alternative 6) if either of these alternatives were selected.

AGENCY PREFERRED ALTERNATIVE

Following their review of the environmental impacts as discussed in EIS, the Agencies have selected the combination of the following Project components and alternatives as their preferred alternative at this time:

- The Proposed Action plan for mining, including the North and South Lease Modifications;

- Mining Alternative B: No permanent placement of seleniferous overburden external to the pit backfills;

- Mining Alternative D: Placement of an infiltration barrier cap over all areas of seleniferous overburden disposal;

- Mining Alternative E: Locating the power line for Panels F and G along the selected haul/access road corridors; and

- Transportation Alternative 2: Using the East Haul/Access road to transport personnel and materials into Panel G and for hauling phosphate ore from that panel to the existing Smoky Canyon mill.

ENVIRONMENTAL IMPACTS

Proposed Action and Alternatives

The environmental effects of the mining components of the Proposed Action were evaluated and compared to the mining alternatives in Chapter 4. A listing of the primary environmental impacts for the mining components of the Proposed Action and the mining alternatives is shown in **Table 2.9-1**. A similar listing and comparison for the transportation components of the Proposed Action and Alternatives 1 through 8 is shown in **Table 2.9-2**. The environmental impacts of these components and alternatives are summarized in the following narrative.

Geology, Topography and Minerals

The Proposed Action and each mining alternative would commit phosphate resources to development. This mining activity would result in physical changes to topography; creation of man-made slopes and highwalls that are designed for stability; movement of overburden to pit backfills and external fills; and potential exposure of rocks containing selenium and other elements to weathering processes.

About 46 acres of the topographic disturbance for the mine panels would be permanent where highwalls and pits would not be reclaimed. Mining Alternatives A (No South and North Lease modifications), B, (No Seleniferous External Overburden Fills), and C (No External Overburden Fills) would have unreclaimed areas of 17, 38, and 0 acres, respectively, while Mining Alternatives D (Infiltration Barrier), E (Power Line Along Roads), and F (Generators) would have the same amount of unreclaimed area as the Proposed Action.

Under Mining Alternative A, not mining the South Lease Modification of Panel F would reduce the ore recovery for the entire project by about 11 percent and not mining the North Lease Modification would reduce ore recovery by another 3 percent. Simplot could respond to increased costs inherent in the other mining alternatives by mining less overburden and ore. Double handling overburden in Mining Alternatives B and C could result in reduced ore recovery for the entire project by about 19 percent and 46 percent, respectively. Increased costs for Mining Alternatives D and F could result in reduced ore recovery for the entire project of about 22 percent and 38 percent, respectively.

Transportation Alternative 1 (Alternate Panel F Haul/Access Road) would disturb about 21 acres less than the Proposed Action Panel F Haul/Access Road with about the same unreclaimed area (**Figure 2.6-8b**). Transportation Alternative 2 (East Haul/Access Road) would disturb about the same area as the Proposed Action Panel G West Haul/Access Road but would have 14 acres less of unreclaimed areas. Alternative 3 (Modified East Haul/Access Road) would have 59 acres more disturbance than the Proposed Action Panel G haul/access road and the same amount of unreclaimed area. Transportation Alternatives 4 (Middle Haul/Access) and 5 (Alternate Panel G West Haul/Access) are similar to the Proposed Action Panel G haul/access road in initial disturbance but would result in larger unreclaimed areas. The conveyor (Transportation Alternative 6) would disturb 61 acres, which is 156 acres less than the Proposed Action Panel G haul/access road but this alternative would also need either the Crow Creek/Wells Canyon Access Road (Transportation Alternative 7, 114 acres) or the Middle Access Road (Transportation Alternative 8, 99 acres). All of the disturbance for the conveyor and Transportation Alternative 8 would be reclaimed, whereas 55 acres of Transportation Alternative 7 would remain after reclamation.

Impacts to paleontological resources would be negligible and approximately the same for all the mining and transportation alternatives.

Air Resources and Noise

Mining operations would impact air resources primarily by emissions of dust and motorized equipment exhaust including particulates, nitrogen oxides, carbon monoxide, volatile organic compounds, and sulfur dioxide. Over the entire 16-year Project life, the total air emissions from mining are estimated to be 8,422 tons. These emissions would comply with the National Ambient Air Quality Standards and would not impact human health in nearby residential areas. There would be no noticeable impact to Class I airsheds. All Mining Alternatives have total air emissions similar to the Proposed Action except for Mining Alternatives A and F, which would have total Project emissions of 7,500 and 9,786 tons, respectively.

The total air emissions from the Proposed Action Panel F and G haul/access roads would be 1,207 and 1,504 tons, respectively. Total emissions for Transportation Alternative 1 (Alternate Panel F Haul/Access), assuming it was combined with the No North Lease Modification would be 960 tons. Transportation Alternatives 2 and 3 (East and Modified East Haul/Access) would be similar to the Proposed Action Panel G Haul/Access Road. Emissions for Transportation Alternative 4 (Middle Haul/Access) would be 1,358 tons. Transportation Alternative 6 (Conveyor) emissions would be 661 tons, which would need to be combined with the 824 tons or 632 tons for either Transportation Alternative 7 or 8 (Crow Creek/Wells Canyon Access and Middle Access).

Distance between the proposed mining operations and residences along Crow Creek in conjunction with intervening topographic and vegetation screening would result in negligible mining noise typically reaching the nearest residences.

Noise for the haul/access roads of the Proposed Action and Transportation Alternatives 1 (Alternate Panel F), 4 (Middle Haul/Access), and 5 (Alternate Panel G West) would typically be negligible at residences along Crow Creek. Transportation Alternatives 2 and 3 (East and Modified East Haul/Access) would present very noticeable noise increases to the nearest residence along Crow Creek. The conveyor (Transportation Alternative 6) would present negligible noise along Crow Creek, as would Transportation Alternative 8 (Middle Access). Transportation Alternative 7 (Crow Creek/Wells Canyon Access Roads) would produce noticeable noise to residences from increased traffic along the Crow Creek Road.

Water Resources

Groundwater located below the proposed mine development in the Wells Formation flows eastward under the Webster Range to discharge at certain locations in lower Deer Creek and Crow Creek upstream of Deer Creek, Books Spring, and South Fork Sage Creek Spring (**Figure 3.3-9**). Removal of Phosphoria Formation rocks in the footprint areas of the proposed pits would remove the aquitard formed by these rocks. This would allow groundwater recharge of the Wells Formation to occur in the proposed open pit areas (763 acres) where recharge naturally did not occur. This would be a 7 percent increase in the local recharge area (10,536 acres) of the Wells Formation and Brazer Limestone. Recharge in these pit backfills and any external overburden disposal areas to the east of the pits would enter Wells Formation rocks and eventually enter the aquifer contained in the Wells Formation. Recharge water in contact with the overburden can dissolve small quantities of COPCs, which can potentially lead to water quality impacts to the groundwater. Geochemical testing of representative samples of the overburden that would be placed in these pit backfills and external overburden fills was done through assays of whole rock and leach column testing. Chromium, manganese, selenium, sulfate, and zinc were elevated in a number of samples above an applicable surface water and/or groundwater standard and were therefore selected for further impact analysis.

Groundwater flow and fate and transport modeling was conducted for the Project Area to estimate potential water quality impacts on the Wells Formation aquifer under and downgradient of the proposed pit backfills and external overburden fills. Solute concentrations in groundwater at specific locations within the model domain were calculated. They include four locations (Observation Points A – D) along the downgradient phosphate lease boundaries and the four locations where Wells Formation groundwater discharges to the surface (**Figure 4.3-2**). Results of the groundwater modeling for the Proposed Action and Mining Alternatives A (no North and South Lease Modifications), B (no external seleniferous overburden), and C (no external overburden) indicated that estimated peak concentrations of selenium in the groundwater at two of the downgradient lease boundaries (Observation Points A and D) would exceed the State groundwater quality standard (0.05 mg/L) in about 25 and 50 years, respectively, after mining began. The modeling results also showed that the estimated peak selenium concentrations at lower Deer Creek and South Fork Sage Creek Spring would exceed the State surface water quality standard (0.005 mg/L) in about 50 and 100 years, respectively, after mining began. For Mining Alternative D, selenium concentrations at all groundwater observation points and the surface discharge locations were less than applicable State groundwater or surface water standards.

The Rex Chert Member and the overlying Dinwoody formations also contain aquifers of local importance. The development of the proposed mining facilities would not impact water quality or quantity in the Dinwoody formation. Negligible impacts on recharge quantity to the Rex Chert would occur from the operations. Water quality impacts under the Panel G South Overburden

Fill are estimated to exceed the secondary groundwater standard for manganese and comply with standards for the other COPCs, including selenium.

Pumping the proposed Panel G water supply well would locally draw down the water table in the Wells Formation but projections of this draw down to existing surface discharges of the Wells Formation aquifer indicate changes in water levels, and flow at these locations would not be noticeable.

Development of the Proposed Action mining and transportation facilities would physically disrupt six small springs or seeps; potentially reduce flow of three springs; potentially cover with road fill or overburden four springs; and potentially affect the water quality of seven springs. All the mining alternatives would have the same effects on springs except Alternative A (no South Lease Modification), which would reduce the number of impacted springs by four.

The Proposed Action and all mining alternatives would increase the amount of hydrologically disturbed land by up to 11 percent in each of the affected HUC 6 watersheds, and by up to 1.3 percent in the HUC 5 Crow Creek watershed. None of the mining action alternatives would cause the total amount of land in a hydrologically disturbed condition to rise above 30 percent in any of the affected HUC 5 or HUC 6 watersheds.

The proposed mining facilities would be fitted with runoff and sediment control ponds that would be designed to contain runoff from the 100-yr storm plus snowmelt and thus would temporarily reduce the amount of runoff to local watersheds in the Project Area. The Proposed Action would reduce the watershed areas of South Fork Sage Creek and Deer Creek by 8 percent and 5 percent, respectively. All the mining alternatives would reduce the watershed areas of these drainages by about the same amount.

Application of BMPs to mine and transportation disturbances for the proposed mining operations would be designed to minimize the contribution of sediment to Project Area streams. Mining disturbance sediment controls would be designed to retain all sediment in ponds that the impact analysis estimated had a low (8 - 10 percent) chance of overflowing during the mine life. All the mining action alternatives were estimated to produce 0.17 tons/acre/year or less of sediment from reclaimed surfaces. The total sediment production from the mining areas would be proportional to total disturbed area. The total disturbed area, and therefore long-term sediment yield would be approximately the same for the Proposed Action and Mining Alternatives B (no external seleniferous overburden), C (no external overburden), E (power line on roads), and F (generators).

Mining Alternative A with no South Lease Modification would reduce the disturbed area by about 142 acres, and Mining Alternative D (infiltration barrier) would increase the disturbed area by about 136 acres.

Proposed roads would also have sediment controls, but their close proximity to area streams indicates some sediment would likely be contributed to these streams. Estimates of the annual sediment loading to Project Area streams from the transportation components of the Proposed Action and the transportation alternatives were prepared. The Proposed Action Panel F Haul/Access Road sediment loading was 0.5 tons/year, and 0.7 tons/year were estimated for Alternative 1 (Alternate F Haul/Access Road). These added sediment loads are less than 0.3 percent and 0.4 percent increases, respectively, over baseline sediment load (154.8 tons/year) in the South Fork Sage Creek watershed. The Proposed Action Panel G West Haul/Access Road sediment loading was 8.5 tons/year, and the alternatives to this road, Transportation Alternatives 2 (East Haul/Access), 3 (Modified East Haul/Access), 4 (Middle Haul/Access), 5 (Alternate West Haul/Access), and 6 (conveyor), had sediment loads of 4.5, 5.1, 7.8, 10.7, and 0.4 tons/year, respectively. These added sediment loads range from 0.1 to 3.5 percent increases over baseline sediment load (307.8 tons/year) in the Deer Creek watershed.

The various transportation alternatives were also compared to the transportation components of the Proposed Action with regard to the numbers of culverts required in perennial streams, springs impacted, and acres of Meade Peak Shale disturbed. Alternative 7 (Crow Creek/Wells Canyon Access) would have the most culverts (4) in perennial streams (culverts are already in place in these locations). The Panel G West Haul/Access and Transportation Alternative 5 (Alternate West Haul/Access) would each have two such culverts. Transportation Alternatives 2 and 3 (East and Modified East) would each have one culvert in a perennial stream, and all the other alternatives would avoid any such culverts. The Panel G West Haul/Access Road and Transportation Alternatives 5 (Alt. West Haul/Access) and 8 (Middle Access) may each impact two springs. One spring may be impacted by each of Transportation Alternatives 2 (East Haul/Access), 3 (Mod. East Haul/Access), and 4 (Middle Haul/Access). All the other road alternatives would avoid impacting any springs. Road disturbance of Meade Peak Shale could increase selenium concentration of runoff from the roads. The Panel G West Haul/Access road and Transportation Alternatives 4 (Middle Haul/Access) and 5 (Alt. West Haul/Access) would each disturb 10 acres of Meade Peak Shale; 9 acres would be disturbed for Transportation Alternative 8 (Middle Access), 3 acres for Transportation Alternatives 2 and 3 (East and Mod. East Haul/Access), 2 acres for Transportation Alternative 6 (conveyor), 1 acre for Transportation Alternative 7 (Wells Canyon Access), and none for the Proposed Action Panel F and Transportation Alternative 1 Panel F Haul/Access roads.

Assuming that the environmental protection measures called for in Chapter 2 are effective in reducing overburden seeps and eliminating surface exposure of selenium-bearing materials that runoff can contact, related impacts from the proposed mining on surface water quality should be negligible. However, there remains the mechanism whereby infiltrated precipitation percolates through overburden, picks up selenium and other COPCs, and is eventually discharged as groundwater contributing to area streams. Using selenium concentrations calculated by the groundwater modeling, concentrations of selenium in Project Area streams downstream of the groundwater discharge locations were calculated. These indicated that the State surface water standard for selenium (0.005 mg/L) would be exceeded year-round in lower Deer Creek, lower South Fork Sage Creek, and lower Sage Creek (downstream of South Fork Sage Creek) for the Proposed Action and Mining Alternatives A, B, and C. Selenium concentrations in Crow Creek below Deer Creek and above Sage Creek would be below State standards at all times. Crow Creek downstream of Sage Creek would be at the standard in the winter and slightly above (0.006 mg/L) the surface water standard in the summer. For Mining Alternative D, selenium concentrations would be just below the State surface water standard in all streams except for lower Sage Creek, where selenium concentrations are currently elevated due to discharges attributed to the Smoky Canyon Mine. As indicated in the groundwater modeling results, the peak selenium concentration in South Fork Sage Creek would occur about 100 years or more after mining begins. It is assumed that current elevated concentrations of selenium in Hoopes Spring and lower Sage Creek would be mitigated by then so all reaches of stream affected by Mining Alternative D would have selenium concentrations less than 0.005 mg/L.

Soils

Soil within the disturbance footprint of the Proposed Action would gradually be removed during project development, stockpiled as needed, and eventually re-applied to reclaimed areas. Some soil would be lost during salvage operations and through erosion of re-applied soil. Soil productivity would be affected by physical disturbance, compaction, and mixing of soil and slash. The calculated soil erosion rate from re-applied soil for initial reclamation conditions (first 3 years) is 0.78 tons/acre/year and 0.17 tons/acre/year or less thereafter.

The mining components of the Proposed Action would result in physical disturbance of up to 1,056 acres of soil of which 46 acres would not be reclaimed. Mining Alternative A could reduce the disturbance area by up to 140 acres. The initial soil disturbance for Mining Alternatives B and C would be the same as the Proposed Action although the unreclaimed areas would be reduced to 38 and 0 acres for these alternatives, respectively. Mining Alternative D would disturb an additional 137 acres while Mining Alternatives E and F would reduce disturbance by up to 28 acres.

The transportation components of the Proposed Action would result in physical disturbance of up to 284 acres of soil (67 acres, Panel F Haul/Access Road and 217 acres, Panel G West Haul/Access Road). The unreclaimed area for these roads would be 25 acres. Transportation Alternative 1 would disturb 46 acres of soil compared to the 67 acres for the Panel F Haul/Access Road. Transportation Alternatives 2 and 3 would disturb 216 and 276 acres of soil, respectively, compared to 217 acres for the Proposed Action (Panel G West Haul/Access). Transportation Alternatives 4 and 5 would disturb 192 and 226 acres, respectively, and result in unreclaimed areas of 34 and 28 acres, respectively. Transportation Alternative 6 combined with either Transportation Alternative 7 or 8 would disturb 175 and 160 acres of soil, respectively, compared to 217 acres for the Proposed Action.

Vegetation

All vegetation would be removed from the 1,340 acres disturbed by the Proposed Action. This would include 558 acres of aspen, 153 acres of aspen/conifer, 23 acres of Douglas-fir, 16 acres of Mt. Snowberry/sagebrush, 82 acres of sagebrush, 487 acres of subalpine fir, 18 acres of forbs, and 3 acres of riparian shrub/wet meadows. There would be no impacts to any Threatened, Endangered, Proposed, or Candidate plant species. All but 46 acres of this disturbed area would be reclaimed and revegetated with a grass and forb seed mix prescribed by the CNF (**Table 2.4-4**). Most species used for revegetation are similar to those now existing in the area, although upon regeneration the exact composition of reclaimed vegetation communities would be different as they follow a unique succession process. Native and short-lived introduced grasses and forbs would be planted throughout reclaimed areas initially, and then other native forbs, shrubs, and trees would be seeded or planted in clusters where they are most likely to establish. Over the long term, forest and mountain brush species may also encroach naturally into reclaimed areas from undisturbed sites adjacent to the mine.

Indirect impacts to vegetation may occur via competition with noxious weeds, particularly for invasive plants located on top of temporarily uncovered waste overburden sites. Environmental protection measures (**Section 2.5.4**) have been designed to minimize the potential for these impacts.

Capping all areas of seleniferous overburden with at least 4 feet of chert and 1 to 3 feet of topsoil would minimize the potential selenium accumulation for reclamation vegetation.

The mining components of the Proposed Action would result in removal of 1,056 acres of vegetation. Mining Alternative A would reduce this by up to 140 acres. The vegetation disturbance for Mining Alternatives B and C would be the same as the Proposed Action. Mining Alternative D would disturb an additional 137 acres, while Mining Alternatives E and F would reduce vegetation disturbance by up to 28 acres.

The transportation components of the Proposed Action would result in physical disturbance of up to 284 acres of vegetation (67 acres for Panel F Haul/Access Road and 217 acres for Panel G West Haul/Access Road). Transportation Alternative 1 would disturb 46 acres of vegetation compared to the 67 acres for the Panel F Haul/Access Road. Transportation Alternatives 2 and 3 would disturb 216 and 276 acres of vegetation, respectively, compared to 217 for the Proposed Action (Panel G West Haul/Access). Transportation Alternatives 4 and 5 would disturb 192 and 226 acres of vegetation, respectively. Transportation Alternative 6 combined with either Transportation Alternative 7 or Alternative 8 would disturb 175 and 160 acres of vegetation, respectively, compared to 217 acres for the Proposed Action.

Wetlands

Disturbance to wetlands and stream channels considered to be Waters of the U.S. that occur as a result of mine panel development would be a permanent impact. Disturbance that results from road construction would be reclaimed at the completion of mining except for that part of the Panel G West Haul/Access Road that would be left in place at the request of the CNF. Jurisdictional channels and wetlands affected by temporary impacts that can be reclaimed would be restored to their approximate pre-construction conditions as mining or use of affected areas is completed. Any waters and wetlands that would be permanently impacted would be mitigated on- or off-site. The type and amount of mitigation required would be determined in consultation with the Corps of Engineers. Indirect impacts to wetlands could include increased metal and sediment loading in surface waters and/or changes in water quality/quantity in both surface waters and groundwater supporting Waters of the U.S.

The mining components of the Proposed Action would disturb 0.99 acres of wetlands and 11,600 linear feet of Waters of the U.S. Mining Alternative A would reduce this by 0.56 acres and 1,100 feet. The wetland and channels disturbance for Mining Alternatives B and C would be the same as the Proposed Action. Mining Alternative D would disturb an additional 0.41 acres of wetland and 870 feet more of Waters of the U.S. Mining Alternatives E and F would have the same impacts to wetlands and Waters of the U.S. as the Proposed Action.

The transportation components of the Proposed Action would disturb 1.57 acres of wetlands (0.14 acres for Panel F and 1.43 acres for Panel G haul/access roads) and 770 linear feet of Waters of the U.S (230 feet for Panel F and 540 feet for Panel G). Transportation Alternative 1 would have the same impacts as the Proposed Action Panel F Haul/Access Road. Transportation Alternatives 2 and 3 would disturb 0.62 and 0.67 acres of wetlands, respectively. They would also disturb 300 and 390 feet of Waters of the U.S., respectively. Transportation Alternative 4 would disturb 0.07 acres of wetlands and 1,200 feet of Waters of the U.S., while Transportation Alternative 5 would disturb 1.43 acres and 490 feet. Transportation Alternative 6 would not impact any wetlands or Waters of the U.S. but would need to be combined with either

Transportation Alternative 7 or 8, which would disturb 20 and 0.62 acres of wetland, and 162 feet and 940 feet of Waters of the U.S., respectively.

Wildlife

The Proposed Action would disturb 1,340 acres in a variety of habitats that are currently utilized by wildlife. Acres of habitat lost would occur gradually as the mining progresses, and the remaining, undisturbed parts of the Study Area (20,462 total acres) would continue to provide habitat, cover, and movement routes for wildlife during the Project. In all, Proposed Action disturbances would remove 10 percent of the forest habitat (8 percent of the aspen, 10 percent of the aspen/conifer, 5 percent of the Douglas-fir, 16 percent of the subalpine fir), 1 percent of the sagebrush habitat, and less than 0.2 percent of the riparian/wet meadow habitat within the Study Area over the course of the Proposed Action. Disturbances in relatively mature habitats (i.e., conifer and aspen forest, mixed forest/brush, and shrub communities) would constitute long-term habitat losses, as forests in particular would not be expected to begin re-establishing for at least 50-100 years. Older stands would not return to their former state (mature, mid- to late-seral trees, snags, and downed dead wood) for at least 150-200 years.

In general, big game species (mule deer, elk, and moose) roam through most of the Study Area year-round. Direct impacts to big game and amphibian individuals may occur by collisions with mine traffic on Project roads. No critical winter range habitat for mule deer, elk, or moose occurs in the Study Area. The Proposed Action would remove 225 acres of vegetation within an 18,230-acre *non*-critical big game winter range area that intersects the Study Area. Corridors of undisturbed habitat within the Study Area would provide routes for big game individuals to circumvent Project disturbances. The Proposed Action would eliminate a maximum of 1,340 acres of habitat for predators over the course of the Project, leaving 93 percent of the habitat within the Study Area undisturbed. Noise and increased human presence would cause minor, short-term impacts to predator individuals forced to alter their normal movement patterns. Prey availability and foraging would be reduced for the short-term by the loss of habitat and loss of prey individuals during ground-clearing activities. Most raptor species found in the Study Area rely on undisturbed, mature forest stands for nesting. Ten percent of the forest habitat in the Study Area would be eliminated for the long-term; mature stands (containing snags suitable for nesting) may not regenerate for 150-200 years. The Proposed Action would affect amphibians by eliminating 2.8 acres of riparian/wetland habitat for the long-term. Ground clearing activities would cause direct impacts (injury, mortality, or displacement) to any amphibians or reptiles in these areas. Montane habitat for the only known population of boreal toads on the Montpelier Ranger District would be fragmented by the Proposed Action Panel G Haul/Access road, and Alternative 4.

The Proposed Action would affect migratory birds, including Neotropical land birds, by eliminating 644 acres within Priority A habitats identified in the Coordinated Implementation Plan for Bird Conservation in Idaho (IWJV 2005). The habitat area avoided by some migratory birds may be larger than the area of disturbance if Project-related noise makes adjacent areas unattractive for nesting.

Adverse impacts of selenium accumulation in vegetation on reclaimed Panels F and G would be unlikely, as the Proposed Action includes Project design features intended to reduce the potential for selenium uptake in reclamation vegetation on overburden disposal areas. Impacts to amphibians from selenium accumulation could occur from increased selenium concentrations in surface water, although limited information exists about the effects of selenium in amphibians.

Impacts to Threatened, Endangered, Proposed, Candidate, and Sensitive (TEPCS) wildlife species were evaluated. For federally listed species, impact determinations concluded that implementation of the Proposed Action would produce negligible to minor impacts to the gray wolf, Canada lynx, and the bald eagle. Regarding CNF sensitive wildlife species, impacts to suitable nesting, denning, and/or foraging habitat would occur for the wolverine, flammulated owl, three-toed woodpecker, great gray owl, greater sage-grouse, and northern goshawk under the Proposed Action. For all the sensitive species evaluated that potentially could be impacted by the proposed operations, it was concluded that the impacts of the Proposed Action and alternatives would generally be minor to moderate.

Mining Alternatives A, D, E, and F have different disturbance footprints than the Proposed Action, and therefore affect different amounts of wildlife habitat. The Alternative A south Lease Modification, Alternative A north Lease Modification, E, and F would create less disturbance (138, 2, 28, and 28 acres, respectively), while Alternative D would create more (137 acres). Most changes under the mining alternatives would result in increased or decreased disturbance in aspen habitat and, consequently, would disproportionately affect the wildlife associated with these areas (e.g., bats, raptors, woodpeckers, sharp-tailed grouse in winter, etc.). In general, impacts to wildlife would be fewer under the alternatives where less habitat disturbance occurs. However, no appreciable increases or decreases (over 5 percent) in habitat disturbance would occur under any mining alternative.

In general, Transportation Alternatives 1 through 8 would result in decreased disturbance in subalpine fir habitat and increased disturbance within aspen, sagebrush, and mountain shrub habitats. Except under Transportation Alternative 3 (mountain mahogany habitat), no changes in habitat disturbance under the transportation alternatives represent appreciable differences (>5 percent) relative to the undisturbed habitat in the Study Area. Compliance with RFP Standards and Guidelines would not change under any Transportation Alternative relative to the Proposed Action, with the possible exception of Transportation Alternative 7 (bald eagle). Fragmentation impacts to big game and amphibian populations would differ among transportation alternatives.

Fisheries and Aquatics

The Proposed Action would directly disturb 475 feet of perennial stream channel, 21,030 feet of intermittent drainage channel, and 65 acres of aquatic influence zones (AIZs) in the Study Area. Aquatic habitat losses would occur gradually. The Proposed Action would directly disturb less than 0.5 percent of the perennial stream channels, 8 percent of the intermittent drainage channels, and 5 percent of the AIZs in the Study Area. The amount of indirect disturbance, by increased sediment levels in stream substrate, is likely to be greater.

Culvert construction across perennial streams would be designed to maintain natural flows for the passage of adult fish. The Project would not violate the RFP standard requiring the maintenance of instream flows. After mining, culverts and road fills would be removed, intermittent stream channels would be restored, and AIZs would be reshaped and reseeded. The displacement and erosion of sediment during culvert installation would create pulses of turbidity immediately downstream of the culvert and increase substrate sedimentation. Suspended sediment and substrate sedimentation would diminish the suitability of Study Area streams as habitat for Yellowstone cutthroat trout (YCT), other fish, and other aquatic organisms. However, major additional sedimentation into Project Area streams is not expected due to environmental protection measures, BMPs, and Project design features. These measures are also designed to prevent the introduction of selenium in sediment and surface runoff from mining disturbances.

Aquatic habitat losses under Mining Alternative A would be reduced if both components (North and South Lease Modifications) of Alternative A were adopted. Approximately 17,860 feet of intermittent drainage channel and 40.4 acres of AIZs would be directly disturbed. Mining Alternatives B and C would directly disturb the same amount of stream channel and acres of AIZs as the Proposed Action. Mining Alternative D would directly disturb 22,919 feet of intermittent drainage channel and 55.6 acres of AIZs where Dinwoody borrow pits and stockpiles would be located. Mining Alternatives E and F would result in 18,311 feet of intermittent drainage channel disturbance and 45.3 acres of direct AIZ disturbance in the Deer Creek drainage, assuming the direct power line (under the Proposed Action) were to disturb the entire 50 foot by 4.5 mile-long corridor.

According to groundwater modeling, the Proposed Action and Mining Alternatives A through C would result in the IDEQ cold water aquatic criterion for selenium (0.005 mg/L) being exceeded in lower Deer Creek, South Fork Sage Creek, Sage Creek, and Crow Creek downstream of Sage Creek. Increases in selenium concentration in Study Area streams, due to discharges of groundwater carrying selenium from the mine areas, would increase the risk for selenium accumulation in native fishes. Mining Alternative D would lower selenium concentrations such that they would equal or be below the cold-water aquatic criterion for selenium (0.005 mg/L) at the mouth of Deer Creek, the mouth of South Fork Sage Creek, and Crow Creek downstream of Sage Creek. Even though these are lower than the Proposed Action and Mining Alternatives A through C, they would add some selenium burden to what now occurs in the lower reaches of Sage Creek.

New direct disturbances resulting from construction of the Panel F Haul/Access Road would total approximately 230 feet of intermittent drainage channel and 0.7 acre of AIZs in the South Fork Sage Creek drainage. New direct disturbances resulting from construction of the Panel G West Haul/Access Road would total approximately 475 feet of perennial stream channel, 450 feet of intermittent drainage channel, and 15 acres of AIZs in the Deer Creek and South Fork Deer Creek drainages.

Relative to Proposed Action haul/access roads, the transportation alternatives would result in additional disturbances within intermittent drainage channels, reductions in disturbances within perennial stream channels, and reductions in disturbances within AIZs in the Study Area. Compared to the Proposed Action, most transportation alternatives would reduce the risk of direct impacts to cutthroat trout and other native fishes. Most transportation alternatives would also decrease the risk of sedimentation into Study Area streams relative to the Proposed Action west haul roads. The direct effects that would occur to drainage channels in the Project Area from the various transportation alternatives are described as follows. Alternative 1 would result in disturbance of 672 feet of intermittent channel (two additional crossings) and 1.7 acres of AIZ disturbance in the South Fork Sage Creek drainage. Alternative 2 would require 2,684 feet of intermittent channel disturbance, 290 feet of perennial stream channel disturbance, and 4.7 acres of AIZ disturbance. Alternative 3 would require 2,851 feet of intermittent channel disturbance, 275 feet of perennial stream channel disturbance, and 10.1 acres of AIZ disturbance. Alternative 4 would result in 3,613 feet of intermittent channel disturbance and 9.2 acres of AIZ disturbance. Alternative 5 would result in similar impacts to stream channels and AIZs as the Proposed Action. Alternative 6 alone would result in 1,682 feet of intermittent channel disturbance, no perennial stream channel disturbance, and 6.2 acres of disturbance in

AIZs. Alternative 7 would result in 883 feet of disturbance in intermittent channels, 2,086 feet of disturbance in perennial stream channels, and 11 acres of disturbance in AIZs. Alternative 8 would result in 2,702 feet of intermittent channel disturbance and 9.7 acres of AIZ disturbance.

Indirect effects to fisheries from the Proposed Action and action alternatives include temporary changes in water flow downstream from the mine panels due to disturbed area controls on runoff and sediment, increases in selenium concentrations in streams down gradient of the mine panels through discharge of groundwater from under the mine panels, and changes to stream substrate sediment conditions downstream from the Project Area.

Selenium contamination of Hoopes Spring and Sage Creek downstream from this groundwater discharge would be cumulative with the selenium contributions from the Proposed Action and mining alternatives. Existing contamination conditions at Hoopes Spring are expected to be mitigated in the future through remedial activities taken in response to current AOC site investigations at the Smoky Canyon Mine under the supervision of the regulatory agencies.

Concerning special status species, impacts to YCT are expected from changes in stream conditions such as: culverts, increased suspended and substrate sediment, and selenium concentrations.

Livestock Grazing

Where mining and associated disturbances are proposed on land that is currently considered suitable for livestock grazing, the land would be unsuitable for grazing during the time period associated with mining and a minimum of 3 years after reclamation is completed. The grazing allotments that would be impacted by the Proposed Action and Alternatives include: Sage Valley (136), Green Mountain (144), Manning Creek (148), Deer Creek (153), and Wells Canyon (165). The Proposed Action would eventually impact 1,340 acres of grazing allotments and up to 20 separate springs, which could be grazing water sources. The CNF Revised Forest Plan (RFP) (USFS 2003a) requires that operations replace any surface water sources that are lost due to their mining activities. Implemented selenium management strategies are expected to control selenium releases to vegetation so it will be suitable for unrestricted grazing after a minimum of 3 years. For these reasons, the predicted, temporary loss of suitable acres for grazing would be confined to the disturbed area footprints. Once disturbed areas associated with mining have been reclaimed and their rangeland capability restored, they would again be suitable for livestock grazing.

The mining components of the Proposed Action would result in removal of 1,056 acres of grazing area and impact up to 20 springs within the grazing allotments. Mining Alternative A would reduce this by 142 acres and reduce the number of impacted springs by 4. The surface disturbance for Mining Alternatives B and C would be the same as the Proposed Action. Mining Alternative D would disturb an additional 137 acres, while Mining Alternatives E and F would reduce allotment disturbance by up to 28 acres. Access across the mine panel disturbances for livestock would be limited during active mining operations and would gradually be restored as areas are reclaimed.

The transportation components of the Proposed Action would result in physical disturbance of up to 284 acres of allotments (67 acres for Panel F Haul/Access Road and 217 acres for Panel G West Haul/Access Road). Transportation Alternative 1 would disturb 46 acres compared to the 67 acres for the Panel F Haul/Access Road. Transportation Alternatives 2 and 3 would disturb 216 and 276 acres of allotments, respectively, compared to 217 for the Proposed Action (Panel G West Haul/Access). Transportation Alternatives 4 and 5 would disturb 192 and 226 acres of allotments, respectively. Transportation Alternative 6 combined with either Transportation Alternatives 7 or 8 would disturb 175 and 159 acres, respectively, compared to 217 acres for the Proposed Action.

The transportation alternatives would each affect movement of livestock within the allotments differently (**Figure 3.9-1**). Simplot would not fence or restrict livestock from crossing haul/access roads, but livestock may be encumbered from free access throughout the allotments by the haul/access roads. The Panel F Haul/Access Road and Transportation Alternative 1 would reduce livestock access in the Manning Creek Allotment to the very northeast section of that allotment and restrict access in the Sage Valley Allotment to an area on its west side. The Proposed Action Panel G West Haul/Access Road and Transportation Alternative 5 would reduce access to the west side of the Manning Creek Allotment from the Diamond Creek Road (FR 1102) and reduce access approximately through the middle of the allotment. Transportation Alternatives 2 and 3 would reduce access into the Manning Creek Allotment and a State section from their east sides. Transportation Alternatives 4 and 8 would bisect the west part of the Deer Creek Allotment. Transportation Alternative 6 would be a greater barrier to east-west movement of livestock within the Deer Creek and Manning Creek allotments than the haul/access roads because it would physically block livestock from crossing, except in isolated locations where there was sufficient clearance between the bottom of the conveyor and the ground.

Recreation and Land Use

The area disturbed in the proposed mine development would be temporarily lost to recreation access. Non-motorized access across mine panels and roads would be allowed unless mining operations present a safety risk for public access at the specific access site. No developed campgrounds or recreation areas would be affected by the Proposed Action or Alternatives. Impacts to dispersed recreation from the Proposed Action would be localized and last for the duration of mining and reclamation activities, after which recreational access would be restored.

The management of the CNF in the area would be affected by the conversion of the Project Area to mining. The big game, range, and timber management practices currently in place for the areas to be mined would generally no longer apply, at least for the duration of mining and reclamation. The CNF area utilized for phosphate mining would increase. Visitors to the CNF would locally see and hear increased activity including vehicles, mining equipment, and buildings. Pits and overburden disposal sites would be noticeable from nearby forest roads or trails during mining.

The areas of temporary restriction for recreation and changed land use for the Proposed Action and Alternatives are the same as described above for the total disturbed areas (see Geology above). In addition to the acres of disturbance, the proposed mining and transportation disturbances would cut or disturb existing Forest Trails including numbers: 092, 093, 102, 402, 403, and 404 (**Figure 3.10-1**). Forest Routes 117 and 740 would be shortened by haul/access roads for the duration of mining and reclamation. Access along Forest Route 146 (Wells Canyon Road) would be controlled at intersections with haul/access roads but not cut off. Eventual relocation of parts of Forest Routes 146 and 1102 (Diamond Creek Road) onto the reclaimed Panel G West Haul/Access Road would change access to adjacent forest areas compared to the existing roads.

Except for where the conveyor crosses Deer Creek and South Fork Sage Creek, Transportation Alternative 6 would impact recreation and grazing land uses along the conveyor corridor by blocking pedestrian, equestrian, and livestock access from the east side of the CNF toward the west in this area. On a larger geographic scale, the conveyor would produce a moderate impact to recreation and grazing land use in the area west of the conveyor, which could still be accessed from other existing trails west of the mine panels. The duration of these effects would be for the length of operation of the conveyor.

Inventoried Roadless Areas (IRAs)

The mining activities and associated haul/access road construction from the Proposed Action would disturb approximately 1,040 acres in the Sage Creek Roadless Area (SCRA) and approximately 60 acres in the Meade Peak Roadless Area (MPRA). On May 13, 2005, a Notice of Final Rule was published, which released the current roadless area management regulations for inventoried National Forest System Lands. IRAs are managed according to the provisions identified in the RFP (USFS 2003b). The majority of proposed disturbance would be reclaimed following mining activities. However, approximately 71 acres of the Proposed Action disturbance (mining and haul/access road areas) would not be reclaimed, leaving permanent indications of past mining activities in the IRAs.

Many of the Roadless Attributes are also resources that have been described in this EIS in separate sections regardless of whether the resource is located within an IRA. These include: soil, air, water, plant diversity, animal communities, wildlife and fish, TES, recreation, traditional cultural properties, and special use authorizations. For the SCRA, the Deer Creek watershed has not been impacted by mining and could be used as a unique aquatic reference (i.e. control comparison watershed at landscape level) (USFS 2003a). The Proposed Action would result in impacts to the aquatic areas within the Deer Creek watershed as described and addressed in **Sections 4.3 and 4.8**; thus, impacts to a potential "Reference Landscape" within the SCRA would occur. These impacts would add to the impacts from roads, timber harvest, and grazing and could potentially eliminate the desire to use the Deer Creek watershed as a unique aquatic reference site if the Proposed Action was implemented. The SCRA has a low scenic integrity rating due to the level of developments such as timber harvest units, roads, and electronic sites (USFS 2003a). The scenic integrity rating for the SCRA would remain low following mining activities. In regards to the MPRA, mining activities should not be visible within identified high scenic integrity areas (i.e. adjacent to Highway 30, the City of Georgetown, and Crow Creek Road); thus, this roadless attribute for this IRA should not be affected by the Proposed Action. The Proposed Action disturbances would be visible to Forest visitors on the Wells Canyon Road and high-elevation viewpoints from Meade Peak and the Snowdrift Mountain Trail.

In regard to the wilderness attributes for the SCRA and the MPRA, mining activities associated with the Proposed Action could change the current wilderness attribute ratings. The SCRA and the MPRA have been rated as low and moderate, respectively, for Natural Integrity/Apparent Naturalness. The rating for the SCRA would remain low following any mining activities. The rating for the MPRA would remain moderate because the Project would affect less than 1 percent of the area and is confined to the northern edge. The current opportunities for Solitude within the SCRA and the MPRA are not anticipated to change as a result of the Proposed Action. The opportunity for primitive recreation in the SCRA is rated as moderate because of the small area size, road corridors projecting into the area, moderate topographic and vegetative screening, and because limited facilities are present (USFS 2003a). The current rating for this attribute within the SCRA could remain unchanged or be reduced to low as additional mining activities would impact approximately 8 percent of the IRA's small size. The MPRA is rated as moderate; however, the approximately 60 acres that would be disturbed occur at the extreme northern portion of the MPRA. Thus, the proposed disturbance acreage and the specific location of the proposed disturbance are not expected to change the current rating for this attribute within the MPRA. The Proposed Action is not expected to change the current rating for Challenging Experience within the IRAs. No impacts to any Special Features/Special Places/Special Values from the Project within the SCRA and the MPRA are anticipated. No issues or impacts related to the Wilderness Manageability/Boundaries from implementation of the Proposed Action are anticipated.

Although the overall impacts to the current roadless and wilderness attributes from each transportation alternative are unlikely to change from what was described for the Proposed Action, the amount of proposed disturbance to IRAs does differ by transportation alternative and is displayed in **Table 4.11-2**. An increase or decrease in the acres of actual new surface disturbance within the IRAs would occur under each alternative. This change in disturbance acreage has been addressed for each transportation alternative throughout this EIS in the various resource sections, and many of the resultant impacts would be applicable as they relate to the roadless and wilderness attributes previously addressed under the Proposed Action.

Visual and Aesthetic Resources

The landscape in the Project Area would be permanently altered by the development of lands for mining and transportation under any of the action alternatives. The initial mining-related developments would cause major and dramatic changes to the local landscape; however, this landscape is generally not within view of property owners along Crow Creek Road. Users of the Wells Canyon Road (FR 146) would have close-up views of the Panel G mine operations. Forest visitors on the Diamond Creek Road (FR 1102) would also have views from numerous observation points of the Panel G West Haul/Access Road. Recreational visitors using Forest Trails 092, 093, 102, 402, 403, and 404 and Forest Routes 179 and 740 would also have views of different parts of the proposed mine development.

According to Seen/Unseen representations provided in **Section 3.12**, certain portions of the Proposed Action and Alternatives have been determined to be visible from view points to the east of the Project. These include views of the top of Panel G and portions of the Wells Canyon Access Road (Transportation Alternative 7) and Transportation Alternatives 2 and 3 from south of Stewart Ranch (**Figure 3.12-2**). None of the elements of the Proposed Action or Alternatives would be visible from the Stewart Ranch buildings. Portions of Transportation Alternatives 2 and 3 in Nate Canyon would be visible from the Crow Creek Road between Stewart Ranch and the Mouth of Deer Creek (**Figures 3.12-4, 3.12-6,** and **3.12-7**). A small portion of Transportation Alternatives 2 and 3 would be visible from the Osprey Ranch (**Figure 3.12-5**). Views of almost all components of the Proposed Action and Alternatives would be possible from a remote, high elevation point east of Crow Creek Valley (**Figure 3.12-8**). The Project would also be visible from high elevation viewpoints on Meade Peak and the Snow Drift Mountain Trail.

The acres of initial and unreclaimed disturbance for the Proposed Action and Alternatives for visual impacts are the same as were described above (see Geology).

VQO's of Modification and Partial Retention would not be met in the Project Area. Scenic integrity would be low in those areas developed for mining, as deviations begin to dominate the landscape view. The mine operation and reclamation plan would mitigate visual changes to the degree that reclamation methods and economics allow. Although VQO's would not be met, the efforts made to mitigate landscape impacts and reclaim mined areas provide compliance with the CNF RFP (USFS 2003b:Vol.II p. 4-9 Final EIS for the CNF RFP).

Cultural Resources

The area proposed for development under the Proposed Action and all alternatives was inventoried for cultural resources. The Proposed Action and alternatives would disturb two inventoried arborglyph sites that have not been evaluated for eligibility for the National Register of Historic Places (NRHP). One of these NRHP unevaluated sites (CB-317) is located within the area of the Proposed Action Panel G West Haul/Access Road and Transportation Alternative 5. The other site (CB-342) is located within the corridor of Transportation Alternatives 2 and 3 and the Wells Canyon access road portion of Transportation Alternative 7. These two unevaluated ("insufficient information to evaluate") cultural resource sites would require additional study/testing prior to implementation of the Project if the chosen alternatives would impact them. These mitigation measures would not only provide the needed data to evaluate the sites for the NRHP, but would also mitigate the adverse impacts if the sites were deemed eligible.

There is a NRHP eligible historic cabin (10CU213 or Forest # CB-222) near the Proposed Action Panel G West Haul/Access Road corridor (also part of Transportation Alternative 5). This portion of the road would not be fully reclaimed after mining; rather it would become a public access road, replacing the current segment of FR 146. An improved public access road could encourage additional casual visitation to the general area, increasing the potential for secondary impacts (such as vandalism) to the cabin site that would be visible from the road.

These cultural resource sites contribute to the heritage values of livestock ranching in the Project Area. The Proposed Action would disturb 1,340 acres within grazing allotments and restrict livestock trailing corridors during mining and reclamation of the Project. In addition, it would remove ½ mile of Trail 402 utilized for trailing livestock onto the Deer and Manning Creek Allotments.

Native American Concerns and Treaty Rights Resources

The Proposed Action and Alternatives would affect certain environmental resources within the Project Area that are the subject of Shoshone-Bannock tribal treaty rights. There would be temporary impacts to the access of those resources. None of the action alternatives would change the status of federal lands on the CNF. There would be no impacts to tribal sacred or historic/archaeological sites from the Proposed Action and Alternatives. The Tribes have stated that there are traditional use sites in the Project Area. Those that may occur within an area of proposed disturbance would be affected.

The initial mining disturbance area would constitute a temporary and minor impact to Tribal access of vegetation, wildlife, and other traditional surface resources in the Project Area. As mining progresses and reclamation is maintained concurrent with mining, areas of limited access would always be less than 1,340 acres. The areas of initial disturbance for the Proposed Action and Alternatives (see Geology above) would also be the areas of Tribal access that are affected. After reclamation, Tribal access would be restored as vegetation would be replanted, wildlife would return, and water should be usable. Unreclaimed areas for the

Proposed Action and Alternatives as described above (see Geology) would constitute a local, long-term impact to Tribal access of traditional surface resources in this part of the Project Area.

Transportation

Public motorized access across or along the haul/access roads would not be allowed in the Proposed Action and transportation alternatives, except for the proposed crossings of the Wells Canyon Road (FR 146) as part of the proposed Panel G West Haul/Access Road. Non-motorized (pedestrian, bike, or horseback) public access across the mine access/haul roads would be allowed for the proposed haul/access roads of the Proposed Action and transportation alternatives. Non-motorized (pedestrian, bike, or horseback), public access along the mine access/haul roads would be discouraged for any future haul/access roads due to public safety concerns.

Impacts to public transportation routes would be localized to where existing roads would be physically affected by the proposed mining and transportation facilities. Most of these impacts would have durations equal to the mining operations themselves because reclamation of the mining and transportation facilities would restore the previous public access conditions. In some cases, permanent changes or improvements in the existing public access routes would be made during the proposed mining operations.

There would be no increase in the total volume of traffic to the Smoky Canyon Mine from offsite due to the Proposed Action and all alternatives except Mining Alternative F (generators). If Mining Alternative F were selected, the additional fuel consumption would require an additional 50 fuel deliveries per year along the selected access route to Panel G.

For the Proposed Action and Transportation Alternatives 1 through 5 and 8, all offsite traffic access to the Smoky Canyon Mine would continue to be via existing routes to the mine entrance off the Smoky Canyon Road (FR 110). For Transportation Alternative 7 (Crow Creek/Wells Canyon Access Road), approximately 115 vehicle round trips per day for mine personnel, visitors, and vendors would be shifted from the Smoky Canyon Road and added to the existing traffic volume on these roads. Improving the access up Wells Canyon could indirectly increase traffic on the Georgetown Canyon and Diamond Creek roads (FR 1102).

The Proposed Action Panel F Haul/Access Road and Transportation Alternative 1 would cut off motorized access along the existing FR 179 about ¾ mile from its terminus. Non-motorized access across the haul/access road along FR 179 would be allowed to continue. The Proposed Action Panel G West Haul/Access Road and Transportation Alternative 5 would cross the existing Wells Canyon Road (FR 146) in two places with intersection crossings that would allow controlled, public motorized access across the haul/access road.

Transportation Alternatives 2 and 3 would cut across the upper end of FR 740 (Manning Creek Road), which is open to the public, about ¼ mile east from where an unnumbered spur road off of FR 740 ends and non-motorized Forest Trail 402 begins. Transportation Alternatives 4, 6, and 8 would not cutoff or restrict existing motorized access routes.

Social and Economic Resources

The Proposed Action, mining alternatives, and transportation alternatives would each result in continued operation of the Smoky Canyon Mine and the Don Plant. Some of the mining alternatives could shorten the mine life of the proposed mining operations and reduce royalty income to the government. The No Action Alternative would result in a cessation of mining on the two proposed leases and have socioeconomic impacts that influence Star Valley, southeast Idaho and adjacent Wyoming, and the phosphate industry.

As a result of the Proposed Action, there is no anticipated change in population or in-migration to Bannock, Caribou, or Power Counties, Idaho or Lincoln County, Wyoming. Therefore, the Proposed Action would not result in changes to the current status of community resources such as schools, housing, police and fire protection, and water and sewage services.

Property values along Crow Creek Road may be affected by the development of the mine panels due to perceived changes in the environment of the Project Area. It is beyond the scope of this EIS to predict in detail how such land values would be impacted. However, the Project would affect some of the areas' characteristics/amenities that subjectively affect property value (i.e. noise, visual, traffic); these impacts may be positive or negative and may change over time as desired property characteristics change. Under the Proposed Action, most of the expected disturbance would be two miles or more from the Crow Creek Valley area.

Under Mining Alternative A, up to about 13.7 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the mine by 2.3 years from the Proposed Action. This would shorten employment at the Smoky Canyon Mine by 2.3 years, reducing local personal income by $17.5 million and reducing federal lease royalties paid by up to 13.7 percent or $0.5 to $0.63 million.

Under Mining Alternative B, up to about 19.3 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the mine by 3.2 years from the Proposed Action. This would shorten employment at the Smoky Canyon Mine by 3.2 years which would reduce local personal income by $24.3 million and reduce federal lease royalties paid by up to 19.3 percent or $0.98 to $1.2 million.

Under Mining Alternative C, up to about 46 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the mine by 7.7 years from the Proposed Action. This would mean a loss of about $59.8 million in salaries to the Star Valley economy and would reduce federal lease royalties paid by up to 46 percent or $5.7 to $7.0 million.

Under Mining Alternative D, up to about 22 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the mine by 3.7 years from the Proposed Action. This would mean a loss of about $28.1 million in salaries to the Star Valley economy and reduce federal lease royalties paid by up to 22 percent or $1.3 to $1.6 million.

Under Mining Alternative E, the impacts would be similar to the Proposed Action.

Under Mining Alternative F, up to about 38 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the mine by 6.5 years from the

Proposed Action. This would mean a loss of about $49.4 million in salaries to the Star Valley economy and reduce federal lease royalties paid by up to 38 percent or $3.9 to $4.9 million.

Transportation Alternatives 2 and 3 would produce noise and visual impacts noticeable by land owners and visitors along the Crow Creek Road compared to the Proposed Action and the other transportation alternatives. These alternatives would also present a noticeable effect on non-motorized access into the CNF in the Project Area, although non-motorized access across these haul/access road would be allowed. All these impacts would affect the current, rural quality of life for property owners and perceived, adjacent, aesthetic qualities that are some of the resources that may subjectively affect property values along Crow Creek.

Transportation Alternative 6 would have much lower direct disturbance impacts on the surface environmental resources of the local area compared to any of the haul/access road alternatives. The conveyor would be built with low ground clearance over most of its length except where it crosses existing FS trails in Deer Creek and South Fork Sage Creek canyons. In between these trails, hikers and persons on horseback would not be able to cross the conveyor in most locations.

Transportation Alternative 7 would increase traffic on the Crow Creek Road, which could affect the development of property along that road. Road improvements and year-round access along Crow Creek Road and the Wells Canyon Road may eventually make the area more desirable to development of permanent rather than seasonal homes, and this increased access may benefit property values. Increased noise, dust, visual disturbance, and traffic would impact characteristics/amenities that may subjectively affect property values along Crow Creek Road.

Under the No Action Alternative, operations at the Smoky Canyon Mine would cease when the current mine plans are exhausted. Upon closure of the mine, employment would cease for the 214 mine employees with potential decreases in employment for vendors supplying the mine. Once any stockpiled ore or concentrate is consumed, the Don Plant could also cease operation, resulting in an additional 331 persons becoming unemployed and also cause potential effects on business and employment for vendors supplying the plant. The No Action Alternative would result in the loss of up to 545 Simplot jobs with an annual payroll of $31,863,000. In addition, Simplot employees not directly associated with the mine or Don Plant could be impacted.

The No Action Alternative would also result in reductions in the property tax paid to Caribou County and to other local taxing entities such as school districts. In addition to the 545 Simplot employees, an estimated additional 1,452 persons across a 27-county area in northeast Colorado, northern Utah, southwestern Wyoming, and southeastern Idaho could become unemployed. Estimated annual wages for these 1,452 persons are $76,792,365. The change in employment and wages in the 27-county area may not be directly observable since other fluctuations in the economy may mask the effect. The Don Plant ceasing operations would result in closure of about 30 percent of the ammonium phosphate manufacturing capacity in the western United States. While the Don Plant represents a major portion of the ammonium phosphate manufacturing capacity in the western United States, it represents 2.4 percent of nationwide capacity.

The No Action Alternative is not expected to impact land ownership patterns (private vs. public, etc.), agriculture, or agricultural economics. There would be no additional noise, traffic, or visual impacts from mining to affect characteristics that subjectively influence property values along Crow Creek. Royalty payments would cease upon mine closure under the No Action Alternative.

Environmental Justice

It has been determined that the Proposed Action and Alternatives would not cause disproportionately high and adverse effects on any minority or low-income populations as per EO 12898 regarding environmental justice.

Smoky Canyon Mine
Panels F & G Draft EIS

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Chapter 1
Introduction/Purpose & Need

1.0 Introduction

This Environmental Impact Statement (EIS) is being prepared by the Bureau of Land Management (BLM), Pocatello Field Office, and the U.S. Forest Service (USFS), Caribou-Targhee National Forest (CTNF), in response to the mine and reclamation plan submitted by the J.R. Simplot Company (Simplot) in April 2003. The Proposed Action is the mining of Panels F (Manning Creek lease) and G (Deer Creek lease) south of the existing Simplot Smoky Canyon Phosphate Mine, Caribou County, Idaho (the Project). The general location of the Project and the Study Area boundary are shown on **Figure 1.0-1.** The Study Area refers to the general area within which baseline data was collected. It encompasses the Project Area, defined as the geographic area that includes the proposed disturbance footprints of the Proposed Action and all action alternatives. Existing and proposed operation areas in relation to the Study Area are shown on **Figure 1.0-2**.

The existing Smoky Canyon mining and milling operations were authorized by a Record of Decision (ROD) issued in 1982 with the Smoky Canyon Phosphate Mine Final EIS. Mining operations began in Panel A in 1984, followed by the mining of Panel D. Mining is completed in both of these Panels. The mining of Panel E commenced in 1998. Mining at Panels B and C was authorized by a ROD as a result of a supplemental EIS in 2002.

The proposed Panels F and G mining operation would be located within the Caribou National Forest (CNF) portion of the CTNF, on federal phosphate leases administered by the BLM. Portions of the facilities and associated mining related disturbances (i.e., transportation/haul routes) would extend off lease on National Forest System (NFS) Lands and could also potentially occur on private, state, and/or BLM administered lands. Mining would take place on Federal phosphate leases I-01441 and I-27512, including a two-part lease modification to I-27512. The BLM is the lead agency for this EIS; the USFS is a joint lead agency, and the Idaho Department of Environmental Quality (IDEQ) is a cooperating agency (the Agencies).

The Agencies will use this EIS to determine whether or not the Project will be approved, which appropriate alternative and mitigation measures will be applied to the Project, and evaluate methods to reduce or eliminate release of potential contaminants from the proposed mining activities. The Agencies will review the Panels F and G Mine and Reclamation Plan to determine the adequacy of environmental protection measures and compliance with applicable rules, guidance, and agency requirements.

About This Document

This document follows regulations promulgated by the Council on Environmental Quality (CEQ) for implementing the procedural provisions of the National Environmental Policy Act (NEPA) (40 CFR 1500-1508), BLM's NEPA Handbook (H-1790-1), and the USFS Handbook of Environmental Policy and Procedures (FSH 1909.15). This EIS describes the components of and reasonable alternatives to the Proposed Action and environmental consequences of this action and the alternatives.

Chapter 1 describes the purpose of and need for the implementation of mining in Panels F & G of the Smoky Canyon Mine; roles of the BLM and USFS; public participation in the EIS process; and general Project history.

Chapter 2 provides a historical perspective of phosphate mining in the Project Area; describes existing and proposed operations; presents and compares alternatives to the Proposed Action; lists potential mitigation actions to reduce or minimize impacts, and discusses the agency-preferred alternative (in the Final EIS).

Chapter 3 describes the affected environment in the Project Area.

Chapter 4 details the potential direct and indirect impacts associated with the Proposed Action and Alternatives.

Chapter 5 describes the potential cumulative impacts associated with the Proposed Action and Alternatives.

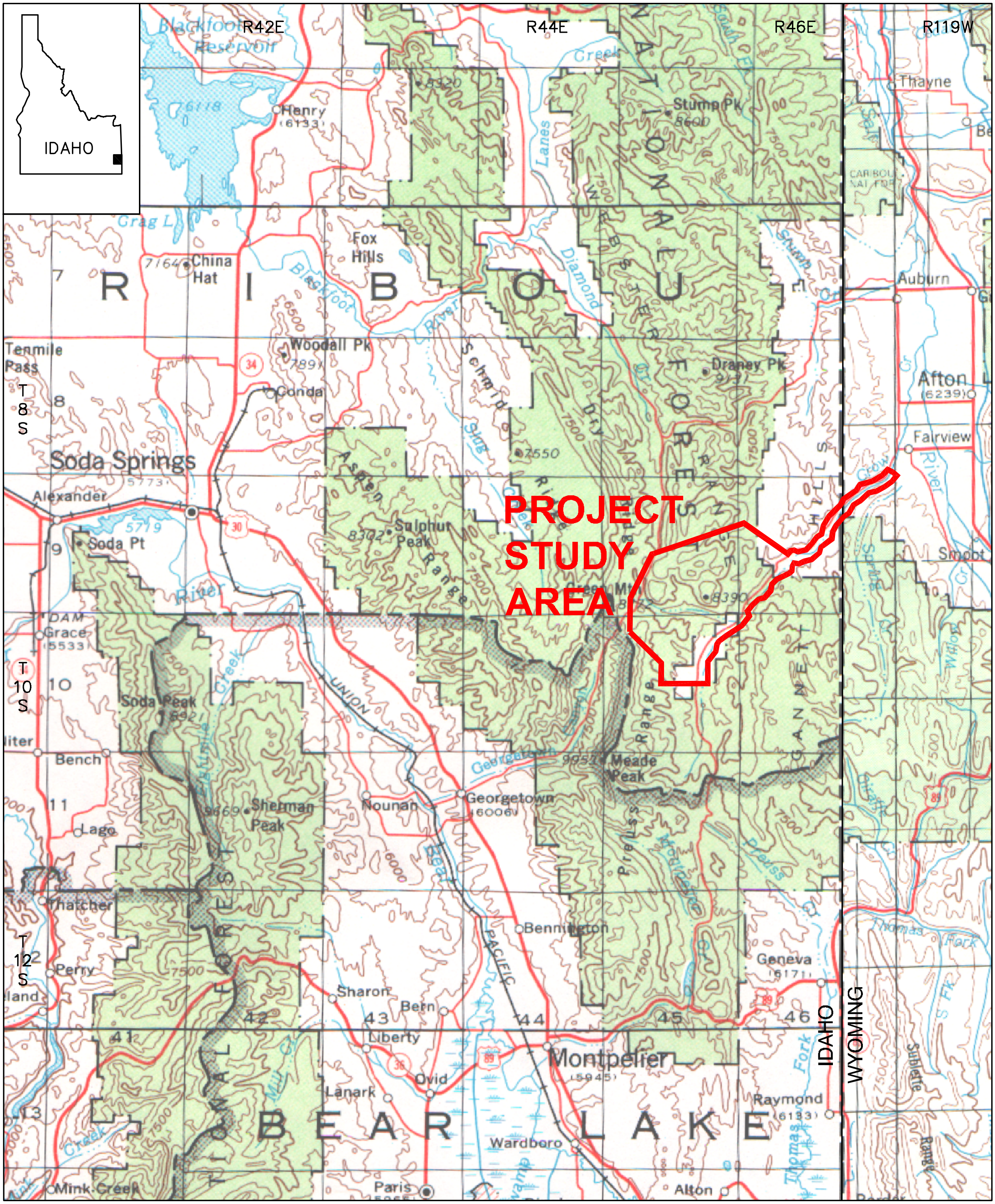
Chapter 6 describes consultation and coordination with state and federal agencies and provides a list of the EIS preparers.

Chapter 7 lists references cited in developing the EIS, as well as providing the index, acronyms, units of measure, and glossary of terms.

Chapter 8 (in the Final EIS) provides all the text of public and agency comment letters received on the Draft EIS (DEIS), and responses to those comments.

1.1 Purpose And Need

The purpose and need for the BLM and the USFS is to evaluate and respond to a mine and reclamation plan (the Proposed Action) from Simplot (2003a) that proposes the recovery of phosphate ore reserves contained within Panels F and G. The Proposed Action is needed to continue economically viable development of the phosphate resources within the federal mineral leases and to supply phosphate ore to Simplot’s fertilizer plant. The plant produces phosphate-based fertilizer to help meet demands in the United States. **Figure 1.0-2** shows existing and proposed operation areas in relation to all lease owners in the area.



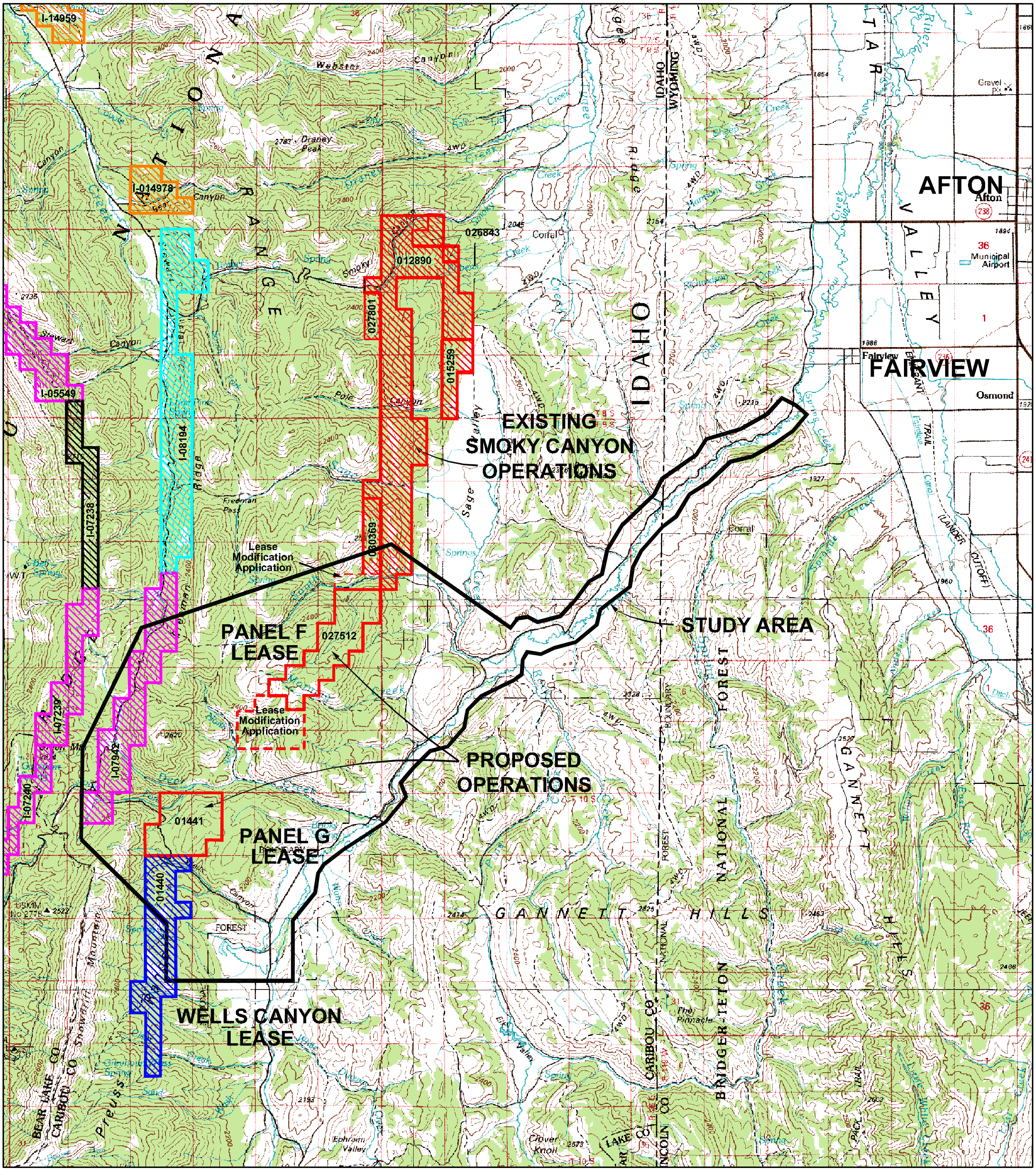
BASE FROM USGS STATE OF IDAHO AND STATE OF WYOMING 1:500,000 MAPS

N

Scale 1:126,720

0 Miles 6

Figure 1.0-1
Location Map
Smoky Canyon Mine Panels F and G



USGS 1:100,000–scale metric topographic maps of Preston and Soda Spring, Idaho and Fonteinelle and Afton, Wyoming

LEASE OWNERS

- Simplot (Proposed Panel F & G Operations)
- Simplot (Lease Modification Application)
- Simplot (Smoky Canyon Operations)
- Simplot
- P4 Productions (Monsanto Wells Canyon)
- Nu West Mining, Inc.
- Rhone-Poulenc
- Nu West Industries, Inc.

N

Scale 1:144,000

0 Feet 12,000

Figure 1.0-2
Existing and Proposed Operations
Smoky Canyon Mine Panels F and G

1.2 Authorizing Actions

The BLM Idaho State Director (Director), who is the responsible official for the EIS and all on-lease lands and lease modifications, will make a decision whether or not to approve the agency-preferred alternative and any required mitigative measures regarding this proposal. The Director will consider the following: comments and responses generated during scoping and review of the EIS; anticipated environmental and socioeconomic consequences discussed in the EIS; recommendation from the CTNF Supervisor; and applicable laws, regulations, and policies. The CTNF Forest Supervisor, who is the responsible official for Caribou-Targhee National Forest System (NFS) Lands, will provide recommendations to the BLM related to the selection of the preferred alternative and appropriate site-specific mitigative measures or other conditions of approval and will also be responsible for the issuance and approval of any Special Use Authorizations (SUAs) needed for the Project for surface disturbances located off-lease within the CTNF. Both the BLM and USFS will consider approval of an entire mine plan for both Panels F and G but can also consider a partial approval of just Panel F, or a phased approval of Panel F followed by a later approval of Panel G. The BLM will finalize and sign the Record of Decision (ROD) for the mining activity. The regulatory approvals will include approval of a site-specific Mine and Reclamation Plan and the possible issuance of phosphate lease modifications by the BLM. Section 404, Clean Water Act Permit(s), will also be required by the U.S. Army Corps of Engineers (USACE). The USACE will render decisions related to that permit and how to mitigate the impacts to affected wetlands and Waters of the United States. Enforcement of federal laws that protect Migratory Birds and Endangered Species lies with the U.S. Fish and Wildlife Service (USFWS) and not primarily with the land management agencies (USFS and BLM). The USFWS will review a Biological Assessment (BA) for listed plant and animal species prepared by the USFS for the agency-preferred alternative. The USFWS will conduct consultations with the land management agencies as they deem necessary and provide direction as required for protection of species within their regulatory authority.

The existing and proposed mining operations must comply with laws and regulations for mining on public land. In addition to the BLM and USFS, other federal, state and local agencies have jurisdiction over certain aspects of the Proposed Action and potential action alternatives. **Table 1.2-1** lists the agencies and identifies their respective authorizing responsibilities.

TABLE 1.2-1 MAJOR PERMITS, APPROVALS, AND CONSULTATIONS POTENTIALLY REQUIRED FOR THE SMOKY CANYON MINE, PANELS F & G

PERMIT OR APPROVAL NAME	NATURE OF PERMIT ACTION	APPLICABLE PROJECT COMPONENT	STATUS OF PERMIT OR APPROVAL ACTION
BLM			
Record of Decision	Compliance with National Environmental Policy Act (NEPA)	Activities affecting federal lands and resources	Required for final approval
Mine and Reclamation Plan	Compliance with 43 Code of Federal Regulations (CFR) 3590.2a, 3592.1a and the Pocatello BLM RMP	Activities affecting federal leased mineral resources	Pending after Record of Decision on the final EIS
USFS Recommendation	Under the Mineral Leasing Act, USFS makes recommendations to the BLM regarding mineral leasing activities on federal mining estates. These recommendations are not a permit	Lease modifications and Mine and Reclamation Plan approval	Recommendations issued after end of appeal period for FEIS
Lease Modification	Authorize expanding existing lease boundaries and recommendations to USFS concerning off-lease disturbances and compliance with 43 CFR 3500	Expansion of existing Federal phosphate lease 027512	Pending after Record of Decision
USFS			
Special Use Authorization	Surface disturbance on USFS-managed lands off-lease.	Disturbance of USFS land off existing BLM leases	Pending after Record of Decision
ENVIRONMENTAL PROTECTION AGENCY (EPA)			
National Pollution Discharge Elimination System (NPDES) Permit	Protects quality of surface waters from stormwater discharge under Clean Water Act	Storm Water Pollution Prevention Plan (SWPPP)	Annually Renewable SWPPP to be updated pending Record of Decision
Spill Prevention Control and Countermeasures Plan (SPCC)	Provides management direction for potential spills	Bulk petroleum products storage	In place. Updated as needed for changes in operations
US FISH AND WILDLIFE SERVICE (USFWS)			
Endangered Species Act Compliance (Section 7)	Protects threatened or endangered species	Any activity, such as displacement or habitat disturbance, potentially affecting listed or proposed threatened or endangered species	Biological Assessment (BA) will be prepared for the agency preferred alternative; consultation will take place
Migratory Bird Treaty Act	Protects migratory birds	All surface disturbing activities	Analysis to be completed
Bald Eagle Protection Act	Protects bald and golden eagles	All surface disturbing activities	Analysis to be completed in BA
US CORPS OF ENGINEERS (USACE)/JOINT APPLICATION			
Permit to Discharge Dredged or Fill Material (Section 404 Permit)	Authorized placement of fill or dredged material in Waters of the U.S. or adjacent wetlands. Clean Water Act Compliance	Disturbances of wetlands and/or Waters of the U.S.	Permits must be obtained and approved before construction
SHOSHONE-BANNOCK TRIBES			
Native American Consultation	Government-to-government consultation regarding mitigation of Project impacts on treaty rights	All ground disturbing activities or public access restrictions	On-going consultation
IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY (IDEQ)			
Air Quality Permit	Release of air pollutants in compliance with the existing Smoky Canyon Mine permit	Elements that contribute to air quality issues, such as blasting, hauling, or crushing	Required air approvals for existing property already in hand, further permit needs pending Record of Decision

PERMIT OR APPROVAL NAME	NATURE OF PERMIT ACTION	APPLICABLE PROJECT COMPONENT	STATUS OF PERMIT OR APPROVAL ACTION
IDAHO DEPARTMENT OF ENVIRONMENTAL QUALITY (IDEQ)			
401 Certification	Water quality certification for authorized placement of fill or dredged material in Waters of the U.S. or adjacent wetlands	Disturbances of wetlands and/or Waters of the U.S.	Certification must be obtained as part of the USACE permit review process
Resource Conservation and Recovery Act program (adopted federal standards)	Management of hazardous waste	Storage and off-site disposal of hazardous wastes	Exempt Small Quantity Generator Notification already completed
Board of Health & Welfare	Governs quality and safety of drinking water	Culinary water supply	No additional approval required
IDAHO DEPARTMENT OF WATER RESOURCES (IDWR)			
Stream Channel Alteration Permit(s)	Protection of perennial stream channels	Potential stream crossings	Application will be filed to seek approval before construction
IDAHO DEPARTMENT OF LANDS (IDL)			
Mine Reclamation Plan Permit	Permit for reclamation	Mining and reclamation plans	Required for mining regulated by federal agencies
Easement Across State Land	Easement for a haul/access road crossing of Section 36 T9S R45E	East and Modified East Haul/Access Road	Application will be filed to seek approval before construction
IDAHO STATE HISTORIC PRESERVATION OFFICE (ISHPO)			
Section 106 Compliance	Protects cultural and historical resources under the National Historic Preservation Act	All ground disturbing activities	ISHPO concurrence received
CARIBOU COUNTY			
Conditional Use Permit	Approval of construction of facilities within an approved land use	General facilities	No additional permit required
BUREAU OF ALCOHOL, TOBACCO, AND FIREARMS			
High explosives permit Explosives Manufacturing Permit	Possession of explosives. Mixing emulsion with ammonium nitrate in blast holes	Blasting in open pits and during construction of portions of proposed roads.	No additional approvals required

1.3 Relationship to Agency and Other Policies and Plans

1.3.1 Federal Land Management Plans

The Proposed Action has been reviewed for compliance with agency policies, plans, and programs. Two federal land management plans guide land use developments and activities in the Project Area: the BLM Pocatello Resource Area Resource Management Plan (RMP) and the USFS CNF Revised Forest Plan (RFP). The proposal is in conformance with minerals decisions in the Record of Decision, Pocatello Resource Area, Resource Management Plan (BLM 1987), approved in 1988.

Management prescriptions have been developed and are applied to specific areas of the National Forest System Lands to attain multiple-use and other goals and objectives. The Study Area **(Figure 1.0-1)** includes six management prescriptions: Prescription 2.7.2 (d) – Elk and Deer Winter Range, Prescription 2.8.3 – Aquatic Influence Zone, Prescription 5.2 (b, c, and f) – Forest Vegetation Management, Prescription 6.2 (b, e, f) – Rangeland Vegetation Management, Prescription 8.2.1 – Inactive Phosphate Leases, and Prescription 8.2.2(g) – Phosphate Mine Areas (USFS 2003a).

Almost all the Project Area is within the 8.2.1 management prescription. This management prescription area is shown on Map 11 of the RFP (USFS 2003a). It is basically a ½-mile buffer around Known Phosphate Lease Areas (KPLAs) and inactive leases that existed at the time the RFP was prepared, and it was intended to include phosphate mining operations and ancillary facilities needed for development of mines within the 8.2.1 management prescription area. This same area is also covered by other management prescriptions shown on Map 8 of the RFP. But those are the prescriptions that guide USFS management until a site-specific, phosphate mine development plan is submitted to the USFS. Then the area of the specific mine plan is intended to only be managed under prescription 8.2.2. Thus, the RFP management prescription that applies to this Proposed Action is 8.2.2, with the exception of the components of the Proposed Action that occur outside the ½-mile buffer area (i.e. haul access roads). In these areas, the appropriate prescription would be in effect.

The management prescriptions are not designed to stand alone and are part of the management direction package presented in the RFP. Where a management prescription allows an activity, such as the development of existing phosphate leases, the standards and guidelines in the prescription or in the Forest-wide direction (explained below) would provide specific parameters within which the activity must be managed. In land areas where prescriptions are applied, direction provided under each prescription would override Forest-wide direction if there were a conflict. Under Prescription 8.2.2(g) (USFS 2003a, page 4-82), site-specific mining and reclamation plans developed by the mining industry will be jointly reviewed and evaluated by the USFS, BLM, and regulatory agencies through the environmental analysis process. One of the goals of this prescription is to "Provide for phosphate resource development with consideration given to biological, physical, social, and economic resources (USFS 2003a)."

The RFP also provides Forest-wide guidance for Desired Future Conditions (DFCs) for each resource. From these DFCs, Forest-wide goals have been formulated, and, for some resources, objectives have been developed to help measure the progress in meeting these goals and achieving the DFCs. Standards and guidelines, by resource, are presented in the RFP and are used to promote the achievement of the DFCs and to assure compliance with laws, regulations, Executive Orders, or policy direction established by the USFS. Disclosure of and compliance with these Forest-wide Standards and Guidelines and the applicable prescriptions listed above are discussed within this EIS. Particular reference is made to the goals of the DFCs for minerals and geology: "1) On mined lands and other drastically disturbed lands, maintain or reestablish hydrologic function, integrity, quality, and other surface resource values within the capability of affected lands; 2) provide for mineral resource development using state-of-the-art practices for surface resource protection and reclamation, and with consideration of social and economic resources; 3) mining activities are administered to prevent the release of hazardous substances in excess of established state and/or federal standards; 4) reclamation is designed to eliminate or minimize wildlife, livestock, and/or human exposure to hazardous substances" (USFS 2003a, page 3-11). The approach for active phosphate leases in the revised Forest Plan (USFS 2003a, pages 4-82 to 4-85) is to incorporate Best Management Practices (BMPs) into the conditions of approval for site-specific mining and reclamation plans, and to allow for developments in research and technology over time to be incorporated into the prescribed practices and monitoring systems.

1.3.2 Inventoried Roadless Areas

Due to the presence of Inventoried Roadless Areas (IRAs) in the Project Area, the background status of IRA policy in the USFS and State of Idaho are described in this section.

The USFS identified IRAs nationwide as part of its 1972-1985 Roadless Area Review and Evaluation (RARE) process. All the IRAs in the nation were reviewed again by the Forest Service in 1999 under the Roadless Area Conservation Initiative (RACI), which established management requirements for IRAs. In November 2000, the USFS issued the Final EIS for the proposed Roadless Area Conservation Rule (RACR) and selected a Preferred Alternative that, with few exceptions, prohibited timber harvesting and road building in IRAs. The final RACR (36 CFR 294) was published in the *Federal Register* on January 21, 2001 and prohibited road construction, reconstruction, and cutting, sale and removal of timber, with some exceptions, for the IRAs identified in the FEIS. Several groups and states sued the USFS over the RACR, alleging there had been insufficient public involvement in the rule making. The Idaho Federal District Court issued a preliminary injunction order on May 10, 2001 prohibiting the USFS from implementing the rule. Several interveners appealed this decision to the Ninth Circuit Court of Appeals. On December 12, 2002, the Ninth Circuit Court of Appeals reversed and remanded the Idaho District Court's injunction. Plaintiffs in the Idaho cases requested the Ninth Circuit to reconsider its decision using the full 10-judge panel. The Ninth Circuit Court declined this request on April 4, 2003 and issued its mandate to the Idaho District Court to remove its preliminary injunction, thereby putting the RACR into effect. On July 14, 2003, the U.S. District Court for the District of Wyoming found the RACR to be unlawful and ordered the rule "be permanently enjoined" because of alleged violations of NEPA and the Wilderness Act. On May 11, 2004 the Tenth Circuit Court of Appeals agreed to hear the appeal of the Wyoming District Court order to permanently enjoin and set aside the RACR.

On July 12, 2004, Ann M. Veneman, former Secretary of Agriculture, responded to concerns raised by local communities, tribes, and states impacted by the RACR by announcing a proposal to establish a state petitioning process for IRA management. The proposed rule, which was published on July 16, 2004, reflected a responsible and balanced approach to re-examining the RACR. After receiving and evaluating public comment on this proposal, USDA has adopted a final rule. On May 13, 2005, the USFS issued a Final Roadless Rule, which replaced the 2001 RACR. This 2005 rule establishes a process for Governors with National Forest System IRAs in their state to petition the Secretary of Agriculture to establish or adjust management requirements for these areas. Unless Governors choose to initiate a change through the petition process, existing IRA management requirements contained in individual land management plans will remain unchanged.

As detailed below, the 2003 CNF RFP considered IRAs in developing the management direction for the RFP. This RFP direction will guide activities in IRAs on the CNF unless or until changed through the petition process.

In preparation for revising its Forest Plan, the CNF completed an IRA re-inventory describing changes in the boundaries and character of the 34 IRAs in the CNF from 1985 to 1996. The IRAs, Phosphate Mine Leases, and Known Phosphate Lease Areas (KPLAs) within the CNF are shown on **Figure 1.0-3**. In 2001, the USFS issued Interim Directives and published an Advanced Notice of Proposed Rulemaking (ANPR) describing how to evaluate IRAs for management decisions. The CNF then conducted an IRA re-evaluation, using the five principles for evaluating IRAs that were published in the ANPR. The results from this re-evaluation were incorporated into Alternative 7R of the RFP that was subsequently selected as the Preferred Alternative in the ROD (see USFS 2003b: Appendix R).

The Sage Creek Roadless Area (IRA No. 04166) and the Meade Peak Roadless Area (IRA No. 04167) occur within the Project Area. Detailed descriptions and characteristics of both of these IRAs are provided in **Section 3.11**. The management of Sage Creek, Meade Peak and other IRAs within the CNF fall under the RFP. The proposed mining activities within the existing leases, lease modifications, and the off-lease disturbances, are currently considered by the CTNF to be allowable under Prescriptions 8.2.1 and 8.2.2 of the RFP.

1.4 Public Scoping

A Preliminary Mine and Reclamation Plan was submitted to the BLM and CTNF on April 21, 2003. The Notice of Intent (NOI) for the Smoky Canyon Mine EIS was published in the Federal Register on September 15, 2003. A copy of this NOI is included in the *Scoping Summary Report, Smoky Canyon Mine Panels F and G Extension EIS* (JBR 2004a). A legal notice was published in the Pocatello, Idaho (September 19, 2003) and Afton, Wyoming (September 25, 2003) newspapers. A news release was also published in Pocatello and Boise, Idaho newspapers September 17, 2003 and September 18, 2003, respectively.

A public mailing list was compiled and 115 scoping letters were sent to federal, state, and local government agencies, and members of the interested public. Two public meetings were held. One meeting was held in Afton, Wyoming on October 8, 2003 at Star Valley High School, and the other in Pocatello, Idaho on October 7, 2003 at the BLM Pocatello Field Office. The open house meetings provided a Project description, photo displays of the Project Area, and a forum for exchange of information and ideas or concerns related to the Project. Comment forms were available at the meetings and agency, proponent, and consultant representatives were present.

Public comments regarding the Project were solicited and then compiled in the Scoping Summary (JBR 2004a) to help determine the issues and alternatives for evaluation in the environmental analysis. By the close of the scoping period on October 20, 2003, 49 comment letters, 3 comment forms, and 130 e-mails had been received for the Smoky Canyon Mine Project. After the end of the scoping period, 47 additional comment e-mails were received for a grand total of 229 comments. The letters included 143 standardized comment letters (about 62 percent) of four general types. Comments were submitted by agencies, entities, and interested citizens. A complete list and copies of all written comment letters, forms, and e-mails can be found in the Scoping Summary (JBR 2004a).

Identified concerns included potential effects of the Project on IRA's, water quality, wetlands, wildlife and fishery habitats, livestock grazing, soils, air quality, socioeconomics, private property values, forested areas, recreation, development of Best Management Practices (BMPs) for mine operations, and 1868 Fort Bridger Treaty Rights.

Caribou-Targhee National Forest

Phosphate Mining Area

Phosphate Mine Leases
Known Phosphate Lease Areas
Roadless Areas (1996)

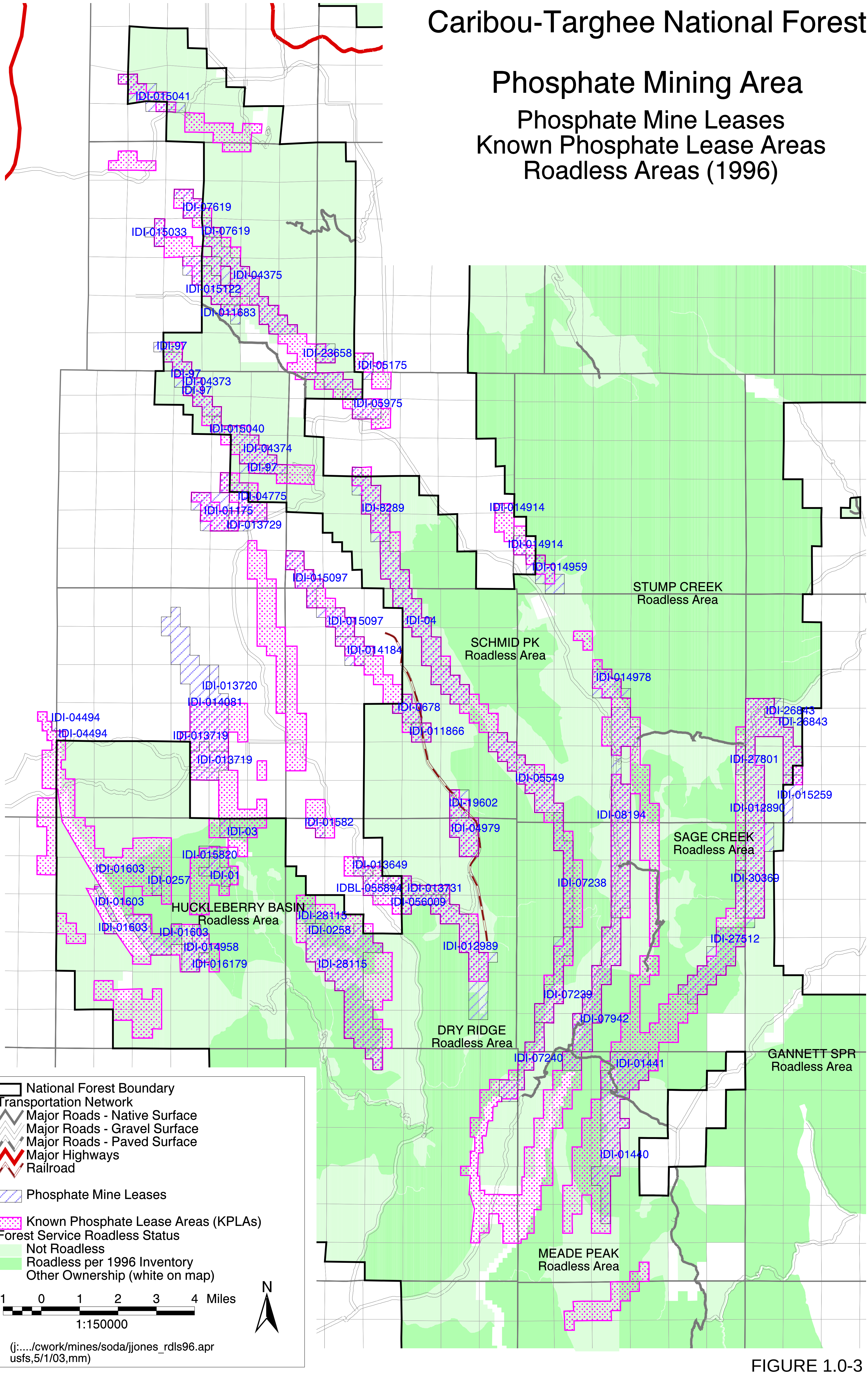


FIGURE 1.0-3

1.5 Tribal Treaty Rights and Native American Consultation

The Shoshone-Bannock Tribes and Northwest Band of the Shoshone have ancestral Treaty Rights to uses of the CTNF and the Curlew National Grassland. The relationship of the United States government with American Indian tribes is based on legal agreements between sovereign nations. The Fort Bridger Treaty of July 3, 1868 granted hunting, fishing, and gathering rights to tribal members on "all unoccupied lands of the United States so long as game is present thereon." This right applies to all public domain lands reserved for National Forest purposes that are presently administered by the CTNF. These rights are still in effect, and management actions recognize these rights. Consultation with the Shoshone-Bannock Tribal Council is required on land management activities and land allocations that could affect these rights.

As part of government-to-government relations, the Shoshone-Bannock Tribes and CTNF are developing a protocol that will guide coordination, cooperation and consultation between the two entities. Tribal concerns with site-specific Projects revolve around impacts to their tribal treaty rights. According to the Fort Bridger Treaty and subsequent court cases clarifying these rights, the Shoshone Bannock Tribes have the right to hunt, fish, gather, and practice traditional uses on all unoccupied lands in the United States. On ceded lands[1], the Tribes have also retained the right to graze domestic livestock. In addition, the Northwest Band of the Shoshone also have treaty rights on the CTNF. Forest Service managers have a responsibility to protect those resources essential for the Tribes to exercise their treaty rights. Concerns that the Shoshone-Bannock Tribes may have with this Project are discussed in this EIS.

The goal of the BLM Manual Section 8160 is to "assure that tribal governments, Native American communities, and individuals whose interests might be affected have a sufficient opportunity for productive participation in BLM planning and resource management decision making." Federal agencies also have a trust responsibility to federally recognized tribes. This trust responsibility is reflected in language contained in BLM Manual Section 8160. To this end, the Pocatello BLM Field Office and CTNF have continued consultation and coordination with the Native Americans represented in southeast Idaho.

Federal agencies are required by law (Archaeological Resources Protection Act of 1979 and National Historic Preservation Act of 1966) and regulation to consult with Native Americans on actions that may affect their traditions or uses of public lands. Specifically, the agencies are required to follow the Section 106 process as recorded in 36 CFR 800 - Subpart B as revised January 11, 2001.

On September 15, 2003, the BLM and USFS mailed a scoping letter to the Tribes that contained maps and illustrations explaining the Project. This was followed up with a meeting with Tribal technical staff in Fort Hall on October 2, 2003. The Shoshone-Bannock Tribes responded to scoping with a comment letter dated October 17, 2003. The BLM and USFS staffs met with Tribal technical staff (Chad Coulter, Yvette Tuell, and Kelly Wright) for a field tour of the area for the proposed mining activity on October 14, 2003. Additionally, a BLM representative accompanied members of the Tribal Cultural Resources Committee to the Project Area to provide an overview of the proposal on July 29, 2004. Following the formulation of Chapters 1,

[1] These lands were formerly part of the Fort Hall Reservation but later ceded to the federal government to allow for white settlement. The ceded lands on the CTNF are primarily on the Westside Ranger District.

2, 3, and 5 by the agencies, a meeting was held with the Tribal technical staff on April 15, 2005 to review how this EIS would address the correspondence from the Tribes. Formal Government to Government consultation between the BLM, USFS, and Shoshone-Bannock Tribes was initiated by a meeting with the Fort Hall Business Council on June 27, 2005. Coordination with the Tribes will continue throughout the EIS process.

A more complete description of the Native American consultation process is provided in **Sections 3.14** and **4.14**.

1.6 Issues and Indicators

The issues to be evaluated in this EIS are derived from the final Smoky Canyon Mine Panels F and G Extension EIS Scoping Summary issued in March 2004 (JBR 2004a). In that document, the comments received during scoping from agencies and the public were summarized into categories, which became the basis for defining issues and indicators.

The defined issues are presented under components of the human and natural environment that are customarily addressed in impact analysis. The indicators are typically the quantifiable criteria that are used to judge the significance of the impact, although some issues rely on a discussion of effects for comparison purposes or an evaluation of the impact instead of a quantifiable indicator. Indicators are based on regulatory requirements, baseline data, trends, and best management technology. A description of the issues and indicators by topic is provided below.

1.6.1 Geology, Minerals, and Topography

There are no controversial issues for these resources. Chapter 4 will still disclose that a certain amount of phosphate ore would be removed from the leases and describe the effects to topography from the reclaimed mine and transportation facilities.

1.6.2 Air and Noise

Issue (air):
The Project emissions may cause air quality effects that are different from existing operations due to relocation of mining emissions and from increased traffic on haul roads and possibly offsite access roads.

Indicators (air):
Exhaust and dust emissions generated from haul trucks and other mining equipment may impact the air quality in this area;

Change in air quality from Project emissions at Class I Areas in the vicinity of the operations with emphasis on compliance with National Ambient Air Quality Standards (NAAQS).

Issue (noise):
Noise from mine operations, mine traffic on haul roads, and traffic on access roads may affect Project Area residents.

Indicators (noise):
Estimated noise levels from mining operations, haul truck traffic related to mining, and access road traffic.

1.6.3 Water Resources

Issue:
The mining operations and related transportation activities may cause changes to the quantity and quality of surface water or groundwater in the Project Area and within the Crow Creek watershed area.

Indicators:
Changes in the volume and timing in surface runoff water caused by the operations;

Increases in suspended sediment, turbidity, and contaminants of concern in downgradient streams, ponds and other surface waters, with regards to applicable surface water quality standards;

Reduction in available groundwater to supply existing baseline flow of streams and springs in the Project Area from pumping the Panel G water supply well;

Increases in concentrations of contaminants of concern in groundwater under and downgradient of pit backfills and overburden fills, with regards to applicable groundwater quality standards;

Length of roads that occur on the Meade Peak Shale outcrop that could contribute selenium in runoff to nearby streams.

1.6.4 Soils

Issue:
The mining operations and related transportation activities may affect soil resources in the Project Area.

Indicators:
Acres of soil disturbance and acres left unreclaimed.

1.6.5 Vegetation

Issue:
The mining operations and related transportation activities may affect vegetation patterns and productivity in the Project Area, including Threatened, Endangered, Proposed, Candidate, and Sensitive (TEPCS) plant species habitat.

Indicators:
Acres of vegetation communities and suitable TEPCS habitats that would be disturbed and also potentially subjected to an increase in weed invasion;

Acres of disturbed area that are planned for reclamation and the types of vegetation that would be restored;

Bioaccumulation potential for reclamation vegetation to become contaminated in excess of USFS guidelines from reclaimed backfills or external dumps;

Acres of permanent vegetation conversion from forest to non-forest cover and predicted re-growth rate back to forest conditions;

Compliance with the applicable RFP Standards and Guidelines.

1.6.6 Wetlands

Issue:
Construction of mine facilities and other surface disturbances may directly affect wetlands and Waters of the U.S. and could include increased metal and sediment loading in surface waters and/or changes in water quantity/quality in both surface waters and groundwater supporting Waters of the U.S.

Indicators:
The number of wetland acres disturbed by mining activities and related facilities;

The number of Waters of the U.S. crossings caused by mining and new transportation corridors;

Change in function and value of all wetlands disturbed by the mine and related facilities.

1.6.7 Wildlife Resources

Issue:
The mining operations and related transportation facilities may physically affect terrestrial wildlife, including Threatened, Endangered, Proposed, Candidate, and Sensitive (TEPCS) and Management Indicator Species (MIS), through direct disturbance and fragmentation of their habitat.

Indicators:
Acres of different wildlife habitats physically disturbed and the juxtaposition of that disturbed habitat over the life of proposed mining activities;

Acres of disturbance to and the proximity of the proposed operations to high value habitats such as: TEPCS species habitat, crucial and or high value big game ranges, wetlands, and seep and spring areas;

Increased uptake by wildlife of contaminants of concern in mining disturbed areas and areas that are reclaimed;

Increase in mining and transportation related noise levels in wildlife habitat;

Increase in vehicle traffic in the Project Area and potential for increased wildlife mortality through accidents;

Compliance with the applicable RFP Standards and Guidelines.

1.6.8 Fisheries and Aquatics

Issue:
The Project may affect cutthroat trout, other native fish, amphibians, or aquatic resources in the Project Area.

Indicators:
The length of intermittent and perennial stream channels directly affected by road fill and associated culverts, and comparison with the undisturbed lengths of these stream channels in the Project Area;

Acres of aquatic influence zone (AIZ) habitat to be affected and comparison with undisturbed acreage of this habitat in the Project Area;

Quantities of suspended sediment and contaminants of concern in fishery resources in the area, with emphasis on compliance with applicable aquatic life water quality standards;

Compliance with the applicable RFP Standards and Guidelines.

1.6.9 Grazing Management

Issue:
The Project may impact permitted livestock grazing within and adjacent to the Project Area.

Indicators:
Acres of suitable livestock foraging areas to be disturbed and the length of time livestock would be excluded from the mining areas, and comparison with undisturbed acres of grazing allotments in the Project Area;

Effects of relocation of grazing from directly impacted allotments to alternate allotments during active mining and reclamation;

Description of grazing allotment improvements and structures that would be disturbed;

Estimated concentrations of contaminants of concern in grazing water sources;

Change in suitable grazing acreage caused by increased Contaminants of Potential Concern (COPCs) in reclamation vegetation.

1.6.10 Recreation and Land Use

Issue:
Recreational use and public access to the Project Area may be limited or prevented by mining activities and could impact adjacent private lands.

Indicators:
Number of acres of active mine area temporarily closed to public use;

Number of recreational access points temporarily closed to public use;

Acres of recreational areas temporarily blocked from public access;

Locations of primary access roads blocked or closed by mining activities.

Issue:
Impacts may occur from unauthorized Off-Highway Vehicle (OHV) and All-Terrain Vehicle (ATV) use on reclaimed and closed roads.

Indicators:
Predicted use of recreational vehicles on reclaimed area or roads with consideration of methods used to prevent OHV and ATV use.

1.6.11 Inventoried Roadless Areas/Recommended Wilderness

Issue:
The Project may impact Inventoried Roadless Area characteristics.

Indicators:
Description of impacts to roadless attributes and characteristics.

1.6.12 Visual and Aesthetic Resources

Issue:
The Project may adversely affect visual resources in the area.

Indicators:
Estimated compliance with the Visual Quality Objectives in the USFS Visual Management System;

Change in scenery, from baseline to projected, from various public and occupied points within the Study Area.

1.6.13 Cultural Resources

Issue:
Cultural resource sites may be impacted in the Project Area.

Indicators:
Number of cultural sites eligible for the National Register of Historic Places (NRHP) impacted by the Project.

Issue:
The heritage values (resources) of the Project Area may be compromised by the Project.

Indicators:
Acres to be removed from historic land uses with local heritage value, and duration of the mining activities.

1.6.14 Treaty Rights Resources

Issue:
The Project activities may impact the ability of Shoshone Bannock tribal members to exercise their treaty rights in the Project Area and may impact resources of cultural significance to tribal members.

Indicators:
Changes in water quality and quantity of both surface and groundwater;

Acres and types of vegetation disturbed versus acres and types of vegetation replanted;

Acres of wetlands disturbed;

Acres of wildlife habitat disturbed;

Increased uptake by wildlife of contaminants of concern in mining disturbed areas and areas that are reclaimed;

Types of aquatic resources to be affected and comparison with undisturbed habitats in the Project Area;

Acres of access and recreation areas that would be available or unavailable and the duration of mining activities;

Visibility of disturbances to adjoining areas;

Known prehistoric cultural resources sites impacted by the Project.

Issue:

The Project would diminish the locations available to exercise Treaty Rights.

Indicator:

Change in land status and accessibility.

1.6.15 Transportation

Issue:
Use of public roads in the Project Area for mine access may affect current traffic characteristics of the roads with increased risk of accidents and potential for spills.

Indicators:
Relative increase in traffic on public roads in the Project Area as a result of proposed mining activities, change in traffic types, and road design features to deal with this;

Changes in existing primary access to and through the CTNF on county or open USFS roads caused by the mining and associated activities.

1.6.16 Social and Economic Resources

Issue:
The heritage values of the Project Area may be compromised by the Project.

Indicators:
Acres to be removed from historic land uses with local heritage value, and duration of the mining activities.

Issue:
Potential closure of mine and effects on the local economy.

Indicators:
Numbers of employees, contractors, and their dependents that could be affected by potential mine and fertilizer plant closure and loss of personal/public income. Appropriate multipliers would be used to estimate economic and social impacts.

Issue:
Potential closure of mine and resulting decreased domestic phosphate production may cause a reduced fertilizer supply, increased price on national agricultural products, and cause an increased foreign natural resource dependence.

Indicators:
Percentage of U.S. phosphate fertilizer market derived from Don Plant production and ability of other domestic and foreign sources to satisfy this demand, if necessary.

Issue:
Chemical degradation of water, soil, and vegetation in the Project Area may impact local farmers and compromise the viability of their farms/ranches in terms of both agribusiness and tourism.

Indicators:
Predicted levels of any offsite contamination of water, soil, and vegetation of farms and ranches within the Project Area with emphasis on compliance with applicable standards.

Issue:
Nearby property values may be changed by proximity of mine and transportation activities.

Indicators:
Relative potential change of property values from mining operations in the area and potential change in property values within the Star Valley if mining were to cease.

1.6.17 Environmental Justice

No significant issues were identified.

Smoky Canyon Mine
Panels F & G Draft EIS

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Chapter 2
Description of Proposed Action and Alternatives

2.1 Introduction

This chapter describes Simplot's existing operations at the Smoky Canyon Mine, Simplot's Proposed Action, and the Alternatives to the Proposed Action. The proposed mining operations would consist of several open pits in Panels F and G, topsoil stockpiles, mine equipment-parking areas, access and haul roads, a power line extension, pit backfills, external overburden disposal areas, and runoff/sediment control facilities. Mining activities would include environmental protection practices to reasonably reduce environmental impacts.

Alternatives considered in the EIS are based on issues identified by the BLM and the USFS, and comments received during the public scoping process. Alternatives developed for consideration in this EIS are intended to reduce potential impacts associated with the Proposed Action.

2.2 Project History

2.2.1 Background

Simplot has been involved in phosphate mining in southeast Idaho since 1945, originally at the Gay Mine on the Fort Hall Indian Reservation. It acquired Anaconda Company's fertilizer operations at Conda in 1959. In 1984, Simplot began extracting phosphate ore from deposits located on federal land at its Smoky Canyon Mine in eastern Caribou County, Idaho. The operation includes mining with standard open pit techniques in five mine panels (A- E) and then concentrating the phosphate content of the ore in an onsite mill. The concentrate is pumped through a buried pipeline to Simplot's existing fertilizer manufacturing plant (Don Plant) in Pocatello, Idaho. Tailings from the Smoky Canyon milling operation are disposed of in two onsite permitted tailings disposal ponds located on private land owned by Simplot.

2.2.2 Past Environmental Impact Reviews

There have been a number of environmental reviews conducted under NEPA for the Smoky Canyon Mine property and operations.

In 1981, the United States Geological Survey (USGS), then in charge of administering phosphate mining, prepared a Draft EIS (DEIS) for mining at the Smoky Canyon Mine in conjunction with the USFS. The Final EIS (FEIS) and the Record of Decision (ROD) for the approval of the mining operations were completed in 1982 and included approval of the following:

- Open pit mining operations in five Panels A through E;
- Onsite disposal of mine overburden in two main disposal sites external to the pits;
- Construction and operation of a mill and associated power line, water supply wells, and access road;
- Tailings pipeline to the tailings ponds and a return water line;
- Two tailings ponds located east of the mine for disposal of mill tailings;

- Installation of the slurry pipeline to Conda; and
- Reclamation of the facilities upon completion of operations.

The conditional permits granted by the BLM and USFS at the beginning of the Smoky Canyon mining operations required that subsequent, site-specific mine plans for the individual mine phases be submitted to the Agencies for their review and that appropriate mitigation measures be developed using further environmental analysis. These additional mine plans were reviewed with environmental assessments (EAs) that tiered off of the information and analyses included in the 1981 DEIS and 1982 FEIS for the Smoky Canyon Mine. These EAs included:

- EA for Smoky Canyon Mine Tailings Pond 2 (USACE 1990)
- EA for Smoky Canyon Mine Panel A-4 (BLM 1991)
- EA for Smoky Canyon Mine Panel D (BLM and USFS 1992)
- EA for Smoky Canyon Mine Panel E (BLM 1997)

Tailings Pond No. 1 was constructed concurrently with the initial mining and milling facilities in 1984. In 1988, plans were completed for construction of an expansion of the tailings pond within the same area identified within the FEIS. In 1990, an EA was prepared by the USACE for three future phases of Tailings Dam No. 2 and the associated tailings pond to contain all tailings from full development of each of the Panels. In this EA, the USACE reviewed the detailed plans for this facility and developed the plans for environmental impact mitigation. Simplot subsequently completed the wetland mitigation for all three phases of the tailings dam and pond.

The mining of Panels B and C was authorized by a 2002 ROD upon the completion of the Final Smoky Canyon Phosphate Mine Supplemental EIS (SEIS). The SEIS evaluated potential effects on threatened, endangered and sensitive species as well as effects from selenium and other constituents of potential concern (COPCs) that were not considered in the 1982 Smoky Canyon FEIS.

Exploration in the Deer Creek and Manning Creek lease areas was analyzed over the last several years through the EAs and EIS listed below and additional Documentations of NEPA Adequacy (DNAs), which authorized continued exploration on these properties.

- EA for Manning Exploration for EIS Leasing (BLM and USFS 1994)
- EA for Phosphate Exploration Program for Lease I-01441 (BLM and USFS 1996)
- EA for I-01441 Lease Modification and Exploration Plan (BLM and USFS 1998)
- Leasing EIS for the Manning and Dairy Syncline Properties (BLM and USFS 1999)
- EA for Manning Creek Exploration Project (BLM and USFS 2003)
- EA for South Manning Creek Exploration Project (BLM and USFS 2005)

2.3 Existing Operations

2.3.1 Location

The Smoky Canyon Mine is located in Caribou County, Idaho approximately ten air miles west of Afton, Wyoming on the east slope of the Webster Range between Smoky Canyon to the north and South Fork Sage Creek to the south. Access to the mine is gained by traveling west from Afton approximately three miles, then north about four miles toward Auburn to the intersection with the Stump-Tygee Creek Road, then approximately eight miles west and southwest to Smoky Canyon.

Overall, the existing operations extend for a length of approximately 5.9 miles north to south along the east flank of the Webster Range (**Figure 2.3-1**). The mill and administrative and maintenance facilities are located in Smoky Canyon near the northern end of the mining operations. Mine Panel A is immediately east of the mill. Panels B and C are located north of the mill, and Panels D and E are toward the south. The tailings ponds are located about 3.2 miles northeast of the mill site in the Tygee Creek drainage. The mill is connected to the tailings ponds with a pipeline down Smoky Canyon.

Elevations in the Smoky Canyon Mine area range from about 6,600 feet above mean sea level (AMSL) at the tailing pond area to about 8,300 feet AMSL along the ridge of unnamed peaks immediately west of the mine.

2.3.2 Land Ownership

The existing mining and milling operations are contained within 2,600 acres of federal phosphate mineral leases administered by the Pocatello Field Office of the BLM and approximately 1,200 acres of Special Use Authorization's (SUAs) administered by the CTNF. The mining operations are located on Federal Phosphate Leases No. I-012890, I-026843, I-027801, I-27512, and I-30369. The federal land surface is administered by the CTNF, Soda Springs Ranger District. The tailings property encompasses 1,680 acres of private land owned by Simplot. **Table 2.3-1** summarizes surface and mineral ownership.

TABLE 2.3-1 LAND AND MINERAL OWNERSHIP

LEASE NUMBER	SURFACE OWNERSHIP	MINERAL OWNERSHIP
I-012890	U.S. Forest Service	Federal
I-015259	Private (Simplot)	Federal
I-026843	U.S. Forest Service	Federal
I-027801	U.S. Forest Service	Federal
I-30369	U.S. Forest Service	Federal
I-27512	U.S. Forest Service	Federal

2.3.3 Facilities Description

Existing facilities at the Smoky Canyon Mine include an access road, office/shop complex, mill, ore stockpiles, open pits, backfilled pits, external overburden disposal sites, tailings ponds, power lines, tailings pipelines, concentrate slurry pipeline, and ancillary facilities such as runoff control ditches and ponds, storage yards, and "Hot Start" (mine equipment fueling, fuel storage, and parking) areas (**Figure 2.3-1**). The office/shop complex consists of a combination shop and office building. This building houses the office, warehouse, and repair shop facilities. Employee parking, site security office, truck wash bay, tire shop, mill, and emergency generators are also located at the office/shop complex. These facilities would continue to be used during the mining activities described as part of the Proposed Action (**Section 2.4**). Detailed descriptions of the major facilities are as follows:

Security Trailer: Security staff provides around the clock (24 hours per day/7 days a week) coverage of the mine facility. Along with security personnel, this facility houses employee lockers.

Office/Warehouse: This facility houses the offices of mine management personnel and warehouse/purchasing personnel. The offices are located upstairs above the shop and adjacent to the warehouse.

Maintenance Shop/Mill: The maintenance shop houses the maintenance staff that work on company mobile equipment. The mill area is housed in the same building where raw phosphate ore is fed from the outside via front-end loaders. The ore is milled into a fine powder/slurry with water through crushing and grinding operations. The phosphate-containing minerals are beneficiated (separated) from the rest of the rock and then are pumped through the concentrate slurry pipeline to the Don Plant in Pocatello for further processing. The tailings slurry (beneficiation waste) from the mill is gravity fed through the pipeline to the tailings ponds for disposal.

Wash-bay: This area is used for steam washing of company mobile equipment. An oil-water separator system for used-oil recovery is connected to the wash bay.

Fuel/Used Oil Containment Area: South of the wash bay building and east of the mill (in the yard), are aboveground storage tanks for anti-freeze, diesel fuel (low-sulfur), gasoline (lead-free), used oil, and used anti-freeze. These tanks are located within secondary containment bermed areas lined either with concrete (used oil and antifreeze), or polyethylene (diesel fuel and gasoline).

Tailings Thickener: Once the ore is beneficiated, the non-ore rock slurry is piped to a thickener, located 1/4 mile north of the mill, and sent in a pipeline to the tailings ponds. Water is then recirculated back to the mill via underground return pipelines.

Industrial and Culinary Wells: The industrial well provides fresh water for the mill operations. The culinary and industrial wells provide potable water for mine personnel and are recognized by the State as public drinking water sources. These wells are located approximately 3/4 mile north of the shop, near Smoky Creek.

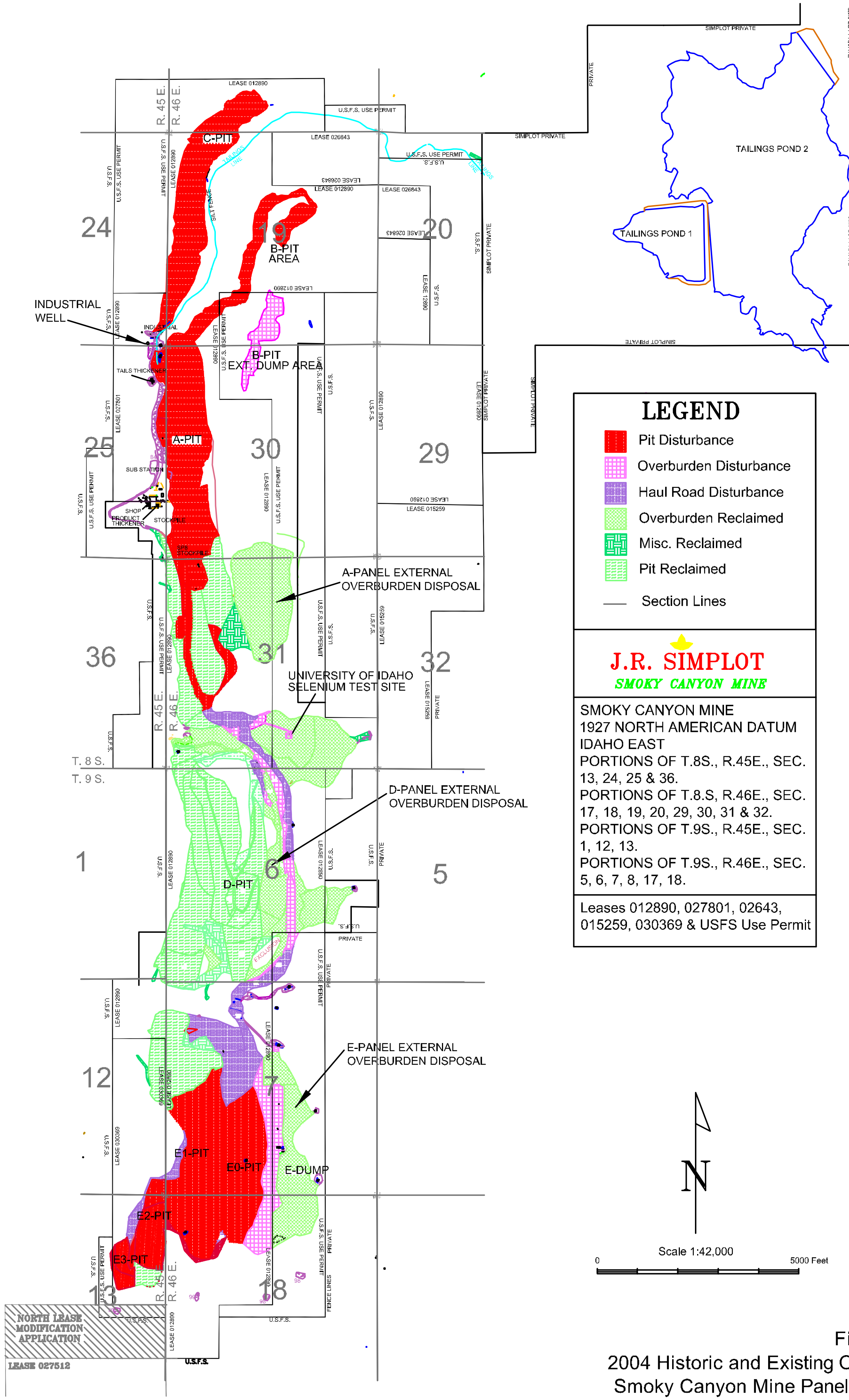


Figure 2.3-1
2004 Historic and Existing Operations
Smoky Canyon Mine Panels F and G

Hot Starts: The "Hot Starts" is the name given to the staging area for the mobile equipment used in the mining operations. Service islands for maintenance and fueling of a number of vehicles simultaneously, lubing services and fuel/lube oil tanks (all tanks are protected in a containment area lined with a polyethylene liner) are located here. The Hot Starts are located near the actual mining area for convenience and accessibility. The Hot Starts area is relocated, as needed, to adjust to the mine area location.

Tailings Ponds No. 1 and No. 2: Located approximately 3.2 air miles northeast of the mill area, this area consists of two tailings ponds with associated delivery lines, return lines, and pump houses.

Bone Yard: This is a temporary storage area for large reusable mining equipment, parts, and recyclable materials. Some material located here can be reused in the mining operation. This is not a fixed facility.

Ammonium Nitrate/Fuel Oil (ANFO) Storage: This is a staging area for blasting materials (kept separate from magazines for safety reasons). Ammonium nitrate and emulsion are stored separately, in above ground storage tanks in this area. Ammonium nitrate is not explosive until mixed with the fuel oil. The materials are only mixed when pumped directly into the blast holes. This area is a completely fenced, secured area under video surveillance and equipped with motion detectors. This area is capable of being monitored 24-hours a day through the onsite security office. These surveillance videos are archived for a set amount of time as well.

2.3.4 Mining Operations

The existing mine operations consist of mine Panels A, B, C, D, and E. Each panel consists of one or more open pits and associated external overburden disposal sites. The mining occurs along a southward trending (striking) phosphate deposit that is inclined (dips) to the west. Open pit mining of this deposit continues down-dip until overburden stripping ratios hinder economic operations at which point mining ceases. Mining at Smoky Canyon began with Panel A and proceeded southward through Panels D and E. The extraction phase of mining is currently wrapping up in Panel E and has begun in Panels B and C. As mining progressed southward along the strike of the deposit, the mined out pits have been backfilled with overburden (**Figure 2.3-2**). At the end of 2004, the existing panels were backfilled and reclaimed to the following degrees: Panel A – 35 percent, Panels B and C – 0 percent, Panel D – 100 percent, Panel E – 15 percent. Excess overburden has been disposed of in external overburden disposal sites located east of the mine pits. Inactive areas of the external overburden disposal sites and backfilled pits have been reclaimed with vegetation as specified by the regulatory agencies.

Current operations at the Smoky Canyon Mine include drilling, blasting, loading, and hauling of ore and overburden from Panels E, B, and C using a shovel and truck fleet. Mining proceeds sequentially by opening individual mining pits along the trend (strike length) of the Phosphoria formation outcrop. Mining in Panels B and C is ongoing and is expected to continue until approximately 2006-2007. Reclamation of Panels A, B, and C would be completed in 2009 to 2010. This reclamation occurs concurrently with mining.

The sequential mining of pits along the strike length of the deposit facilitates backfilling open pits with overburden from subsequent pits. When overburden is removed from the ground, it is fractured into particles, which occupy approximately 30 percent more volume than before the rock was mined. This volume expansion is called “swell” and is one reason why all the overburden cannot be returned to the same open pit from which it came even when considering the ore that is removed from the individual pits. Some overburden must be placed in external overburden disposal sites outside of the open pits.

At the end of 2004, the total disturbed area of the existing operations at the Smoky Canyon Mine was 2,150 acres, of which 756 acres had already been reclaimed. Current reclamation plans for the existing Smoky Canyon Mine indicate almost all of the disturbed acreage involved in the mining will eventually be reclaimed. The following description of mining operations applies to the existing operations. Thus, because the Proposed Action would be an extension of the existing mining operations, the following description of mining operations also applies to the Proposed Action.

The mine is operated 24-hours per day throughout the year with crews working overlapping shifts. Hard rock overburden is drilled with blast hole drills. Each blast hole is loaded with a mixture of ANFO. The loaded blast holes are typically detonated 3 to 4 days a week in the afternoon. On average, 400 blast holes are detonated per week. Softer overburden is ripped with dozers. A number of 15- to 27-cubic-yard diesel-powered hydraulic shovels are used to load ore and overburden into off-road type haul trucks.

Ore and overburden are loaded into 150-ton rear dump haul trucks. Depending on the concentration of phosphate mineral in the rock, the trucks deliver the material to one of the mill ore stockpiles, external overburden disposal areas, or previously mined pits as backfill. Water trucks are used to water haul roads, ancillary roads, and the active pit floors to control dust. Roads are also maintained with motor graders. Other equipment used in the operation includes: pickup trucks, vans, service trucks, maintenance trucks, explosives trucks, and other miscellaneous support equipment.

The typical current mining operation in any mining panel complies with the following general mining sequence:

- A detailed Mining and Reclamation Plan for the next phase of mining is prepared and sent to the BLM and USFS for their review. The mining plan is reviewed by BLM mining engineers and geologists to ensure that the mineral resource is being properly developed. The environmental impacts of the plan are reviewed by BLM and USFS resource specialists who suggest what mitigation is necessary. Appropriate stipulations are decided upon by the Agencies. BLM decides whether or not to approve a Mine and Reclamation Plan (considering input from the USFS), and the USFS decides whether or not to issue any needed Special Use Authorizations for mining activities outside the phosphate lease boundaries.

- The USFS determines the fair value of the timber on the area to be disturbed in the mine plan and issues a timber sale to Simplot, who then pays the USFS the timber sale price. Simplot contracts with another firm for the removal of the timber.

- Small timber roads are built and timber is removed from the proposed disturbance area by a contractor.

- Access and haul roads are built.

(Typical mining section, Smoky Canyon Mine, 2000)

The proposed panels would be mined like previous panels at Smoky Canyon Mine. Sediment control facilities, such as silt fences and sediment ponds, would be installed before and during mining to minimize siltation impacts. A timber inspection by the USFS would determine the value of the trees to be purchased within the footprint of the area to be mined. After the logging, crews remove the usable trees, and the remaining scrub is pushed into berms around the perimeter of the area to be mined. These berms serve as silt barriers, temporary animal habitat, and as eventual ground cover on the reclaimed areas. Topsoil is then salvaged and immediately spread over the mined-out, backfilled and regraded areas or temporarily stockpiled until such areas become available.

Dozers establish predetermined bench levels on the overburden above the ore zones and the overburden is drilled with a pattern of holes to the bench design depth. Each of these holes is loaded with a predetermined amount of explosives from a truck. The column of explosives in the hole is capped with crushed rock to minimize the air shock wave when detonation occurs and to maximize the fragmentation of the surrounding rock. These are controlled explosions that must meet the rules, regulations and requirements of MSHA and the BATF before they can occur. The ore itself is not blasted; only the overburden and interburden need to be blasted.

The blasted rock is dug out with shovels and loaded into trucks to be hauled to overburden disposal areas. These disposal areas are initially external to the pit. Once an area of the pit has been mined to its final depth, any further non-ore rock will be used to backfill the mined-out pit. Those zones of rock that are known to have low selenium concentations are separated from the other rock. This low selenium rock is used for haul road construction or set aside in stockpiles to be used as capping material above the regraded backfill. The ore zones are loaded into trucks as they are encountered and hauled to the mill for processing.

Mined-out, backfilled and regraded pits are capped with low selenium rock and covered with topsoil. The remains of the scrub berms around the perimeter are spread over the topsoil and the reclaimed surfaces reseeded using USFS approved seed mixes. Reclamation is ongoing during mining operations.

Figure 2.3-2
Open Pit Mining at Smoky Canyon
Smoky Canyon Mine Panels F and G

- Fencing, berms, or signs are used as necessary to control public motorized access to active mining areas. Non-motorized crossing of mining areas by the public is not controlled unless there is a safety concern.
- Where grazing water sources are affected by mining operations, alternative water sources are provided to grazing permittees in coordination with the USFS.
- Where grazing allotments are affected by active mining operations, grazing access to the affected areas is temporarily controlled with fencing in coordination with the USFS and grazing permit holders.
- Surface runoff management ditches, culverts, settling ponds, and sediment traps are constructed following approved BMPs and information contained in the Smoky Canyon Storm Water Pollution Prevention Plan (SWPPP). The SWPPP was developed in accordance with EPA National Pollution Discharge Elimination System (NPDES) rules and other regulatory input.
- Simplot crews clear the remaining vegetation from the disturbance area on an as-needed basis. After the vegetation is removed, available topsoil is stripped to the stipulated limits and stockpiled in designated locations. This topsoil is sometimes immediately hauled to previous regraded mine disturbances and spread for reclamation. Topsoil stockpiles are graded and seeded to reduce loss of the soil resource by erosion.
- Upper chert overburden (the term “chert” includes cherty limestone and limestone) is removed down to the first ore beds and is hauled away. The hard chert overburden requires blasting in order to facilitate mining. The blasting procedures followed by Simplot are dictated by the Federal Metal and Nonmetallic Mine Safety and Health Standards (30 CFR 56/57/58). The blasting materials used are controlled by the Federal Explosives Law, Regulation of Explosives (Public Law 91-452) through the Bureau of Alcohol, Tobacco, and Firearms Department of the Treasury. The Smoky Canyon Mine is required by law to apply for and periodically renew a permit for the use of high explosives and a license for the manufacture of blasting agents. Only qualified trained personnel have access to or can handle blasting materials as prescribed by federal rules.
- Overburden is typically used to backfill existing open pits. Chert and limestone overburden is also used for road construction and other civil engineering projects at the mine. Some overburden may be disposed of in external overburden disposal sites. The chert typically does not release elevated concentrations of selenium and is currently used to cap or cover any seleniferous overburden that has been placed in pit backfills or external overburden disposal sites. This was not fully implemented in pre-2000 mining operations but has since been adopted as a management practice for seleniferous overburden. This is possible at Smoky Canyon Mine because the chert sampling/testing has thus far indicated low selenium concentrations.
- Ore from the upper ore zone is removed and hauled to the mill ore stockpile.
- The center waste shale, which lies between the upper and lower ore beds, is removed and hauled to previous open pits for use as backfill or is placed in external overburden disposal sites. Because the middle waste shale is known to contain the highest concentrations of selenium and other COPCs, it is placed deeper in these disposal sites and is covered with chert overburden to isolate it from the surface environment. This was not fully implemented in mining operations prior to 2000 but has since been adopted as a management practice for seleniferous overburden.

- The lower ore zone is removed and hauled to the mill ore stockpile.
- The process of removing upper ore, middle waste, and lower ore is repeated several times within a given pit. Each of these iterations is called a “bench” or “lift”.
- The mined out, open pit is then available for backfilling with overburden from subsequent mining operations in a future pit. When the pit backfill reaches the final grade, reclamation of that area is commenced.
- Reclamation of disturbed areas is an ongoing process, concurrent with mining. At closure, ancillary mine facilities, as well as roads deemed no longer necessary for maintenance access or monitoring, are removed. Road removal incorporates removal of road fills and backfilling road cuts to achieve a final profile similar to the original topography.
- Reclamation of completed mine areas commences with regrading to maximum slopes of 3h:1v. Topsoil is hauled and spread on the regraded area to typical depths of 12 to 36 inches. The topsoil is scarified, fertilized, and seeded with drilling or broadcast methods. Mulch is applied as needed. Tree seedlings are also planted as recommended by USFS foresters.

Each mine panel is divided into a number of separate open pits. The above-described physical mining sequence is repeated in each of the separate pit areas within the panel. All the pits within each panel are designed at the same time and reviewed by the Agencies.

2.3.5 Water Management

Simplot has developed a site-wide SWPPP for surface water resources at the Smoky Canyon Mine in compliance with the NPDES General Storm Water Permit issued by the U.S. EPA. The primary purpose of the SWPPP is to prevent any discharges to surface waters associated with the mine disturbance. The SWPPP provides for control of runoff from mine facilities (removal of sediment prior to dispersed discharge to vegetated areas) and designation of water diversions necessary to accommodate mine facilities. The Mine also carries an NPDES General Construction Storm Water Permit to cover the ongoing expansion of the mine each time a new pit is opened. The SWPPP covers the conditions for both permits and is updated as new disturbance areas are added to the mine operations. The existing SWPPP would be modified as needed to accommodate the new disturbance areas included in the Proposed Action.

The SWPPP is implemented in phases over the life of the Smoky Canyon Mine. Depending on the location of mining activity, the SWPPP describes water diversions (ditches) of ephemeral channels and tributaries to the nearest perennial or intermittent creek. In addition to ephemeral stream diversions, Simplot has constructed stream crossings for the major east-flowing creeks that cross the mine footprint. These are built with corrugated metal culverts placed in the stream channels at the base of road fills. Simplot has installed fish ladders in the Sage Creek culvert to allow for upstream fish migration.

New mine pits and external overburden disposal sites are designed to avoid any direct disturbance of the existing main, east-flowing intermittent or perennial stream channels. This is done by establishing a prescribed buffer zone on either side of these stream channels with no disturbance allowed within this buffer zone.

Storm water catch basins are located throughout the mining area to collect, settle, infiltrate, and evaporate runoff water from land disturbed by the mining operation. These ponds are designed to contain runoff from the contributing watershed area that would be produced in a 100-year, 24-hour storm event (3.0 inches of precipitation) plus 2.5 inches of snow melt runoff (USFS 1981:Appendix D). The ponds have engineered outlets to protect the impounding dikes from erosion by discharges. Outlets from ditches and culverts are protected from erosion with rock riprap, as are some of the steeper ditches. Simplot also uses revegetation and other land reclamation techniques to reduce erosion from disturbed areas.

Haul roads and access roads at the Smoky Canyon Mine site are designed and constructed to provide proper surface drainage. Use of culverts, roadside sediment traps, and berms allows Simplot to control erosion from roadways and subsequent sedimentation. Snow removal from roadways involves placement of snow where eventual melting will not cause erosion or increase sediment delivery to potential receiving waters.

2.3.6 Mill and Tailings Operations

The following description of the mill and tailings operations is for the existing facilities, which would continue to be used during the mining operations described in the Proposed Action. The existing mill and tailings operations are already in place and fully permitted to accommodate the tailings produced in the Proposed Action and all the mining action alternatives. The mill and tailings facilities are not considered to be connected actions for this EIS because the Proposed Action does not justify or act as a prerequisite for the currently authorized mill and tailings facilities. The Proposed Action also does not trigger any additional mill or tailings pond permitting not already authorized. For these reasons, the tailings ponds are not included within the Proposed Action or Alternatives for Panels F and G, and the environmental impacts for the tailings ponds are evaluated as part of the Cumulative Effects analysis in this EIS.

Ore is fed from the mill stockpile into two hoppers. The hoppers feed a trommel washing system where water is added and the ore is screened, crushed and then ground to a fine consistency in grinding mills. The ground ore slurry is beneficiated to separate the material with the highest phosphate content (ore concentrate) from the low-grade material (tailings).

The ore concentrate slurry (a 60:40 ore to water ratio by weight) is introduced into a buried eight-inch pipeline. A 1,000 HP pump at Smoky Canyon pumps the concentrate slurry 27 miles to Conda, Idaho, crossing the Webster Range and Dry Ridge. At Conda, two 1,200 HP booster pumps provide additional power to push the slurry another 60 miles, crossing Inman Pass and ending up at the Simplot Don Plant fertilizer manufacturing facility near Pocatello. The slurry is then processed into various grades of both liquid and dry fertilizer. The Simplot ore-slurry pipeline safely transports over 1.5 million tons of phosphate concentrate over the mountainous terrain annually.

The tailings slurry leaving the mill passes through a tailings thickener. The underflow solids from this thickener discharge into the existing tailings line at a maximum rate of 550 gallons per minute (gpm) and 35 percent solids. The clarified water from the thickener is pumped back to the mill at about 3,500 gpm for reuse in the milling operation.

Simplot currently operates two tailings ponds (No. 1 and No. 2) on private property located about 3.2 air miles northeast of the mill. Tailings slurry is discharged in a controlled manner with a system of piping and valves into tailings pond No. 2. As the slurry flows from the discharge points into the Tailings Pond No. 2, they settle out and sink to the bottom. Tailings Pond No. 1 was built at the start up of the mine and is considered full of tailings. Clarified water is collected on top of Tailings Pond No.1 and pumped with high pressure, high volume pumps back to the mill via the underground reclaim water pipeline.

By design, there is no discharge of tailings solids or water from the tailings ponds. Approximately 2,500 gpm of reclaimed water is recycled back to the mill. Additional water is added to the tailings ponds, as needed, from the production well and from Roberts Creek, under existing water rights, in order to maintain the water level in the ponds at the proper operating levels. Depending on production requirements, the Smoky Canyon mill produces approximately 500,000 tons of tailings solids per year.

The tailings ponds were built to be no-discharge facilities under a permit issued by the USACE and IDWR. They are located on private land owned by Simplot in a topographically low area along Tygee Creek. Geotechnical investigations of both tailings pond sites prior to their construction indicated that the entire area of both impoundments is underlain by low-permeability clayey soils that provide control of seepage from the impoundments. The tailings dams were also constructed from these low permeability soils, designed to prevent seepage of tailings water through them. Piezometers in the tailings dams are monitored to ensure that any seepage is detected and controlled before any surface discharge past the dams could occur. Roberts and Tygee Creeks were diverted around the tailings ponds in open channels designed to safely pass the design storm runoff required by the IDWR.

2.3.7 Reclamation Activities and Mine Closure

Reclamation of disturbed areas at the Smoky Canyon Mine is an ongoing process, concurrent with mining and would continue in a similar manner for the Proposed Action. Backfilling is completed by placing the higher selenium concentration overburden in the pit first and capping with chert. The area is rough graded and drainage configurations are established. Topsoil is directly placed from active soil salvaging operations or from nearby stockpiles and spread over the graded surface. Topsoil is spread to a thickness of 1 to 3 feet. The seedbed is prepared by fine grading followed by placement of fertilizer and seed. Revegetation is implemented when mine activities in an area are completed. The detailed planning for each phase of mining has been separately reviewed by the BLM and USFS and different revegetation practices and seed mixes have been specified at different points of time by the Agencies, which incorporate lessons learned at the Smoky Canyon Mine and other phosphate mines. In addition to erosion protection, reclamation is intended to meet the final CTNF multiple land use goals of wildlife habitat, recreation, hunting, and grazing. An example of the overall reclamation process is shown in **Figure 2.3-2**.

At closure, ancillary mine facilities, as well as roads deemed no longer necessary for maintenance access, monitoring, or public access, would be removed. Offices, buildings, shops, mill facilities, and utilities would be removed. The sites of these facilities would then be regraded and revegetated.

Public motorized access to reclaimed mine areas is controlled until the reclamation is deemed successful by the BLM and USFS. Public motorized access to reclaimed areas is then re-established in concurrence with USFS management plans. Public, non-motorized access to reclaimed areas is not restricted.

Grazing of reclaimed areas is restricted until the reclamation is deemed successful by the BLM and USFS, and it is determined that grazing can be re-established on the reclaimed areas.

The tailings ponds have been designed to remain upon abandonment and closure after the tailings storage volume is filled. At that time, the reclaimed water pumping facilities would be removed. The proposed closure plan, filed with the IDWR and conditionally approved on March 28, 2005, indicates that an overflow spillway would be excavated into one abutment of both tailings dams (NewFields 2005). These spillways would be designed to pass the peak flow from a 100-year, 24-hour storm event. The peak flow was calculated from the entire 8.6-square mile watershed directly upgradient of the tailings dams. The spillway for Tailings Dam No. 1 would discharge to the Tailings Pond No. 2. The spillway for Tailings Dam No. 2 would be connected to the Tygee Creek diversion channel downstream of the dam. The spillways would be designed to be open channels with bottom widths 30 to 35-feet wide, 3h:1v side slopes and 5-foot depths.

The existing Roberts Creek/Tygee Creek diversion channel was designed to safely carry runoff from a 100-year, 24-hour storm event around both tailings impoundments and route the flow to Tygee Creek below Tailings Dam No.2. It is proposed that the channel be left in place after reclamation of the tailings facility to handle normal runoff flows from the watershed above the tailings facility. A second diversion channel is proposed to be constructed along the north side of the Tailings Pond No. 2 to further reduce runon into the tailings impoundment area after reclamation. This also is designed to safely pass the peak flow from the 100-year, 24-hour storm event.

The tailings impoundments would be allowed time to dry out to the maximum extent feasible. The grades of the final tailings solids surface will depend on the total tailings deposited in the impoundments, the pattern of deposition, and the amount of water stored in the impoundments. It is intended that the final grades on the dried tailings would be toward the spillways so the tailings areas would not impound water. The finished tailings surface would be amended with organic materials to reduce plant uptake of selenium and revegetated by broadcasting or drilling seed. At this time, soil cover is not considered essential for reclamation success. The seed chosen for reclamation would be selected in concert with the regulatory agencies to provide perennial cover and to reduce biological uptake of selenium and other contaminants from the tailings. Fertilizer and mulch may be used to enhance revegetation success. Studies are underway to determine the most effective approach for revegetating the tailings and minimizing the uptake of selenium by plants used for revegetation. Annual inspections and maintenance of the reclamation would continue for five years after completion of closure. Institutional controls on grazing have already been implemented for the tailings facility, and other controls as necessary would be determined at the time of final closure.

Actual cost bonding by Simplot for the Smoky Canyon Mine is approximately 8.6 million dollars for existing and planned reclamation. This amount is an estimate of the actual cost for the state and federal governments to close and reclaim the currently approved facilities at the mine in the event Simplot abandoned operations before completing reclamation. This amount does not yet include any of the proposed disturbance related to Panels F and G. An estimate would be made and approved for the proposed new disturbance, and if the Project is authorized, Simplot would adjust the current bond amount accordingly. Based upon the anticipated land disturbance, bond calculations are made yearly at the BLM Pocatello Field Office, and the bond amounts are adjusted as necessary. Simplot must complete reclamation of federal lands at the mine to the BLM's and USFS' satisfaction. As reclaimed areas are approved for release by the BLM and CTNF, a lower bond amount for these areas may be requested by Simplot.

2.3.8 Hazardous Materials

The Smoky Canyon Mine operations comply with both state and federal hazardous materials regulations and would continue to do so during the Proposed Action. The term "hazardous materials" is defined in 49 CFR 172.101 (U.S. Department of Transportation (DOT) regulations governing transportation of hazardous materials). The principal hazardous materials that are transported, stored, or used at the Smoky Canyon Mine are summarized in **Table 2.3-2**.

The primary route for transporting hazardous materials to the mine is via U.S. Interstate Highway 15 and U.S. Highway 30 to Soda Springs. From Soda Springs, the principal hauling routes are U.S. Highway 30 to U.S. Highway 89 to Afton, Wyoming. An alternate route is from Interstate Highway 80 at Evanston or Little America, Wyoming to Highway 30 to Border and then Highway 89 to Afton. Another alternate route is Interstate 15 to Idaho Falls and then Highway 26 to Alpine and then south on Highway 89 to Afton. From Afton, access to the site is via the Afton to Auburn road to the Stump-Tygee Road to the Smoky Canyon Road. Transportation of hazardous materials is not allowed across the CTNF via the Blackfoot Narrows, Diamond Creek, or Georgetown Canyon roads. U.S. DOT-regulated transporters are used for shipping regulated hazardous materials. Hazardous materials are stored at designated locations onsite in tanks or DOT-approved containers. Spill containment structures are provided as appropriate for all liquid hazardous materials.

2.3.9 Petroleum Management

Simplot has implemented a Spill Prevention Control and Countermeasures Plan (SPCC) (Simplot 2000) for managing aboveground petroleum product tanks and vessels and potential spills, in accordance with the Clean Water Act (40 CFR Part 112). The plan describes types of containment structures at the facility to prevent petroleum products from reaching surface water and groundwater receptors and the procedures to be followed in the event of a spill or release.

The plan is amended when there is a change in facility design, construction, operation, or maintenance that materially affects the potential for a release of oil or other petroleum products into the environment. The SPCC Plan would be amended as required to accommodate the petroleum storage facilities that are part of the Proposed Action.

All liquid petroleum products and antifreeze are stored in aboveground containers as described in **Table 2.3-2**. The bulk storage areas are bermed and lined to contain spills. All bermed containment areas are of sufficient capacity to hold the entire contents of the largest tank and allow sufficient freeboard for precipitation. The shop building provides containment for all tanks located in that structure. The SPCC Plan states that tanks, pumps, and pipelines will be visually inspected for leaks. Inspections are conducted and recorded on a routine basis by mine personnel. The SPCC Plan also requires that Simplot's operating and maintenance personnel be trained in the proper use and maintenance of all equipment containing petroleum products. The training is necessary to educate employees as to environmental consequences, thus minimizing the chance of a spill due to operator error. Any petroleum-contaminated soil is treated onsite at a land-farm.

TABLE 2.3-2 HAZARDOUS MATERIALS MANAGEMENT, SIMPLOT SMOKY CANYON PROJECT

SUBSTANCE	AREA USED/ STORED	ANNUAL RATE OF USE (GALLONS)	ONSITE STORAGE CAPACITY	STORAGE METHOD	SHIPMENT QUANTITIES (GALLONS)
Diesel (Hi & Lo Sulfur)	Yard Stockpile Hot Start	3,000,000	(1) 10,300 gallon tank (1) 7,400 gallon tank (1) 50,000 gallon tank (1) 11,700 gallon tank	Above-ground bulk tanks	10,000
Gasoline	Yard	48,000	(1) 10,000 gallon tank	Above-ground bulk tank	10,000
10W Oil 15-40W Oil HD 30W 50W Oil 5-30W Oil Used Oil 80-90W Oil 10W Oil 15W-40 Oil ATF 50W TO4 40W Oil 40W TO4 40W Oil 30W Oil 10W Oil 15W-40 Oil Used Oil	Shop Yard Hot Start	100,000	(1) 4,000 gallon tank (1) 2,000 gallon tank (1) 2,000 gallon tank (1) 2,000 gallon tank (1) 300 gallon tank (1) 10,000 gallon tank (1) 500 gallon tank (1) 7,800 gallon tank (1) 7,800 gallon tank (1) 500 gallon tank (1) 2,300 gallon tank (1) 2,100 gallon tank (1) 3,000 gallon tank (1) 500 gallon tank (1) 500 gallon tank (1) 500 gallon tank (1) 500 gallon tank (1) 8,500 gallon tank	Above-ground bulk tanks	2,000
Antifreeze Used Coolant Antifreeze	Yard Hot Start		(2) 500 gallon tanks (1) 5,000 gallon tank (1) 300 gallon tank	Above-ground bulk tanks	2,000

2.3.10 Hazardous Waste

Hazardous waste is regulated under the Federal Resource Conservation and Recovery Act (RCRA) regulations (40 CFR Part 260 et. seq.). Generators of hazardous waste must follow strict rules regarding the generation, storage, handling, and disposal of their wastes. The Smoky Canyon Mine is considered a *Conditionally Exempt Small Quantity Generator* because it generates less than 100 kilograms of hazardous waste per month. These wastes are generated and temporarily stored at the mill and mine maintenance shops. The only specific hazardous waste generated at the facility is paint-related waste including waste paint and thinner (Waste Code D001). The off-site disposal facility for this waste is a permitted hazardous waste incinerator. The existing hazardous waste status for the mine is not anticipated to change for the Proposed Action.

The mine complies with applicable state and federal hazardous waste regulations. All hazardous wastes are accumulated and shipped in proper containers that are normally closed except when wastes are added or removed. These containers are properly labeled and marked according to the hazardous waste and U.S. DOT hazardous materials transportation regulations. Employees at the mine are trained to properly handle and dispose of hazardous wastes in accordance with mine procedures.

2.3.11 Safety

The Smoky Canyon Mine is subject to the Federal Mine Safety and Health Act of 1977 (MSHA), which sets mandatory safety and health standards for surface metal and nonmetal mines, including open-pit operations. The purpose of these standards is the protection of life, promotion of health and safety, and prevention of accidents. Regulations promulgated under MSHA are codified under 30 CFR.

Simplot maintains site-specific safety procedures and policies. These include procedures for operating equipment, requirements for wearing personal protective equipment, lockout-tagout procedures, fire suppression, housekeeping, proper use and storage of explosives, first aid, hazardous materials handling, and other operation or production related health and safety scenarios.

Shipping and receiving personnel and the facility health and safety coordinator receive applicable training in handling and care of hazardous materials in accordance with the DOT regulations (40 CFR 172.704). Simplot personnel also receive hazard communication and recognition training in accordance with the MSHA regulations.

The safety procedures and policies for the mine would also apply to the operations included in the Proposed Action.

2.4 Proposed Action

Overview

The Proposed Action would consist of two new mine panels, Panels F and G (sometimes referred to as Manning Creek and Deer Creek leases or tracts, respectively), topsoil stockpiles, mine equipment parking and service areas, access and haul roads (Panel F Access/Haul Road and Panel G West Access/Haul Road on **Figure 2.4-1**), a 25kV power line extension from the existing Smoky Canyon loop, permanent external overburden storage areas, and runoff/sediment control facilities. All of the mining activities under the Proposed Action would be located on federal leases and land administered by the BLM and USFS, respectively. The proposed mining would occur in existing Federal phosphate leases No. I-27512 and I-01441 held by Simplot. Simplot has also proposed to modify (expand) lease I-27512 on its north and south ends to accommodate mining in currently unleased federal land for Panel F (**Figure 2.4-1**). Special use authorizations would be needed from the CTNF for required mine-associated uses and surface disturbances outside of BLM administered lease boundaries.

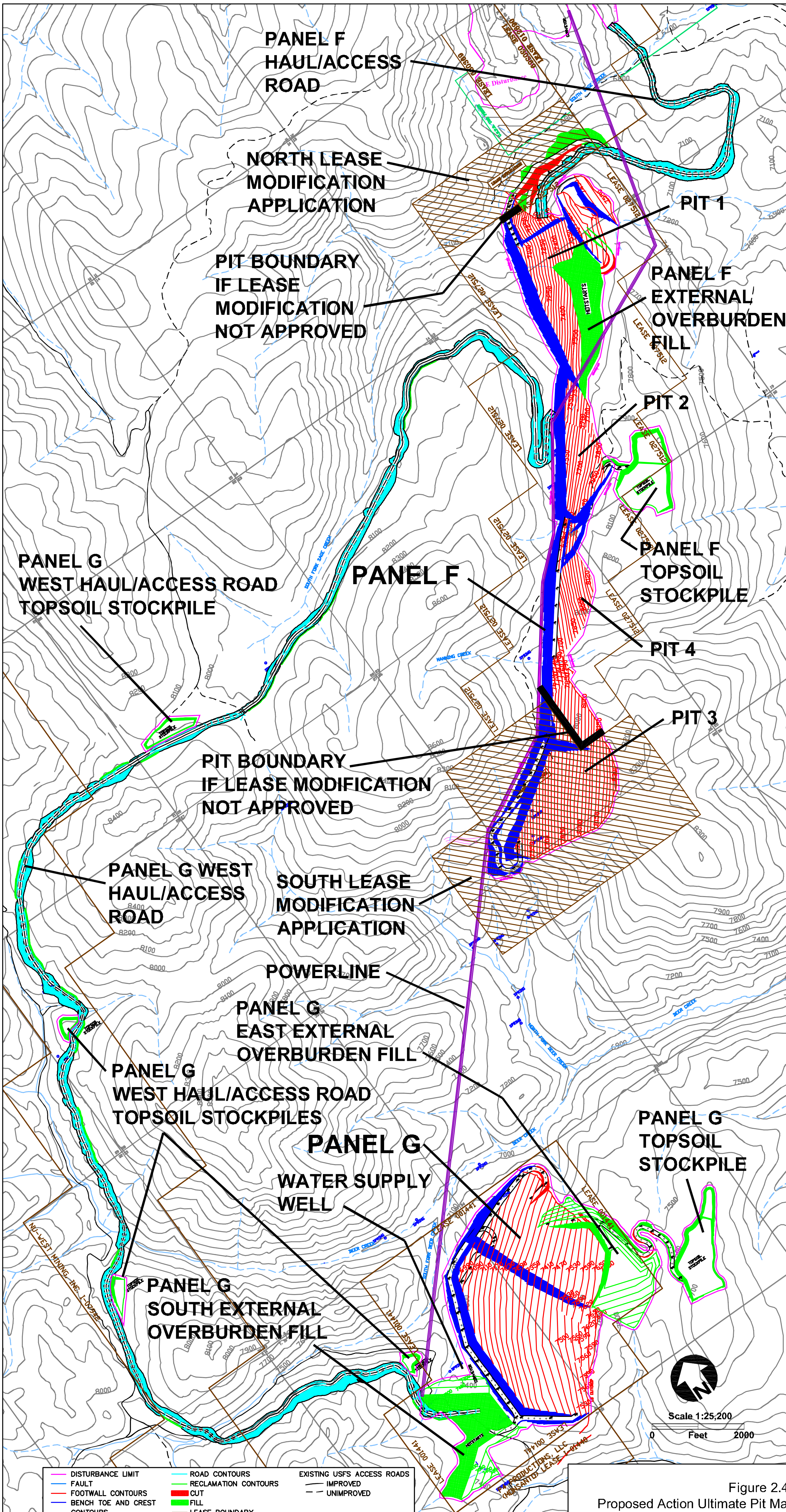


Figure 2.4-1
Proposed Action Ultimate Pit Map
Smoky Canyon Mine Panels F and G

If approved, mining is proposed to begin in Panel F in 2006-2007, toward the end of mining in the existing Panel B. At full ore production rate, the mine life of Panel F, including both lease modifications, would be about 7 years. If the lease modifications were not approved, mining in Panel F would be completed in about 4.5 years. Mining in Panel G would take between 6 and 8 years, at full ore production rate. Concurrent reclamation work is proposed and would continue for approximately 2 years following completion of mining in each panel. The conceptual time line for the Proposed Action is shown in **Table 2.4-1**. The actual time line for the proposed mining operations could be different than shown due to a number of factors including: mining technology, markets and economic constraints, company planning, natural site conditions, and government approvals.

TABLE 2.4-1 ESTIMATED CONCEPTUAL TIMELINE FOR PANELS F & G PROPOSED ACTION

ACTIVITY	START (MO)	DURATION (MO)	END (MO)
Start Project	0	0	0
Initial Timber Removal Panel F	1	3	4
Panel F Haul/Access Rd Construction	1	4	5
Mining in Panel F	6	76	82
Reclamation in Panel F	24	76	100
Initial Timber Removal Panel G	70	3	73
Panel G Haul/Access Rd & Power Line Construction	66	12	78
Mining in Panel G	78	96	174
Reclamation in Panel G	96	96	192
Reclamation of Panels F and G Haul/Access Roads	180	12	192

The proposed mine panels would be operated 24-hours per day throughout the year with crews working overlapping shifts. Hard (chert and limestone) overburden would be drilled with a blast hole drill. The blast holes would be loaded with a mixture of ammonium nitrate and fuel oil (ANFO) and then typically detonated once every two to three days. Blasting would take place during daytime hours only. Softer (shale) overburden would be ripped with tracked dozers. Excavators would load ore and overburden into off-road-type haul trucks at the active mining face in the pits. Ore and overburden would be loaded into 150-ton rear dump haul trucks. Depending on the concentration of phosphate mineral in the rock, the trucks would deliver the material to the mill ore stockpile, external overburden disposal areas, or previously mined pits as backfill.

Water trucks would be used to water haul roads, ancillary roads, and the pit floors as needed to control dust. Roads would also be maintained with road graders. Other equipment used in the operation would include: pickup trucks, service trucks, maintenance trucks, explosives trucks, and other miscellaneous support equipment. The mining operations proposed for Panels F and G would include the general mining sequence described in **Section 2.3.4**.

Haul/Access Roads

Initially under the Proposed Action, a new haul/access road would be constructed from the existing roads in the south end of Panel E approximately 2.5 miles to the proposed Panel F (Panel F Haul/Access Road) (**Figure 2.4-1**). Before operations begin in Panel G, another haul road (Panel G West Haul/Access Road on **Figure 2.4-1**) would be built to transport ore from the southwestern end of Panel G to Panel F where it would join the haul road in that panel. Portions of these roads would be constructed within USFS IRAs outside of the existing Simplot leases. These roads would be used for general mine access from the existing Smoky Canyon Mine and to haul ore and overburden in 150-ton haul trucks. A typical cross section of these roads is shown in **Figure 2.4-2**. During road construction, topsoil would be removed from the disturbance area and stockpiled in windrows along the margins of the disturbance area and in discrete topsoil piles as shown on **Figure 2.4-1**. Cut slopes along the haul/access roads would vary to a maximum slope of 1h:1v. Fill slopes would be constructed at the angle of repose, approximately 1.5h:1v. The total disturbance width of the haul/access roads would vary from about 100 to 500 feet. The road disturbance statistics are shown in **Table 2.4-2**:

TABLE 2.4-2 PROPOSED ACTION HAUL/ACCESS ROAD DISTURBANCE

FEATURE	PANEL F HAUL/ ACCESS ROAD	PANEL G WEST HAUL/ ACCESS ROAD
Total Length (driving miles)	2.6	7.8
Total Disturbance (acres, outside of pits)	66.5	217.3
Acres on Lease	5.1	20.6
Acres off Lease	61.4	196.72
Acres Outside of IRAs	42.3	117.7
Total Acres in IRAs	24.2	99.6
Acres in IRAs off Lease	19.2	96.4

Note: Includes all disturbance in the road corridor including cut and fill slopes, and topsoil stockpiles.

Plans for construction of the Panel F Haul/Access Road include the use of low selenium overburden and material from road cuts. The maximum road grade would be 9.5 percent, as dictated by Simplot's safety policy concerning maximum ascent/descent grade of a loaded haul truck. A crossing is proposed at the intermittent channel of South Fork Sage Creek with a, circular culvert approximately 230 feet long. This and other stream crossings in areas of known fish and amphibian habitat would be designed with circular culverts placed to pass fish and amphibians in accordance with CTNF requirements. The selection of circular culverts for this Project followed an evaluation of stream crossing designs for fish passage based on available literature and monitoring data obtained from the existing Sage Creek haul/access road culvert at the Smoky Canyon Mine (**Appendix 2A**).

Design, construction, operation, and reclamation of the haul/access roads planned for the Panels F and G Project would be in accordance with applicable state and federal requirements for protection of water quality. Detailed designs for the haul/access roads that are eventually selected by the Agencies would be provided by Simplot for review and approval before construction. To support the environmental analyses in this EIS, Simplot provided the Agencies with the Haul and Access Roads Environmental Commitments and BMPs document included in **Appendix 2B**.

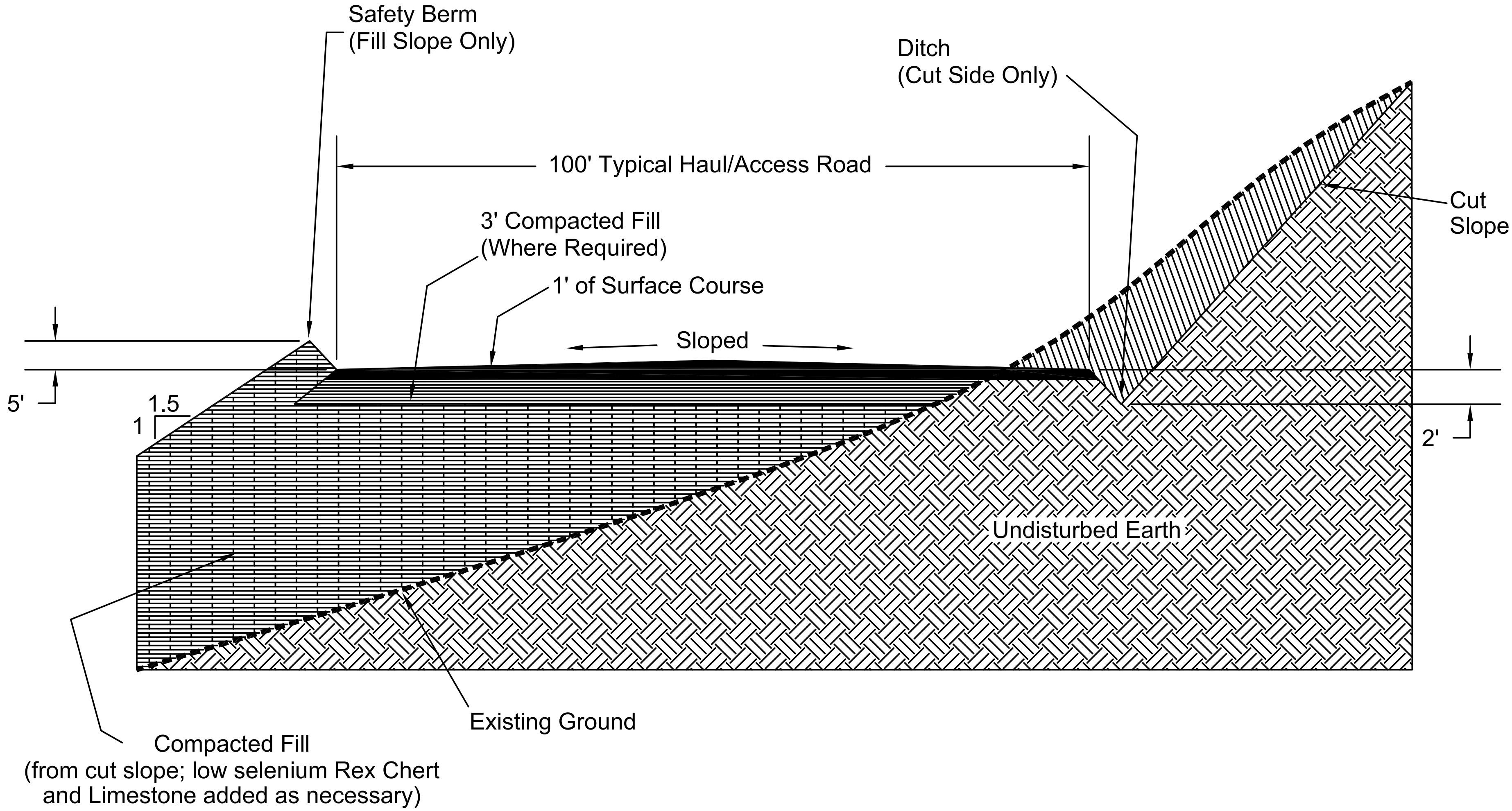


Figure 2.4-2
Typical Haul/Access Road
Smoky Canyon Mine Panels F and G

The Panel F Haul/Access Road would cross and cut off the existing dirt road in South Fork Sage Creek Canyon for the duration of the Proposed Action. This haul/access road would be used for mine personnel access and hauling ore from Panel F to the existing mill stockpile, approximately 4.6 miles to the north. This road crosses USFS land outside of the existing Panel F lease boundary and enters the north end of the Panel F lease at a specific location to allow ore extraction down to this elevation. This haul/access road could be authorized with approval of a USFS SUA, or with the combination of the North Lease Modification and a SUA. As Panel F is developed from north to south, this haul road would be extended approximately 2.6 miles to the south end of the panel.

Construction of the Panel G West Haul/Access Road is planned to provide access from Panel F to Panel G. It too would be built of low selenium overburden and material from road cuts. Where it crosses Meade Peak Shale, seleniferous shale excavated in full-face road cuts would be hauled to overburden fills at the mine panels. No seleniferous shale would be used in road fills. The road would be constructed west from Panel F along an existing, reclaimed timber sale road corridor on the south slope of South Fork Sage Creek Canyon to the Sage Meadow area. From this point, the road would be built over a pass to the east side of the summit between Deer Creek (to the south) and Diamond Creek (to the north). From this point, it would be routed south on the east side of Deer Creek to South Fork Deer Creek. It would cross the perennial Deer Creek and South Fork Deer Creek with culverts that are 280 and 260 feet long, respectively (refer to **Figure 2.4-1**). The haul road would also cross the existing USFS road approximately at the same point it crosses South Fork Deer Creek. The haul/access road would then be routed east in the South Fork Deer Creek Canyon uphill (south) of the existing USFS road in this canyon and cross the USFS road approximately at the Panel G staging area. Due to safety concerns, the Panel G West Haul/Access road would be restricted to mine traffic only. Sections of this road would fall within the existing Conda Partnership Phosphate Lease I-07942 and accommodations would be made by Simplot with the lease owners for any ore grade material excavated during construction of this road.

Where the haul road crosses the existing USFS access road near the Georgetown turnoff the routes would cross at grade. There may be temporary road closures in order to place and grade material during construction, but it is anticipated that this would normally be a matter of hours or at the most, a day or two. Signs, road cones, barriers and construction personnel would be used to warn and redirect traffic during these construction-period road closures. Once the “at grade” intersection is completed, warning signs would alert drivers of the haul truck traffic and direct them not to turn onto the haul road but to proceed with caution across the haul road. Haul trucks would have the right of way at these crossings.

The existing USFS access road across the planned staging area, located southwest of the proposed Panel G pit, would also have to be rerouted. The depth of the access road chert cover over the existing topography at this location would be 50 feet or less. This rerouting of the USFS access road can be completed and in place prior to the staging pad construction. There may be temporary road closures in order to place and grade material during construction, but it is anticipated that this would normally be a matter of hours or at the most, a day or two. Signs, road cones, barriers and construction personnel would be used to warn and redirect traffic during these construction period road closures. During the placement of overburden fill material for the completion of the staging area, berms would be in place on either side of the USFS access road to keep vehicles of the general public from straying into the active mine site area. Signs would be posted along this portion of the access road reroute to indicate that this is an active mine area and that no stopping or parking would be allowed. The berms along the rerouted USFS road would also be high enough to keep the haul trucks from entering the USFS public access road. The haul trucks would only be able to cross the USFS public access route within the staging area at one point. This point would be a gated, attendant-operated crossing, whose purpose would be to stop the general public momentarily in order to allow mine traffic to access either side of the staging area.

During construction of the haul/access roads, topsoil would be stockpiled in windrows along the uphill edge of the road disturbance or in discrete topsoil stockpiles. These additional disturbances have been included in the overall acreages shown for the haul/access roads in this EIS.

Facilities

The existing Smoky Canyon Mine, maintenance, administrative, and milling facilities would continue to be used for the Proposed Action. However, because Panels F and G lie several miles south of the current maintenance and fuel facilities, proposed new mine support facilities at the new panels would include: equipment ready lines, electrical substations, warehouse and storage areas, lunch rooms, repair shops, restrooms, fuel and lubricant storage and dispensing facilities (hot starts), and blasting supplies storage.

Water for dust control for the Panel F operations would be hauled from the existing source at the Smoky Canyon Mill. Because of the longer distance to Panel G, a water supply well with an annual average pumping rate of 100 gpm would be installed at the facilities area to supply water necessary for mining operations.

Electric power for the proposed mining operations would be provided with a 25kV power line extending southward from the existing power system in Panel E across South Fork Sage Creek Canyon through Panel F along the western edge of the proposed pit limits. The power line would then cross the North Fork and Main Fork of Deer Creek into the southwestern portion of Panel G (**Figure 2.4-1**). The total length of this new power line from Panel E to Panel G would be approximately 6 miles, of which about 4.6 miles would cross undisturbed areas, and the rest would be within the mine panel disturbance. The power line would consist of approximately 30-foot tall, single wooden poles with an average conductor span of approximately 330 feet. Approximately 16 structures per mile would be needed. All creeks would be spanned and a 50-foot wide corridor (25 feet on either side of the center of the power line) would be maintained in order to prevent trees from falling on the line. Any cut down trees would be left in place. A helicopter would be used to install all power poles situated off existing lease areas under a SUA issued by the USFS. All pole holes off lease would be dug by hand or with the aid of airlifted equipment. A total of four conductors would be installed on the poles and cross arms. Staging and pulling stations would only be situated on existing lease areas. The 50-foot wide corridor would result in a maximum corridor footprint total of approximately 28 acres, although actual ground surface disturbance from installation of the line would be much less. Assuming a 25-foot radius circular area of temporary surface disturbance around each pole location, actual surface disturbance for the approximately 4.6 mile line located outside of the Panel F and G mine disturbance areas would total approximately 3.0 acres of new surface disturbance (74 poles).

Pits and Overburden

The development of the full Panels F and G (including both lease modifications for Panel F) would require removal and handling of over 100 million (MM) in-place or Bank Cubic Yards (BCY) of overburden. Of this total, 89 percent would be used to backfill the mined out Panels E, F, and G pits, and 11 percent would be placed external to the pits.

Salvageable topsoil would be removed from the proposed mine disturbance areas and temporarily placed in stockpiles shown on **Figure 2.4-1** or immediately moved to previous, mined-out areas that have been regraded and are ready to receive topsoil for reclamation.

A total of four individual pits are proposed for Panel F (**Figure 2.4-1**). The proposed sequence for Panel F mining would be Pit 1, 2, 3, and 4. Approximately 6.1 Million Loose Cubic Yards (MM LCY) of overburden generated from Pit 1 in Panel F would be trucked to the existing Panel E open pit to backfill an area of about 29 acres in Pit E-0 of Panel E (**Figure 2.4-3**). Another 0.5 MM LCY of Panel F chert overburden would be used to build the haul road between Panels E and F. Approximately 1.3 MM LCY of chert overburden would be used to build the haul road between Panels F and G. The volume of LCY is greater than BCY because of the 30 percent swell caused by breaking up the rock. Panel E is currently permitted to be completed with a remaining open pit (E-0) in its south end, but the Panel F overburden would be used to backfill this open pit. The total overburden volume (backfill and external) and area of Panel E is 66.9 MM LCY and 465 acres, so the amount of overburden contributed by Panel F would be relatively small in comparison, but would complete the reclamation of Panel E. In addition, backfilling of the E-0 pit reduces the potential volume of the external overburden fill at Panel F by 6.1 MM LCY.

Approximately 4.8 MM LCY of excess overburden from the remainder of Pit 1 in Panel F would be permanently placed on a 38-acre external overburden fill area on-lease (Panel F External Overburden Fill on **Figure 2.4-1**). The overburden placed in this fill would include seleniferous material. This overburden disposal area would also be used as the location for mining equipment staging, a hot start facility, and other temporary mine support facilities. As designed, most of the surface on which this external fill is placed would drain back into the pit. Remaining overburden from subsequent pits in Panel F would be placed as backfill in Panel F.

Only one large pit is proposed for Panel G. Overburden generated from mining Panel G would be largely used as backfill in the Panel G open pit. Excess overburden would be permanently placed in two external overburden fills adjacent to the open pit area. One external overburden fill would hold 4.1 MM LCY of mixed run-of-mine (ROM) overburden on 64 acres east of the Panel G pit (Panel G East External Overburden Fill on **Figure 2.4-1**). The other external overburden fill would hold 4.3 MM LCY of chert overburden on 74 acres southwest of the pit (Panel G South External Overburden Fill on **Figure 2.4-1**). This southern overburden disposal area would be used as the location for mining equipment staging, a hot start facility, and other temporary mine support facilities. A water supply well would also be installed at Panel G to provide water for mining operations. This well would have an instantaneous pumping capacity of 500 gpm and an annual average withdrawal rate of 100 gpm.

The Panel G East External Overburden Fill would be too large to fit within the existing Deer Creek Lease and would extend off the existing lease onto USFS land. To enable this, the BLM and USFS would need to issue appropriate land use authorizations to cover the approximately 18 acres of overburden fill extending off lease shown on **Figure 2.4-1**.

Disturbance Areas and Reclamation Activities

The disturbance areas for the Proposed Action are shown in **Table 2.4-3**.

TABLE 2.4-3 PROPOSED ACTION DISTURBANCE AREAS (IN ACRES)

AREA	ROADS	PITS	EXTERNAL OVERBURDEN FILLS	OTHER*	TOTAL
Panel F on lease (roads acreage outside of pit limits)	5	295	38	28	366
Panel F Off Lease (Special Use Authorization)	39	0	0	20	59
North Lease Modification	23	2	0	0	25
South Lease Modification	0	138	0	4	142
Panel G on lease (roads acreage outside of pit limits)	21	328	120	4	473
Panel G Off Lease (Special Use Authorization) Includes haul road stockpiles for road	196	0	18	61	275
Total	284	763	176	117	1,340

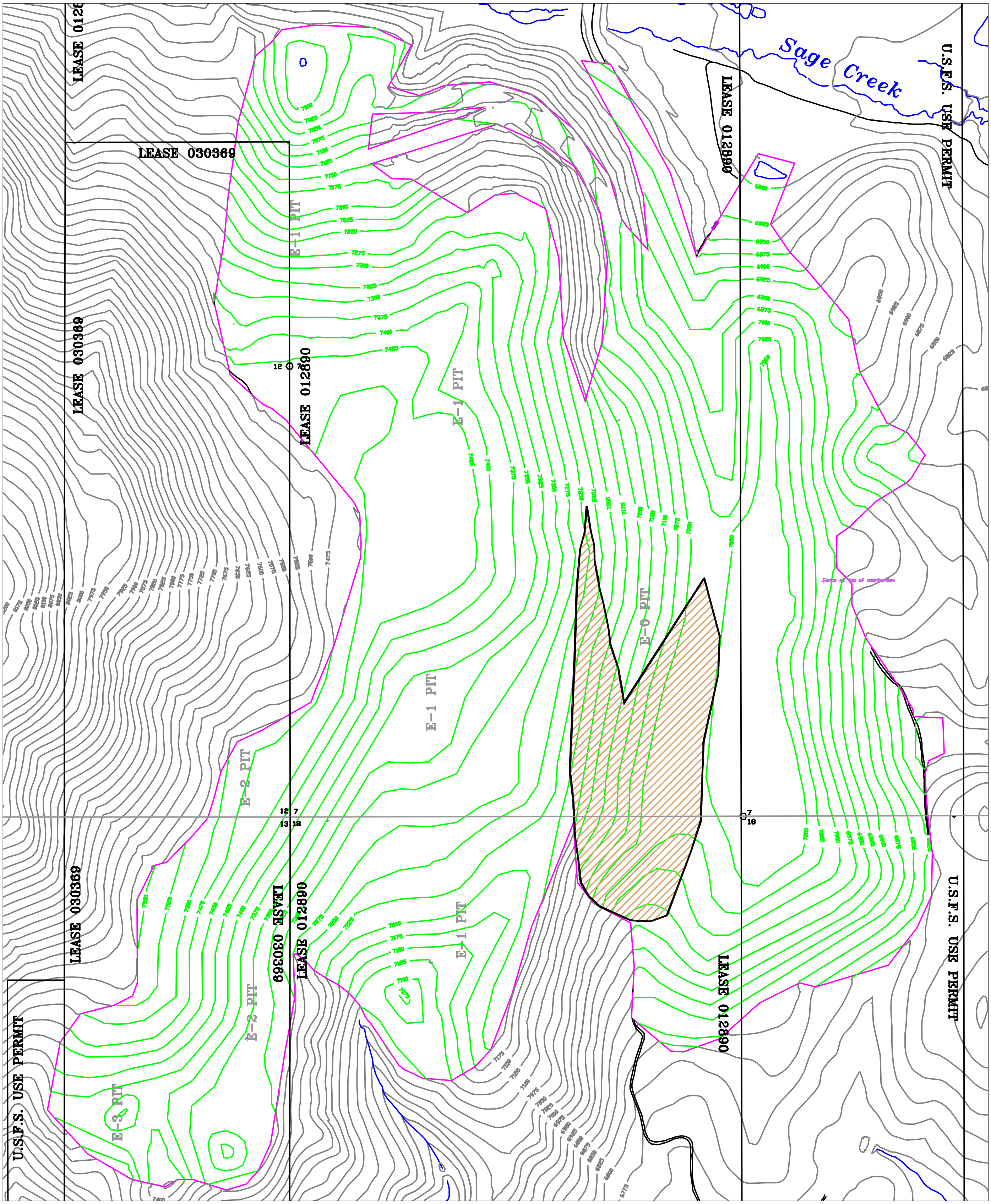
* Settling ponds and ditches, topsoil stockpiles, and power line

Disturbed lands directly resulting from the Proposed Action would total 1,340 acres. New pits would disturb approximately 763 acres, of which approximately 717 acres would be backfilled and reclaimed. Forty-six acres of highwall and pit bottoms would remain after reclamation is complete. Approximately 29 acres of the Panel E open pit (currently approved and active) would be backfilled and reclaimed with overburden from Panel F. The rest of the disturbed acreage would consist of approximately 284 acres of roads, 176 acres of overburden disposal areas, 117 acres of runoff management facilities, power line, and topsoil piles for the mine pits (topsoil stockpiles for roads are included in the road disturbance figures), all of which would be reclaimed, with the exception of portions of haul/access roads that would not be reclaimed (see explanation below).

The design of the Panel F and G pits is such that the maximum vertical height of any highwall is 350 feet or less. Because of the 20 years of mining experience at the Smoky Canyon Mine, Simplot is confident they would be able to mine to these depths. Slope stability aspects would be closely monitored during mining to adjust maximum mining depths if significant slope instability becomes a concern. The disturbance area boundary for permitting is purposely placed 50 feet beyond the designed pit limits and other disturbances to allow for tree removal above a highwall and to remove unconsolidated materials per MSHA regulations.

Public and Tribal member motorized access to the active mining areas (including mining roads) would be controlled by Simplot for the duration of the active mining operations. Non-motorized access across active mining areas would typically be unrestricted but may be restricted by Simplot if necessary for public safety. This motorized access would be re-established to reclaimed mined areas, in concert with the USFS, when reclamation activities are judged to be completed by the Agencies.

Grazing would be controlled by Simplot in active mining areas with fencing and coordination with the USFS and grazing permittees. Grazing controls would be practiced until reclaimed areas are deemed ready for grazing by the USFS.



N

Scale 1:9600

0 Feet 800

Disturbance Limit

Pit E-0 Area

Green contours are proposed final configuration

Figure 2.4-3
Pit E-0 Area to be Backfilled from Panel F
Smoky Canyon Mine Panels F and G

At the end of mining operations, Panels F and G would be largely backfilled with overburden and the pit areas would resemble natural contours (**Figure 2.4-4**). However, a 38-acre portion of Panel F would not be backfilled, which would leave part of the pit footwall and two remaining highwalls exposed; one would be 2,200 feet long with a maximum height of 250 feet, and the other would be 2,600 feet long with a maximum height of 175 feet. The remaining footwall of this open pit would be approximately 400 feet high and 1,000 feet long (measured up and down the slope). An 8-acre portion of the Panel G highwall 2,600 feet long and up to 250 feet high would be left exposed in the final configuration of this pit. These highwalls would be benched and have overall slope angles of 49 degrees (0.9h:1v).

Certain portions of the haul/access roads are proposed to be built across some areas of natural slopes that are steeper than 33 percent (3h:1v). In these areas, some lower portions of road fill slopes would be beyond the reach of an excavator to bring the fill material back up into the cut and would not be reclaimed. In addition, final reclaimed road areas would have maximum slopes of 3h:1v, which is the practical limit of safe operation for reclamation construction equipment working on sloping surfaces. It also provides a stable reclamation slope that would not be an erosion problem and meets the intent of RFP guidelines. Where road cuts would be necessary in natural slopes greater than 3h:1v, the upper portions of the road cuts would not receive backfill or be reclaimed. Basically, this means that for road disturbances across natural slopes, less than 33 percent, there would be full recontouring and reclamation, and for original slopes greater than 33 percent there would not be full recontouring or reclamation. The areas of the haul/access roads that would not be reclaimed are shown on **Figure 2.4-4**.

If the Panel G West Haul/Access Road was selected by the Agencies and eventually constructed, it would not be fully reclaimed like the other haul/access roads. The CTNF has requested that Simplot leave a 20-foot wide, public access road along the portion of the haul/access road from Panel G to the summit between Deer Creek and Diamond Creek (**Figure 2.4-4**). This new road would be turned over to the USFS to replace the existing USFS road between Panel G and the mouth of South Fork Deer Creek (Wells Canyon Road, FR 146) and the existing USFS road between the Georgetown Canyon road and the summit between Deer Creek and Diamond Creek (Diamond Creek Road, FR 1102).

The existing USFS roads that would be replaced by this new road are, in places, narrow, steep, and/or located in Aquatic Influence Zones (AIZs). The replacement road would have a uniform width, maximum grades of 9.5 percent, and be located higher on the slopes above South Fork Deer Creek and Deer Creek to avoid paralleling these stream channels in the drainage bottoms like the existing road. When the new road is ready for public access, connections between the new public access road and the existing Wells Canyon, Diamond Creek, and Georgetown Canyon roads would be constructed. Simplot would then reclaim the portions of the existing USFS roads that would no longer be required. Along these reclaimed access roads, all drainage features, i.e. culverts, would be removed, and any fill across natural drainages would also be removed. The old road surface would then be ripped, and the fill portion of the old road template would be pulled back into the road. The final surface would then be graded and revegetated.

At stream crossings, the haul/access roadway width would also be reduced from 100 feet to 20 feet. The width of the fill crossing the streams would be reduced by an equal amount, and the culverts would be cut back and removed accordingly. The road grade for the public access road would not be altered from the haul/access road at these stream crossings.

Following regrading activities, topsoil would be applied to a thickness of 1 to 3 feet, scarified, fertilized and seeded with the specified revegetation seed mix.

The revegetation of the reclaimed areas related to the mine panels and haul/access roads would primarily be with quick establishing, short-lived native and introduced grass species along with long-lived native bunch grasses and forbs. **Table 2.4-4** provides a list of grasses and forbs that could potentially be used in the seed mix. A goal of the revegetation would be to establish healthy native bunch grass communities that are structurally diverse and would allow for succession over time. The forb component would be seeded at a low rate of approximately 1 - 8 seeds per square foot.

Other native forbs, shrubs and trees would be seeded or planted in clusters where they are most likely to establish (i.e. appropriate aspect, soil depths and soil maturity for the given species) and where there are little or no concerns relative to the integrity of the overburden caps or potential selenium uptake. These areas of more diverse seeding and planting can be referred to as “islands of diversity”. The individual plants can act as mother plants by producing seed for the gradual increase in diversity of the disturbed areas overtime.

TABLE 2.4-4 PROPOSED LIST OF APPROPRIATE REVEGETATION SPECIES

SPECIES	SUGGESTED RELEASES[1]
GRASSES	
Big Bluegrass	Sherman
Bluebunch Wheatgrass	P-7
Bottlebrush Squirreltail	Sand Hallow
Great Basin Wildrye	Magnar, Trailhead
Idaho fescue	Joseph, Nezpurs
Junegrass	Currently no released cultivars or selected class germplasm
Mountain Brome	Bromar, Garnet
Sandberg Bluegrass	Canbar, High Plains Germplasm
Slender wheatgrass	Primar, Pryor, Revenue, San Luis
Western Wheatgrass	Rosana
Sterile or cover crop grain (species not specified)	Example: Regreen, annual rye, Quickguard (sterile triticale), etc.
FORBS	
Blue Flax	Appar, Maple grove
Showy Goldeneye	Currently no released cultivars or selected class germplasm
Western Yarrow	Locally adapted ecotypes
Sticky geranium	Currently no released cultivars or selected class germplasm
Silky lupine	Currently no released cultivars or selected class germplasm
Clover	Releases with shallow or no taproot

[1]Listed are currently available cultivars and selected class germplasm that are relatively adapted to the site. Additional cultivars and other releases may become available in the future that are more adapted and genetically appropriate for the site.

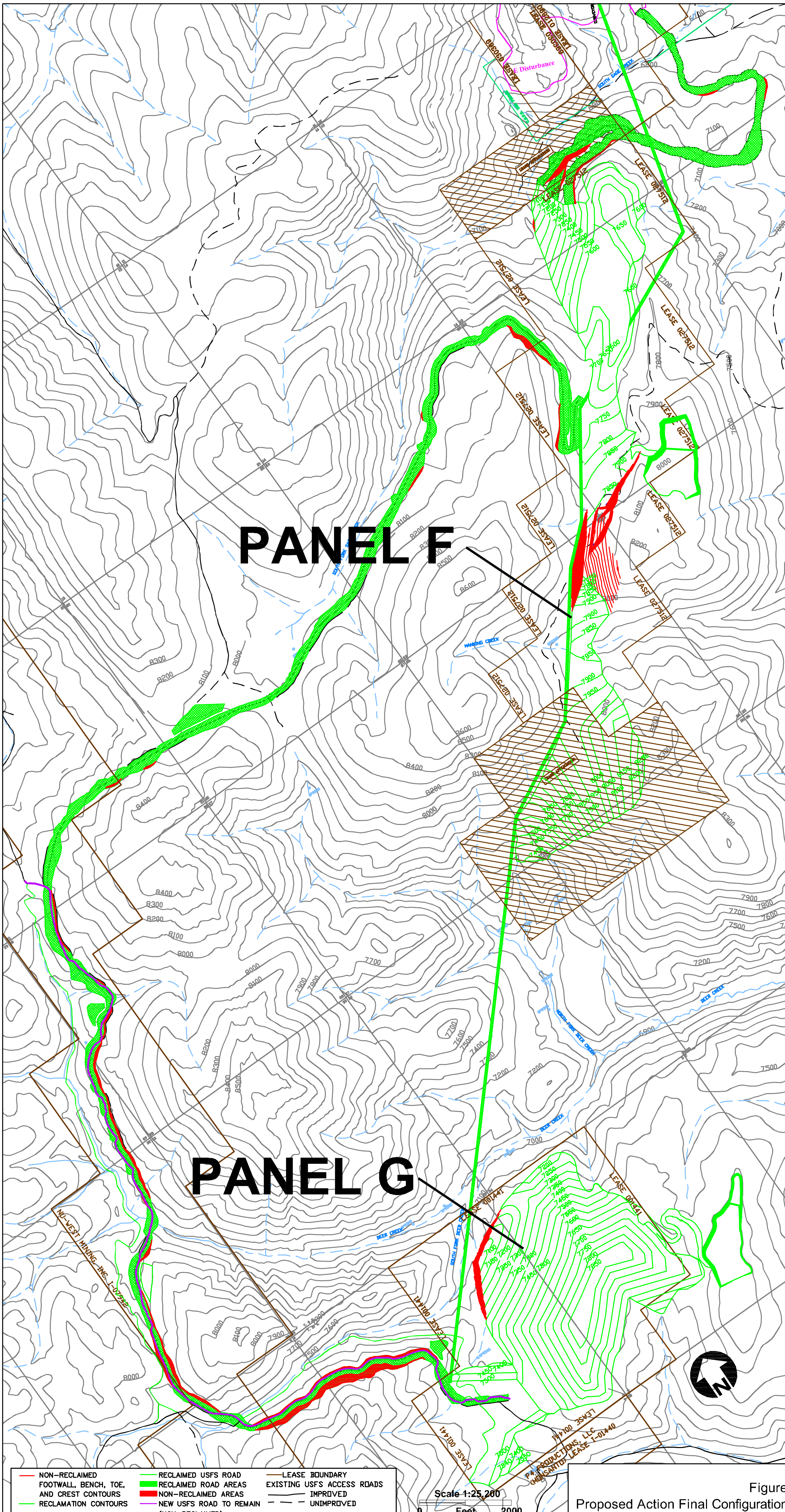


Figure 2.4-4
Proposed Action Final Configuration Map
Smoky Canyon Mine Panels F and G

Disturbance and reclaimed areas for the Proposed Action are shown in **Table 2.4-5**.

TABLE 2.4-5 COMPARISON OF DISTURBANCE AND RECLAMATION AREAS FOR THE PROPOSED ACTION

AREA	ROADS		PITS		EXTERNAL OVERBURDEN		OTHER*		TOTAL	
	DIST	RECL	DIST	RECL	DIST	RECL	DIST	RECL	DIST	RECL
Panel F on lease	5	4	295	257	38	38	28	28	366	327
Panel F Off Lease (SUA)	39	39	0	0	0	0	20	20	59	59
North Lease Mod.	23	20	2	2	0	0	0	0	25	22
South Lease Mod.	0	0	138	138	0	0	4	4	142	142
Panel G on lease	21	20	328	320	120	120	4	4	473	464
Panel G Off Lease (SUA)	196	176	0	0	18	18	61	61	275	255
Total	284	259	763	717	176	176	117	117	1,340	1,269

* Settling ponds and ditches, topsoil stockpiles, and power line.

2.5 Proposed Action Environmental Protection Measures

The Proposed Action is an extension of the existing Smoky Canyon Mine operations and the environmental and safety protection measures already being implemented and employed at the existing mining operations (see **Sections 2.3.4** to **2.3.11**) would be utilized in the new Panels F and G and associated haul/access roads. Applicable Standards and Guidelines, as outlined in the USFS RFP, have been evaluated by resource and considered for incorporation into the environmental protection measures for the Proposed Action. Specific environmental protection measures that would apply to the Proposed Action include the following:

2.5.1 Cultural Resources (including Paleontological Resources)

The proposed disturbance areas for the Proposed Action and haul/access road alternatives were inventoried for cultural resources during recent baseline surveys. Reports on these investigations, including descriptions of any discovered historic site or cultural materials, were provided to the regulatory agencies. State Historic Preservation Office (SHPO) concurrence has been received and/or requested by the USFS for all areas that have been inventoried. If unanticipated cultural materials, historic sites, or vertebrate macro-fossils (exclusive of disarticulated fish parts) are encountered during mining, the USFS and the BLM would be notified, and operations would be halted in the vicinity of the discovery until inspected by a professionally trained archaeologist or paleontologist, and a mitigation plan developed, if necessary. Vertebrate macrofossils would be avoided to the extent possible until the USFS or BLM conduct field surveys as needed to determine the significance of the fossils. At the discretion of the USFS or BLM, these fossils would be avoided for a length of time that is reasonable to allow Agency personnel to conduct the field surveys.

2.5.2 Air Quality

Dust from drilling activities would be controlled with dust collectors mounted on the drill rigs or with water. Fugitive dust from traffic on unpaved haul and access roads would be controlled with dust suppressant water applied by water trucks. Dust suppressing chemicals such as magnesium chloride and calcium chloride would also be used on roads as needed.

2.5.3 Soil

Available and suitable topsoil resources in the proposed mining disturbance areas have been described with baseline surveys. Suitable topsoil and growth medium would be salvaged during pre-stripping from proposed disturbed areas for use in reclamation. Soil suitability would be determined by US Department of Agriculture (USDA) Forest Service Soil Salvage guidelines (USDA 2003a). Soil that is salvaged would either be transported directly to areas being reclaimed or would be temporarily stockpiled.

Soil stockpiles would be protected from erosion by seeding and establishment of short-term vegetation cover. They would be built with as little compaction as possible and located out of traffic areas to minimize compaction from equipment.

Reclamation of disturbed areas that are no longer required for active mining operations would be conducted concurrent with other mining operations. Soil that is applied to reclaimed areas would be applied to a thickness of 1 to 3 feet with minimal compaction and protected from erosion through revegetation and use, as necessary, of: run-on controls, mulch, swales, terraces, silt fences, and other erosion control measures. Areas that are left unreclaimed due to equipment restraints would be stabilized using approved BMPs.

2.5.4 Vegetation

Timber would be cruised and then harvested from proposed disturbance areas as directed by the USFS. Simplot would purchase all cruised timber at the market value appraised at the time of harvest. Non-commercial timber, brush and slash would be stockpiled for use as runoff and sediment control brush barriers along the downhill margins of disturbed areas. Small brush and slash would be incorporated in the topsoil when it is salvaged.

Revegetation of disturbed areas would be conducted during reclamation activities by seeding and planting with the vegetation species mix approved by the USFS. Seeding of the approved reclamation seed mix would proceed no later than the first fall after a regraded area is covered with topsoil.

In order to control and prevent the spread of noxious weeds, Simplot would comply with the CTNF Integrated Pest Management Strategy approved in 1996, and also all off-road vehicles would be cleaned prior to entering the Project Area for the initial time.

Revegetation would be conducted to stabilize reclaimed surfaces with perennial vegetation communities and restore a post-mining land use for multiple use management. Potential species selected for revegetation have been previously identified in **Table 2.4-4**.

Livestock grazing in reclaimed areas would be controlled until the areas have become stabilized and are deemed ready for grazing by the USFS.

2.5.5 Surface Water

Simplot has submitted a set of BMPs for Erosion, Sedimentation and Selenium Control that would apply to the design, construction, operation and reclamation of the Panels F and G mine extension (**Appendix 2C**). Part of that BMP document applies to protection of surface water resources.

Drainage and diversion channels would be constructed to divert run-on water around disturbance areas and collect runoff from disturbed areas to route it to settling ponds and other sediment control features.

Runoff from disturbed areas would be directed to sediment ponds or silt traps to contain sediment in the runoff water. Sediment ponds would be designed for the runoff from the 100-year, 24-hour storm event in the control area, plus a snow melt event. They would be located outside and off of seleniferous overburden fills.

Erosion of channels and fills would be controlled by use of erosion control blankets, vegetation, chert, or limestone riprap or gabions filled with chert or limestone. Culverts would be properly designed for water flow and fish passage and installed for road crossings of waterways.

Snow removal would be practiced to prevent the soil contained in the removed snow from being released outside of the runoff control area and to reduce man-made entrainment of snow in external overburden fills to the extent practicable.

Perennial and significant intermittent drainages would be avoided in location of overburden disposal areas to the extent possible.

Drainage channels that are routed over overburden would be designed to reduce infiltration of channel flow into underlying seleniferous overburden.

Fills for road and parking area surfaces would be constructed of chert and would be designed with slopes and temporary vegetation, as applicable, to stabilize slopes and reduce generation of sediment in runoff from these areas.

Seleniferous overburden would be placed in approved fills and capped with chert and topsoil.

The bottom layer of seleniferous overburden fills would be constructed to reduce the potential for formation of overburden seeps. Low permeability layers of soil or shale in foundations of external overburden disposal area slopes would be modified or removed to avoid the perching of water leading to the formation of overburden seeps.

Surface water resources would be monitored in accordance with an agency-approved Monitoring Plan for the preferred alternative.

2.5.6 Wetlands

Boundaries and characteristics of wetlands and riparian areas in the disturbance footprints of the Proposed Action and Alternatives have been described during recent baseline studies. Disturbance of these areas would be minimized through design efforts. Wetland disturbances would be permitted and mitigated, and/or restored as directed by the USACE.

Runoff from planned disturbances upgradient of wetlands and riparian areas would be controlled to reduce transport of sediment and other contaminants into the wetlands and riparian areas.

2.5.7 Wildlife and Fisheries/Aquatics

Construction in stream channels would be planned in advance to occur during low flows, and the channels and banks would be stabilized against erosion as part of the initial construction.

Culverts in stream channels that are known fisheries would be designed for the passage of migrating fish. Pipes (bypass pipes left in place or installed independently) would also be placed for passage of amphibians in known and/or suspected amphibian habitat areas and near Sage Meadows.

Biological surveys would be conducted in areas planned for disturbance to identify any active nests for TEPCS bird species. Avoidance plans would be developed as necessary before these areas are disturbed.

Drivers would be required to report all collisions on the mine property involving wildlife, and these incidents would be reported to the appropriate agencies. If necessary, mitigation measures would be developed for areas with high collision rates to reduce the collision frequency and vehicle damage.

Aquatic habitat monitoring would be conducted in accordance with the requirements of the Record of Decision and an agency-approved Monitoring Plan for the preferred alternatives.

2.5.8 Groundwater

Simplot has submitted a set of BMPs for Erosion, Sedimentation and Selenium Control that would apply to the design, construction, operation and reclamation of the Panels F and G mine extension (**Appendix 2C**). Part of that BMP document applies to protection of groundwater resources.

Covering natural seeps and springs with overburden would be avoided to eliminate introduction of water into seleniferous overburden from these sources.

Overburden final slopes would be graded to promote runoff and avoid ponding to reduce infiltration from precipitation and snowmelt.

Runoff and sediment control facilities would be located off overburden fills to the extent feasible to reduce infiltration of collected water into seleniferous overburden.

South- and west-facing aspects have been incorporated into final overburden fill slopes as possible to enhance evapotranspiration and reduce infiltration. Topsoil and vegetation would be re-established on overburden disposal areas to enhance evapotranspiration of precipitation.

Runoff from haul road drainage ditches onto external seleniferous overburden fills would be avoided.

Stockpiled areas of snow would be controlled and placed in areas to reduce infiltration or mixing of snow or snow melt into/with external overburden to the extent practicable.

Seleniferous overburden would be mined and disposed of in a timely manner to reduce exposure of this material to surface weathering and oxidation, the process that liberates soluble selenium compounds. Overburden has been characterized to determine selenium containing (seleniferous) lithologic units that can generate problematic leachate or promote bioaccumulation. Overburden from these lithologic units would be selectively handled to reduce its exposure to surface environments. Surface area of seleniferous overburden fills would be reduced by design to the extent practicable to limit the amount of water infiltration and potential release.

Seleniferous overburden fills would be capped with chert and topsoil to reduce exposure of the overburden to vegetation roots, to protect them from erosion, and to promote evapotranspiration from the cap (**Section 2.5.9**).

A vertical drain of low selenium chert would be constructed along the base of the remaining highwall in Panel G to convey surface runoff that would collect there through the pit backfill in low selenium chert instead of allowing it to percolate through run of mine (ROM) overburden. This would reduce the selenium content in this percolating water.

Groundwater would be monitored in accordance with the requirements of the Record of Decision and an agency-approved Monitoring Plan for the preferred alternative.

2.5.9 Overburden Cap

Selenium and other COPCs contained in the seleniferous shale overburden can be mobilized to the environment through a number of pathways including: erosion and transportation as sediment in air or water, dissolution and washing away in surface runoff, dissolution and infiltration in percolating water, vegetative uptake by plant roots, and ingestion of plants subject to selenium bioaccumulation by wildlife and livestock.

Pre-1999 practices in design of the overburden disposal facilities at the Smoky Canyon Mine and other mines typically consisted of handling overburden material as a mixture as it came from the mine pit, sometimes purposely handling it so as to cover the entire surface of the overburden disposal facility with a layer of shale which would presumably weather into a topsoil substitute growth medium. These past practices placed shales, now known to have high selenium concentrations, on the surface of waste piles. The selenium was available for mobilization to the environment in one or more of the release pathways listed above. This practice is no longer in use.

The current technique to reduce the exposure of seleniferous overburden to the surface environment is the placement of topsoil and low selenium chert as a cover (**Figure 2.5-1**). The term “chert” as used in this document refers to overburden with a low selenium concentration and can include chert, cherty limestone, and limestone. Chert of sufficient depth and coarse texture would deter deep root penetration into underlying seleniferous overburden reducing bioaccumulation in reclamation vegetation. Separation of vegetation roots from the seleniferous overburden would be accomplished by the thick chert and topsoil cap. Rooting depths for the grass and forb vegetation mix proposed for reclamation are typically up to about 4 feet, which is less than the thickness of the chert and topsoil cap.

The proposed cap would control erosion by covering all seleniferous overburden on the tops of the overburden fills with at least 4 feet of chert material resistant to weathering and erosion and approximately 1 to 2 feet of topsoil over the chert for a total cover thickness of 5 to 6 feet. All areas of the chert/topsoil cover would also be revegetated to further protect the reclaimed surface from erosion and provide evapotranspiration. Simplot would monitor the reclaimed areas after revegetation is complete to identify erosion potential or problems. Identified problems would be addressed.

Infiltration of precipitation and snow melt into the seleniferous overburden shales would be reduced by a number of features including: 1) producing a final grade on reclaimed surfaces to shed runoff instead of letting it pond and infiltrate; 2) establishing a perennial vegetation cover which would consume soil moisture during the growing season; and 3) providing adequate thickness of topsoil and chert subsoil to retain quantities of annual infiltration in the chert cap, making it available for plants to remove through evapotranspiration during the growing season.

2.5.10 Management of Hazardous Materials

Management of hazardous materials, hazardous wastes, and petroleum products would be in compliance with applicable federal and state requirements and would be the same as currently practiced at the Smoky Canyon Mine (see **Sections 2.3.8** through **2.3.10**).

2.5.11 Inspections, Records and Monitoring

During operations, daily inspections would be made by mine supervisory staff of all active mine operations to ensure they are conducted in compliance with conditions of approvals, applicable permits, and regulations. Records of these observations would be kept in the mine records.

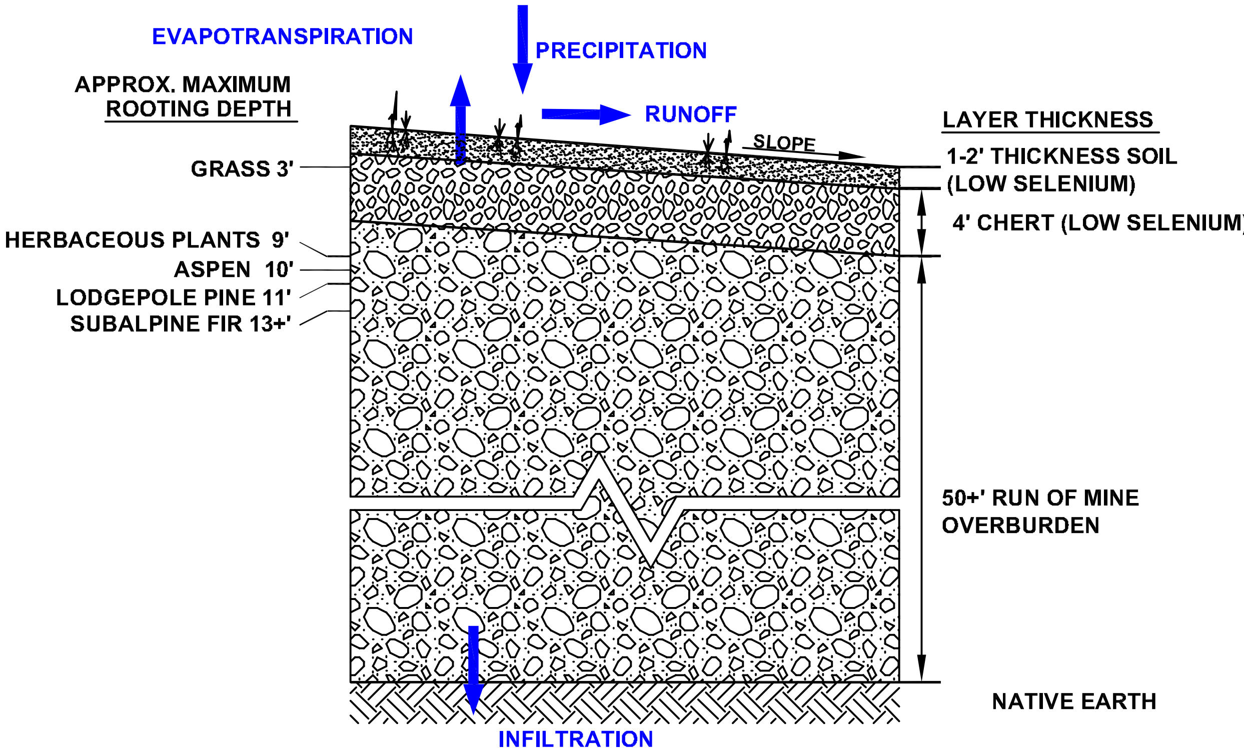
Regular SWPPP and SPCC inspections would be conducted to observe compliance with these plans and detect any conditions requiring modification to maintain compliance with the requirements and operating conditions included in the plans. Necessary maintenance or repair actions would be completed and filed in mine records.

Samples of storm water, groundwater, soil, sediment, aquatic biota, vegetation and surface water would be taken by mine staff and contractors as required in compliance with permits and conditions of approvals.

Simplot has submitted a set of BMPs for Erosion, Sedimentation, and Selenium Control that would apply to the design, construction, operation and reclamation of the Panels F and G mine extension (**Appendix 2C**). Part of that BMP document applies to the types of monitoring that are proposed to track the effectiveness of the various mitigative measures.

2.6 Alternatives to the Proposed Action

The need for a wide, objective review of potential alternatives stems from 40 CFR 1500.2(e), which states that the NEPA process must “identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects of these actions upon the quality of the human environment,” and also as directed under 40 CFR 1501.2(c) which states that agencies need to “study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved resource conflicts concerning alterative uses of available resources...”.



Construction of a chert cap over run of mine overburden is intended to prevent problematic selenium concentrations in the overlying surface ecosystem including the vegetation and runoff. Past testing at Smoky Canyon has shown the chert to be low in selenium content, while other shale overburden can be seleniferous. Covering seleniferous overburden with a 4-foot thick layer of chert and 1 to 2 feet of topsoil would isolate the proposed seleniferous overburden fills from surface weathering, erosion and offsite transport in runoff.

The maximum rooting depths for the grass and forb species initially seeded during reclamation are generally less than one meter (Nobel 1991) and would be largely contained within the topsoil and chert cover above the run of mine overburden. Much of the root mass of trees and shrubs is also within the upper feet of growth medium but the maximum rooting depths of shrubs and trees are greater than grass and forbs. The mean maximum rooting depth from multiple studies of herbaceous plants is about 8.5 feet (Canadell et al. 1996). Stone and Kalisz (1991) reviewed multiple studies and found the maximum rooting depths of quaking aspen were from about 5 to 10 feet , 4 to 11 feet for lodgepole pine, and 5 to 13+ for subalpine fir.

Most of the annual precipitation falling on the cap would be removed from the site by runoff and evapotranspiration (evaporation plus water taken up and given off by plants) from the soil and plants without coming in contact with seleniferous overburden. A small portion of the annual precipitation would eventually percolate out the bottom of the overburden fills into the underlying ground and groundwater.

Figure 2.5-1
Overburden Cap Design
Smoky Canyon Mine Panels F and G

The Alternatives proposed for detailed analysis in this EIS meet the following definitions of a "reasonable alternative":

- Generally meets the Purpose and Need and is needed to address one or more significant issues,
- Would not require significant changes in government policy or legislation (Case Law Natural Resources Defense Council v. Callaway 524 F.2d 79 2cd Circuit, 1975),
- Would avoid or minimize adverse effect of the actions upon the quality of the human environment; and
- Would be subject to the "rule of reason," with the alternative being in proportion to the significance of the environmental impacts related to the proposed action. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense. An alternative that is outside the jurisdiction of the lead agency must still be analyzed if it is reasonable.

A range of alternatives has been considered for this analysis. There are six alternatives for the mining activities, called Alternatives A through F. There are also eight alternatives for the transportation of ore, personnel, and materials, called Alternatives 1 through 8. Finally, the No Action Alternative is also being considered. These mining and transportation alternatives are discussed in the following sections and are evaluated in Chapter 4 along with the Proposed Action. In addition to the alternatives that are being considered in detail, four other mining alternatives and nine transportation alternatives were considered but eliminated from this analysis for reasons described in **Section 2.7**.

The description of existing mine and mill operations contained in **Sections 2.3.4** through **2.3.11** would also apply to the mining and transportation alternatives evaluated in this document. The activities and conditions included in the description of the Proposed Action (**Section 2.4**) would apply to the alternatives, except where specific differences are identified in the descriptions of the alternatives. Finally, the environmental protection measures described for the Proposed Action (**Section 2.5**) would also apply to the alternatives.

When choosing a preferred alternative, the Agencies may choose one or a combination of the alternative components presented here.

2.6.1 Mining Alternatives

The following mining alternatives have been designed in response to scoping input and Agency concerns. Comparisons of the disturbance characteristics for these alternatives are listed in **Table 2.6-1**.

TABLE 2.6-1 SUMMARY OF DISTURBANCE AND RECLAMATION AREAS FOR THE MINING ALTERNATIVES (ACRES)

ALTERNATIVE	A*	B	C	D	E	F
Disturbed Area	1,054 / 918	1,056	1,056	1,193	1,028	1,028
Reclaimed Area	1,008 / 901	1,018	1,056	1,147	982	982
Unreclaimed Area	46 / 17	38	0	46	46	46

* Two values are provided for No North Lease Modification / No South Lease Modification

Alternative A – No South and/or North Panel F Lease Modifications – This alternative analyzes not mining the ore within the north and/or south Panel F Lease modification areas. It addresses scoping concerns about allowing new leases and mining in IRAs. Simplot has applied for a two-part lease modification to expand Federal Phosphate Lease I-27512 for the Panel F operations: a smaller 120-acre lease modification on the northern edge of the lease (North Lease Modification), and a larger 400-acre lease modification on the southern edge of the lease (South Lease Modification) (**Figure 2.4-1**). The Proposed Action assumes both lease modifications would be approved and includes mining plans for these areas. The change in environmental impacts from <u>not</u> issuing these lease modifications and <u>not</u> mining these areas are evaluated in this mining alternative to the Proposed Action.

This alternative addresses the scoping concerns over mining within portions of the Sage Creek IRA that are currently not under lease. Approximately 22 percent of the ore in the Panel F Proposed Action mine plan is situated within the south lease modification area alone (Simplot Mine and Reclamation Plan). The north lease modification is intended to allow mining of phosphate ore while building the Proposed Action haul/access road north of the existing lease, but more importantly, allows mining of the phosphate ore topographically lower than could be accessed from above. Approximately 6 percent of recoverable phosphate reserves in Panel F would be lost without the approval of the Proposed Action Panel F Haul/Access Road. If this alternative were fully adopted, there would be no Panel F mining disturbance outside of the existing Lease I-27512 boundaries. The mining disturbances included in the Proposed Action for the north and south lease modifications would not occur and would be subtracted from the total disturbance included in the Proposed Action, with the exception of the Proposed Action power line that would remain in the same location regardless of this alternative.

If the north lease modification were not approved, the Proposed Action Panel F Haul/Access Road might also not be constructed because it occurs in the North Lease Modification Area and would cross part of the Sage Creek IRA (see Transportation Alternative 1). In this event, the CTNF could possibly issue a SUA for the Proposed Action haul/access road across unleased federal land. If the Proposed Action Panel F Haul/Access Road were not approved, it would be replaced by the Alternate Panel F Haul/Access Road (Transportation Alternative 1), which would enter Panel F south of the Proposed Action road.

If this mining alternative was selected, the pit boundaries for the Panel F operations would be changed on the north and south ends as shown in **Figure 2.6-1**. The main difference between this mine area and the Proposed Action (**Figure 2.4-1**) is that the area of Pit 3 would be greatly reduced and the mine disturbance would not cross over the topographic divide into the Deer Creek drainage. In addition to mining less ore, the reduced mining plan would also involve handling less overburden so the final reclamation contours would be different (**Figure 2.6-2**). The main difference in the final configuration of this alternative and the Proposed Action would be that the remaining highwall would be located in the south end of Pit 1 and the north end of Pit 2 instead of in the north end of Pit 4. The remaining highwall would be approximately 2,400 feet long compared to the 4,800 feet of remaining highwall proposed for Pit 4 in the Proposed Action.

The design of open pit phosphate mines is a balance between recovery of the phosphate ore, and the revenue that ore will produce, with the overall costs of mining and milling the ore.

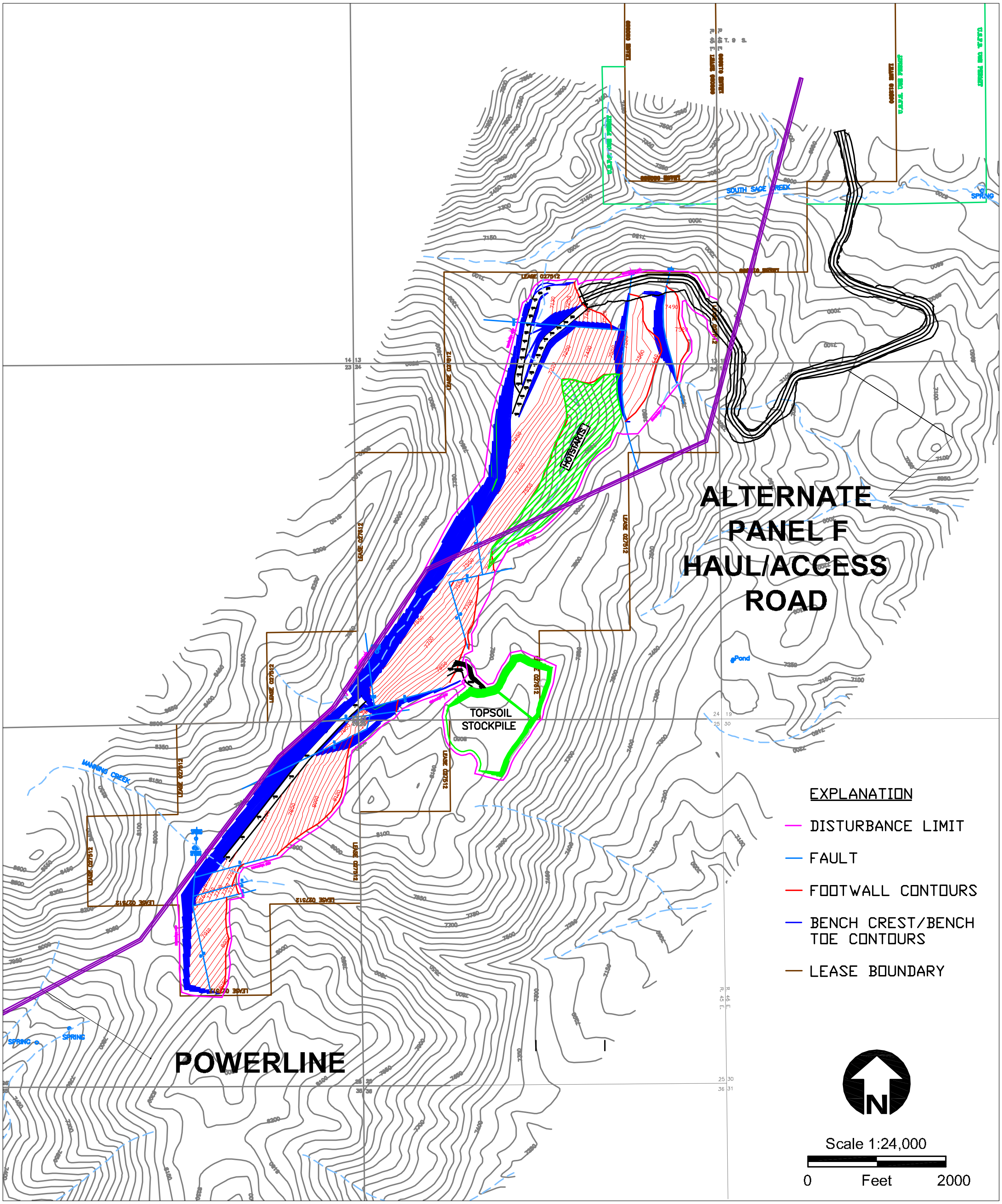


Figure 2.6-1
Alternative A
Panel F Ultimate Pit Map without Lease Modifications
Smoky Canyon Mine Panels F and G

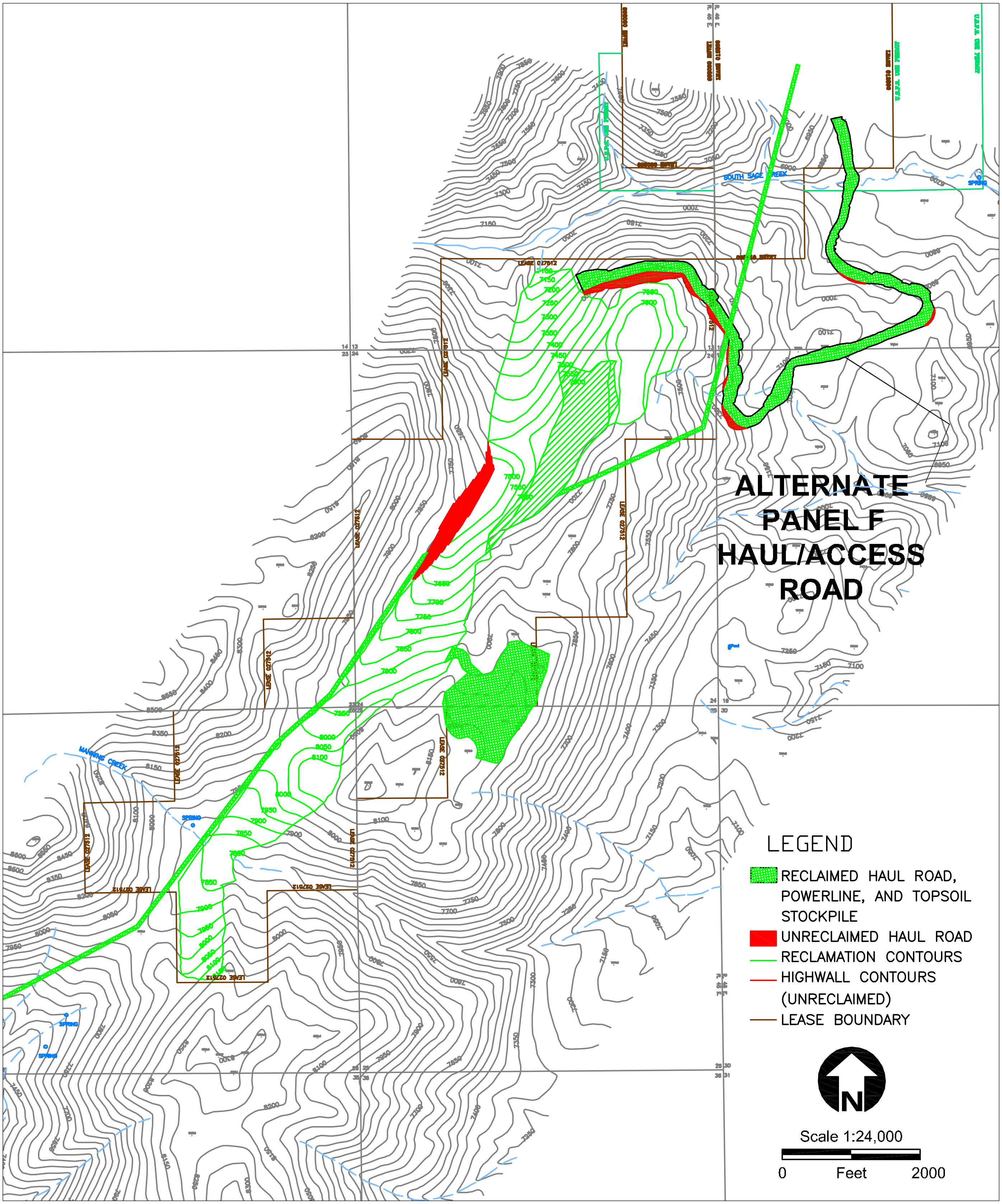


Figure 2.6-2
Alternative A
Panel F Final Configuration Map without Lease Modifications
Smoky Canyon Mine Panels F and G

Removing and handling the overburden from on top of the buried ore beds is the largest cost of the mining operation. The phosphate ore beds are inclined (dip) in the ground, and mining them proceeds down-dip until the cost of removing the overburden is roughly balanced with the revenue derived from the ore that is removed. The ratio of the overburden handled to the ore removed is called the "stripping ratio". The lower the overall cost of mining and the higher the economic stripping ratio, the deeper the ore can be mined, which results in a larger open pit and more overburden to handle. When mining and processing costs significantly increase for any reason, the cost of mining the ore can be reduced by reducing the stripping ratio, which results in less overburden being removed, less ore being recovered, and smaller open pits. The BLM requires that phosphate ore from federal leases should be mined to the maximum extent practicable, within economic limits that apply to each specific mining operation.

For this alternative and mining alternatives B, C, D, and F, the increased operating costs inherent to each alternative could be balanced by redesign of the open pits to reduce stripping ratios. This would reduce the size of the open pits and the amount of phosphate ore extracted from the mining operations, shortening the life of the mine. The reduction in recovered ore could mean that Simplot would potentially begin mining operations at another location in Southeastern Idaho earlier than currently planned. The amount of new surface disturbance required at a different mine to obtain the same amount of ore left in the pits at Panels F and G under this alternative would likely be greater because of the new access and ancillary disturbances necessary for the new mine. The detailed mine planning for the redesigned mine pits at Panels F and G, as well as the design for the new mine at another location, is beyond the scope of this EIS. The specifics of these effects are discussed in Chapter 4 of this EIS.

The disturbed areas for the Panel F mining operations under this alternative would be reduced (as compared to the Proposed Action) as shown in **Table 2.6-2**.

TABLE 2.6-2 ALTERNATIVE A DISTURBANCE AREAS FOR PANEL F ON LEASE (IN ACRES)

AREA	ROADS	PITS	EXTERNAL OVERBURDEN FILLS	OTHER	TOTAL
Proposed Action Panel F Total (includes lease modifications)	28	435	38	28	529
North Lease Modification	-23*	-2	0	NC	-25
South Lease Modification	0	-138	0	NC	-138
Revised Panel F Total **	5	295	38	28	366

NC = No change would occur to settling ponds and ditches, topsoil stockpiles, and power line.
* Assumes the Alternate Panel F Haul/Access Road would be selected.
**Acreage may be less because disturbance boundaries do not conform to lease boundaries.

Alternative B - No External Seleniferous Overburden Fills – This alternative addresses scoping concerns about potential selenium contamination from external overburden fills. In this alternative, all the overburden initially proposed for disposal in the external overburden fills would still be placed there during mining; however, 4.7 MM BCY of seleniferous overburden would subsequently be removed from the external fills and placed back in the pit backfills. The duration of reclamation work would increase in this alternative because of the need to double handle more of the overburden material than under the Proposed Action. This would result in a delay in reclamation of approximately 6.5 months.

This alternative would have the same initial disturbance footprint as the Proposed Action because the full external overburden disturbance areas would be needed to temporarily store seleniferous overburden, which would then be relocated to a pit backfill during final stages of mining. The volume of overburden permanently disposed of in the external overburden fills would be less, changing the final contours of these areas compared to the Proposed Action (**Figure 2.6-3**).

The area potentially requiring a cap to reduce releases of COPCs from seleniferous overburden would be less than the Proposed Action because all seleniferous overburden would be consolidated to a smaller footprint area than the Proposed Action. The area of seleniferous overburden disposal in this alternative would be approximately 725 acres compared to 819 acres for the Proposed Action.

The remaining highwalls in Panel F would remain the same as in the Proposed Action because the seleniferous overburden relocated from the external overburden fill would be placed into Pits 1 and 2 and not in Pit 4. However, the remaining highwall in Panel G would be completely backfilled in this alternative.

Alternative C - No External Overburden Fills at All – This alternative addresses scoping concerns related to environmental effects from any external overburden fills. In this alternative, all the overburden initially proposed for disposal in the external overburden fills would still be placed there during mining, however all this overburden (10.1 MM BCY) would subsequently be removed from the external fills and placed back in the pit backfills. Operations would need to be extended by 12.5 months to allow time for all this overburden to be relocated back to the open pits.

This alternative would also have approximately the same initial disturbance footprint as the Proposed Action because the full external overburden disturbance area would be needed to temporarily store the overburden, which would all then be relocated to the pits during final stages of mining.

This alternative would result in higher pit backfill final contours than in the Proposed Action or Alternative B. The footprints of the external overburden fills would be restored to approximate original contours. The remaining highwalls would be eliminated in this alternative compared to the Proposed Action or Alternative B because more overburden would be relocated to the pits where it would be used to completely bury all highwalls (**Figure 2.6-4**).

The area potentially requiring a cap to reduce releases of COPCs from seleniferous overburden would be less than the Proposed Action, and 38 acres greater than Alternative B. This is because all seleniferous overburden would be removed from the external overburden fills in Alternative B, so moving all the remaining non-seleniferous overburden from the external overburden fills back to the pit backfills in this alternative does not further reduce the area of potential cap. The final area of seleniferous overburden requiring a cap in this alternative would be the pit backfills, 763 acres.

Alternative D - Infiltration Barriers on Overburden Fills – This alternative addresses concerns over groundwater impacts from infiltration of precipitation into seleniferous overburden, which could then percolate out the bottoms of the overburden fills and eventually enter the groundwater beneath these sites. Use of synthetic infiltration barriers at the Smoky Canyon Mine site was evaluated for the Panels B and C SEIS and found to be unreasonable for

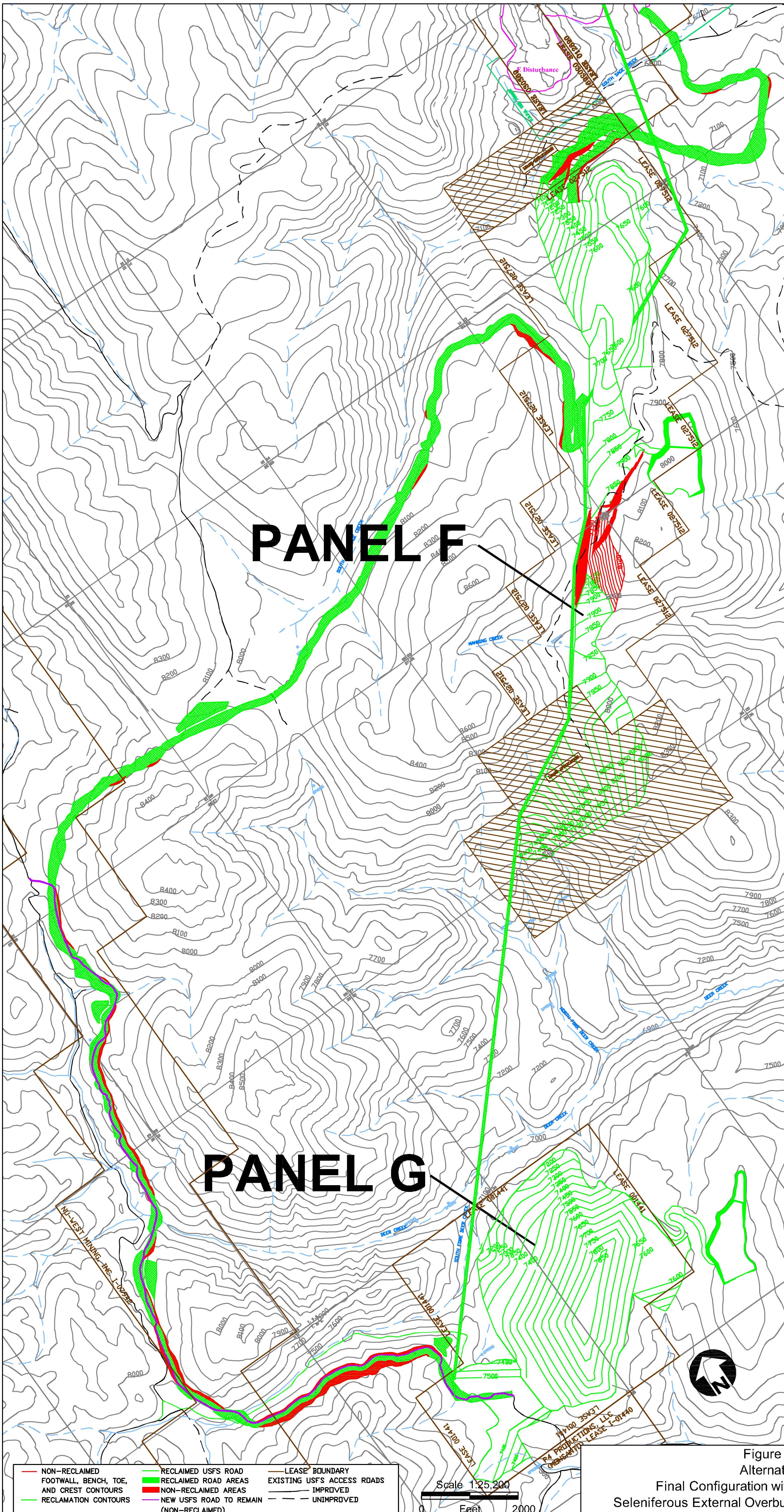


Figure 2.6-3
Alternative B
Final Configuration without
Seleniferous External Overburden
Smoky Canyon Mine Panels F and G

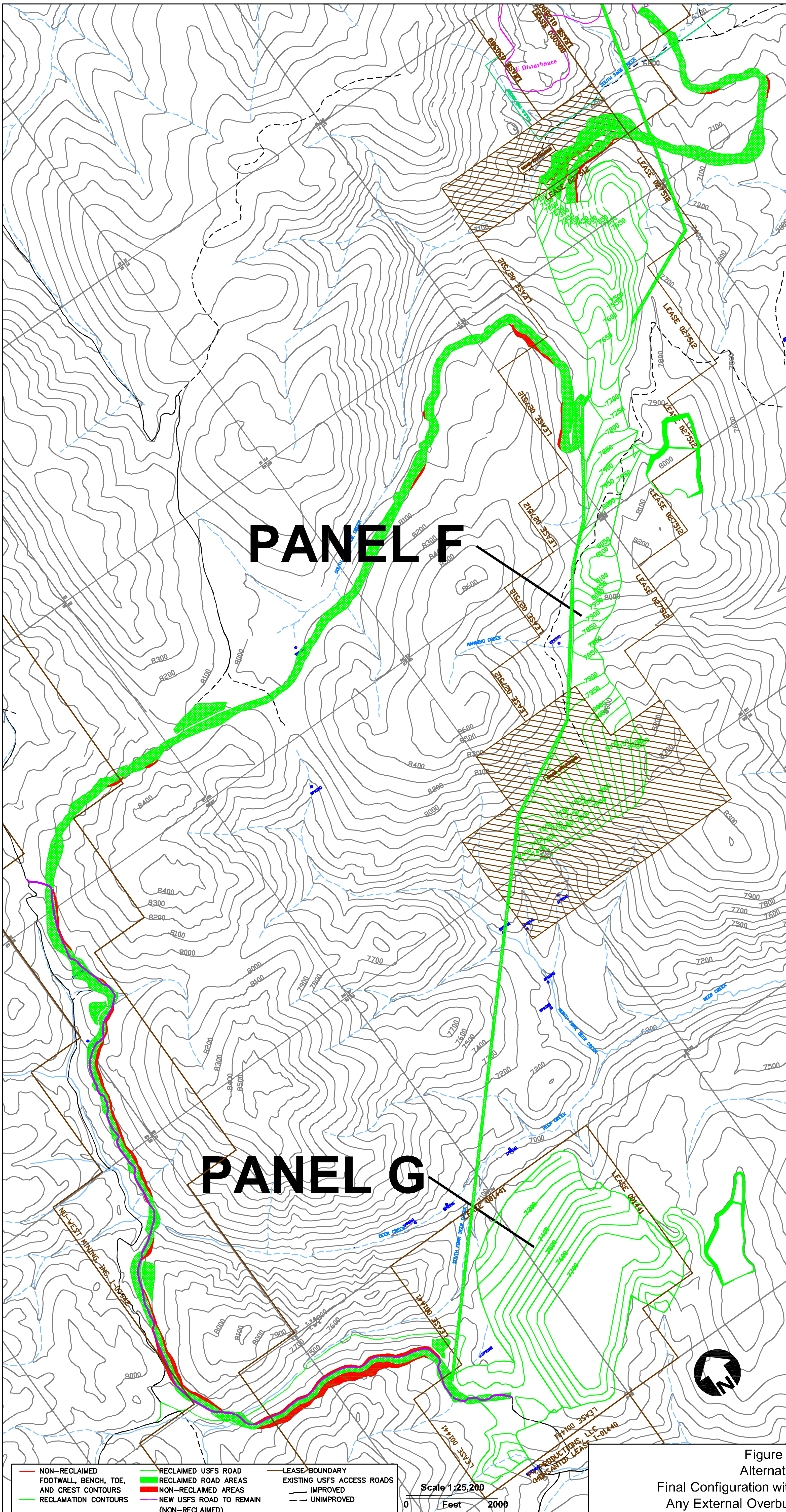


Figure 2.6-4
Alternative C
Final Configuration without
Any External Overburden
Smoky Canyon Mine Panels F and G

technical and cost factors (BLM and USFS 2002). In that application, use of clay infiltration barriers was also not feasible, primarily for cost reasons because the only available clay was too expensive to haul to the overburden sites. In the case of Panels F and G, there is Dinwoody formation reasonably available that could be used to construct a low-permeability, infiltration barrier, or its equivalent, over all areas of seleniferous overburden fills. This infiltration barrier would be built on top of the outer edges of each lift of external overburden fills and over the sloping tops of pit backfills and external overburden fills (**Figure 2.6-5**). The overlapping nature of each level of the infiltration barrier with levels above and below it would provide continuous coverage of the seleniferous overburden fills. The infiltration barrier would be built concurrently with placing the overburden and would be covered with the chert cap material to protect it. The total thickness of the Dinwoody/chert/topsoil cap over the seleniferous overburden on the reclaimed overburden fills would be at least as much as the Proposed Action. The thickness, material properties, and hydraulic functions of the cap would be determined through detailed designs provided by Simplot at a later time. Water infiltrating into the growth medium of the cap would largely be removed by evapotranspiration. Remaining water in the chert layer of the cap would impinge on the top of the infiltration barrier and drain laterally to the edge of each level of the infiltration barrier where it would then flow down through the chert to the next level and so on to the outer margins of the overburden fill, thus reducing percolation of this water into the underlying overburden. Final designs, to be provided by Simplot, may be different than described here but will still provide the level of percolation reduction required to protect quality of groundwater and surface water to levels in concert with applicable regulatory requirements and the environmental analyses included in this EIS.

The construction material to be used for the infiltration barrier cap occurs in the lower shale member of the Dinwoody formation. Sufficient quantities of this material are available within the Panel F and G leases (**Figure 2.6-6**). Exploration drilling in the Panel F area indicates there would be sufficient Dinwoody resources within the overburden intended for removal from the existing pit plan. If additional Dinwoody resources are required for this panel, more Dinwoody is available on approximately 86 acres immediately west of the pit highwall and could be accessed by laying back the proposed pit highwalls along this area. Dinwoody would be excavated from this borrow pit during the life of the Panel F mining activity. The same safety and environmental protection measures proposed for the phosphate mining operations would also apply to the Dinwoody formation borrow pits.

The Dinwoody material necessary for Panel G would be obtained on lease within the proposed boundaries of the open pit or the South External Overburden Fill and within two borrow pits totaling 25-acres to the south and west of the open pit (**Figure 2.6-6**). Dinwoody would be mined from the borrow areas with standard open-pit methods. The vegetation would be removed, and the suitable topsoil would be stockpiled for future reclamation of the borrow pits. Where the Dinwoody resources occur in the overburden that would be stripped prior to mining, stockpile areas in Panel F (18 acres) and Panel G (8 acres) have been situated on lease as displayed on **Figure 2.6-6**. The Dinwoody material would be mined, temporarily stockpiled as necessary, and hauled to the construction sites where it would be spread to a loose thickness of about 18 inches. The foundation for the infiltration barrier would be compacted ROM overburden on the top of designated portions of each lift of overburden fill. The Dinwoody material would be conditioned with moisture by water trucks, if necessary, to the required moisture content indicated by geotechnical design studies and compacted to a minimum thickness of 12 inches. Quality control measures would, among other observations, include physical and permeability testing conducted in the field to ensure the infiltration barrier had the specified characteristics to reduce annual infiltration through the infiltration barrier to the amounts indicated in the groundwater impact analysis for this alternative (see **Section 4.3**).

The infiltration barrier would be covered with the chert layer shortly after being compacted to preserve moisture and protect it from frost and roots. When no longer required, the Dinwoody borrow pit areas would be regraded to maximum slopes of 3h:1v, topsoiled and revegetated.

Alternative E –Power Line Connection from Panel F to Panel G Along Haul/Access Road In this alternative, electric power for the proposed mining operations would be provided with a 25kV, single-pole structure, power line extending southward along the selected haul/access roads from the existing power line in Panel E. The power line would be constructed within the footprint of the agency-preferred haul/access roads (**Figure 2.6-7**). The power line would consist of approximately 30-foot tall single, wooden structures with a nominal span of approximately 330 feet. Approximately 16 pole structures per mile would be needed for straighter sections of the line, and more poles would be required to route the line around sections of the road having curvature.

Alternative F – Electrical Generators at Panel G – With the consideration of a separate power line corridor from Panel F to Panel G (under the Proposed Action and Alternative E), the Agencies decided to evaluate an alternative that would negate the need for any power line at all to Panel G through the use of generators located at the hot starts area of Panel G. The required generator capacity would be 1,100 to 1,200 kW. It would be powered by a 1,500 HP motor running continuously and using about 63 gallons of fuel oil per hour. For continuity of electrical service during normal maintenance and/or break downs, two such generator sets would be required, with one on automatic standby status at all times.

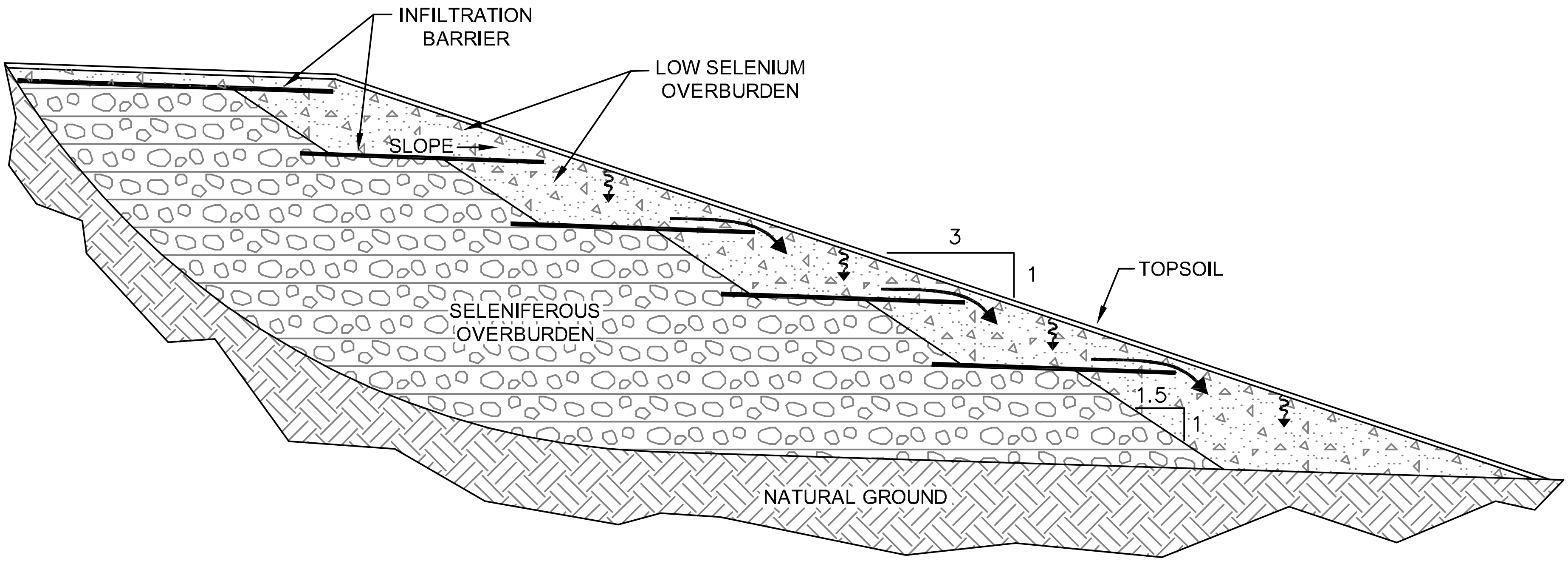
A separate oil tank would be added to the hot starts tank farm to hold the fuel for the generators and would be included within the secondary containment and SPCC procedures that would apply to the rest of the tanks.

The stationary exhaust emissions from these generators would be a significant increase over the current stationary air emissions for the Smoky Canyon Mine, and a Title V air emissions permit issued by the State of Idaho would be required.

The new electrical generators would cause an increase in vendor truck traffic to the Panel G mine compared to the other alternatives for the delivery of the extra fuel and lubricants required by the generators. The generators would also produce more used lubricating oil and coolant, which would be added to the mine's waste disposal activities.

2.6.2 Transportation Alternatives

The following transportation alternatives have been designed in response to scoping input and Agency concerns (**Figure 2.6-8a**). Comparisons of the disturbance characteristics for these alternatives are listed in **Table 2.6-3**. As described for the Proposed Action haul/access roads, portions of the alternative transportation corridors may be aligned across natural slopes steeper than 33 percent necessitating leaving portions of these corridors unreclaimed as indicated on **Figure 2.6-8b** and in **Table 2.6-3**.



The overburden fills would be built in lifts ranging from 50 feet thick in their interiors to 10 feet thick at their margins. As the outside edge of each lift is completed, chert would be placed along its outer margin to cover the run-of-mine, seleniferous overburden with low selenium material. Dinwoody Formation material would be hauled from borrow pits and spread over the outer margin of the lift, moisture conditioned if necessary, and compacted to form a low-permeability infiltration barrier. Sufficient overlap of each infiltration barrier with the underlying one would ensure water draining outward on each level of the infiltration barrier would not drain into the seleniferous overburden. Each infiltration barrier would be covered with sufficient chert and soil to protect it from freezing, root penetration, and drying. At the end of construction of each overburden fill slope, the chert would be graded to an overall slope of approximately 3h:1v, covered with soil, and revegetated. The completed infiltration barrier would work in conjunction with the overlying chert and soil to permanently reduce infiltration of meteoric water into the seleniferous overburden.

Figure 2.6-5
Alternative D
Crest-lined Slope
Smoky Canyon Mine Panels F and G

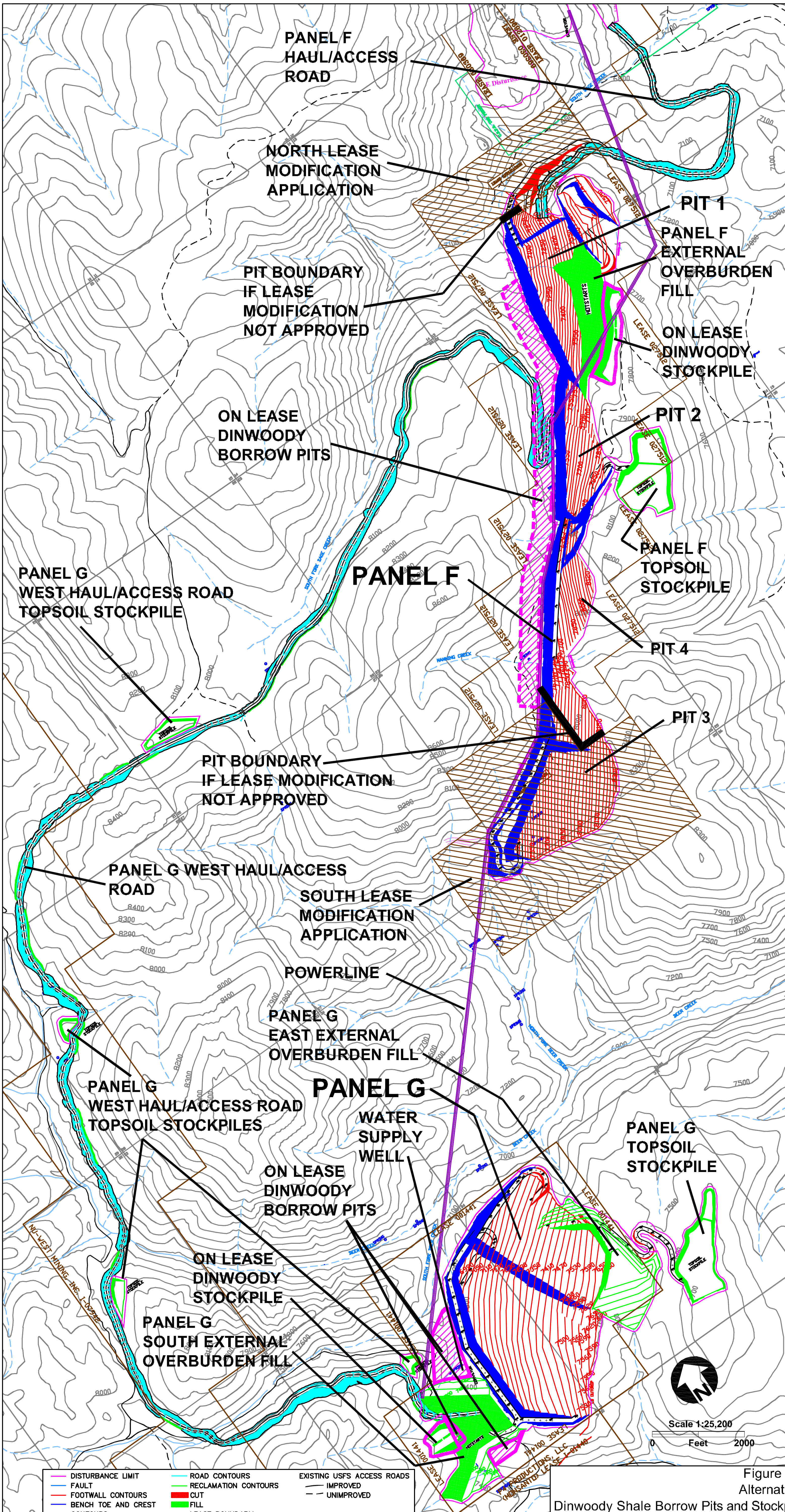


Figure 2.6-6
Alternative D
Dinwoody Shale Borrow Pits and Stockpiles
Smoky Canyon Mine Panels F and G

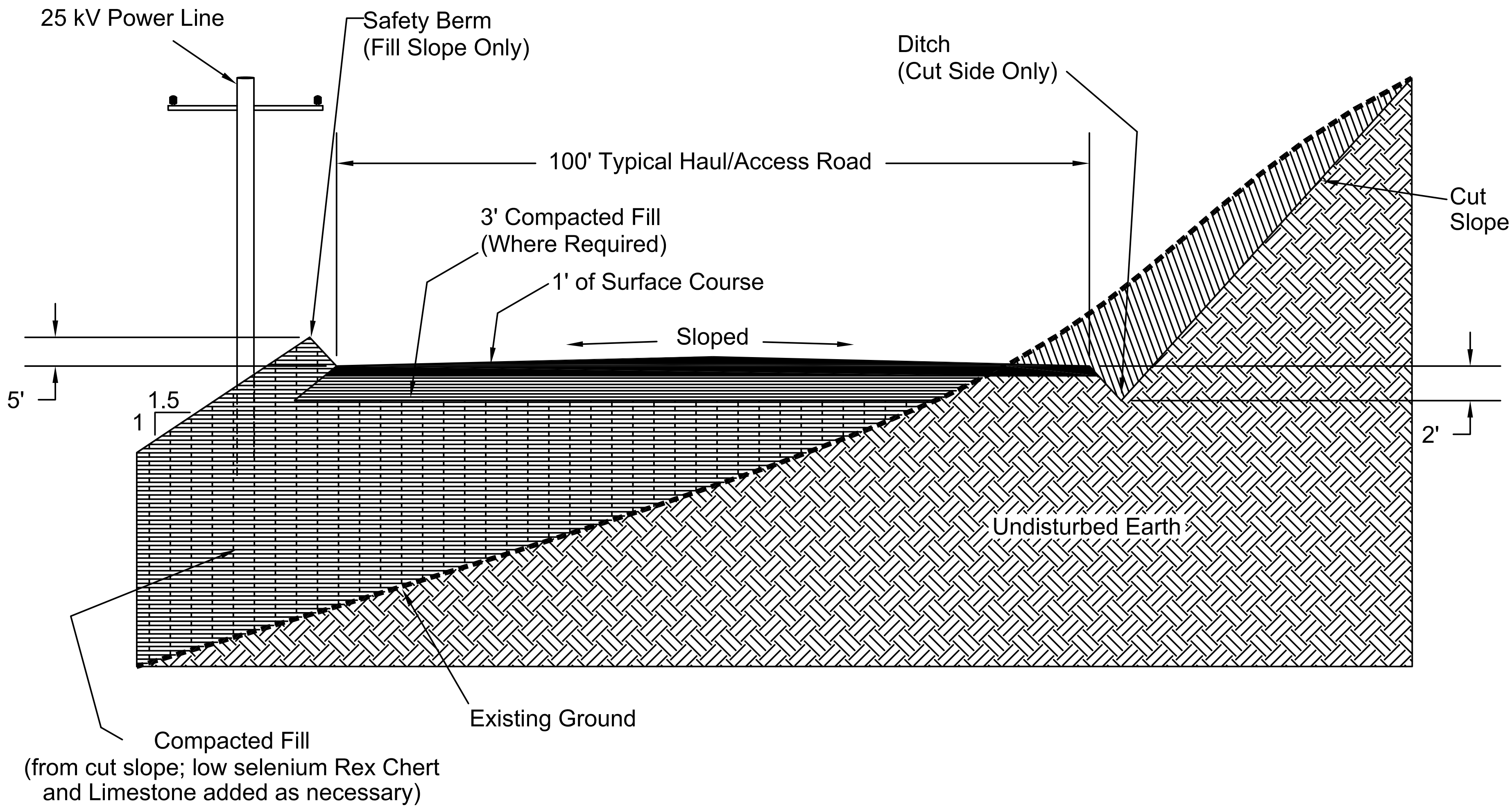


Figure 2.6-7
Alternative E
Power Line Along Haul/Access Road
Smoky Canyon Mine Panels F and G

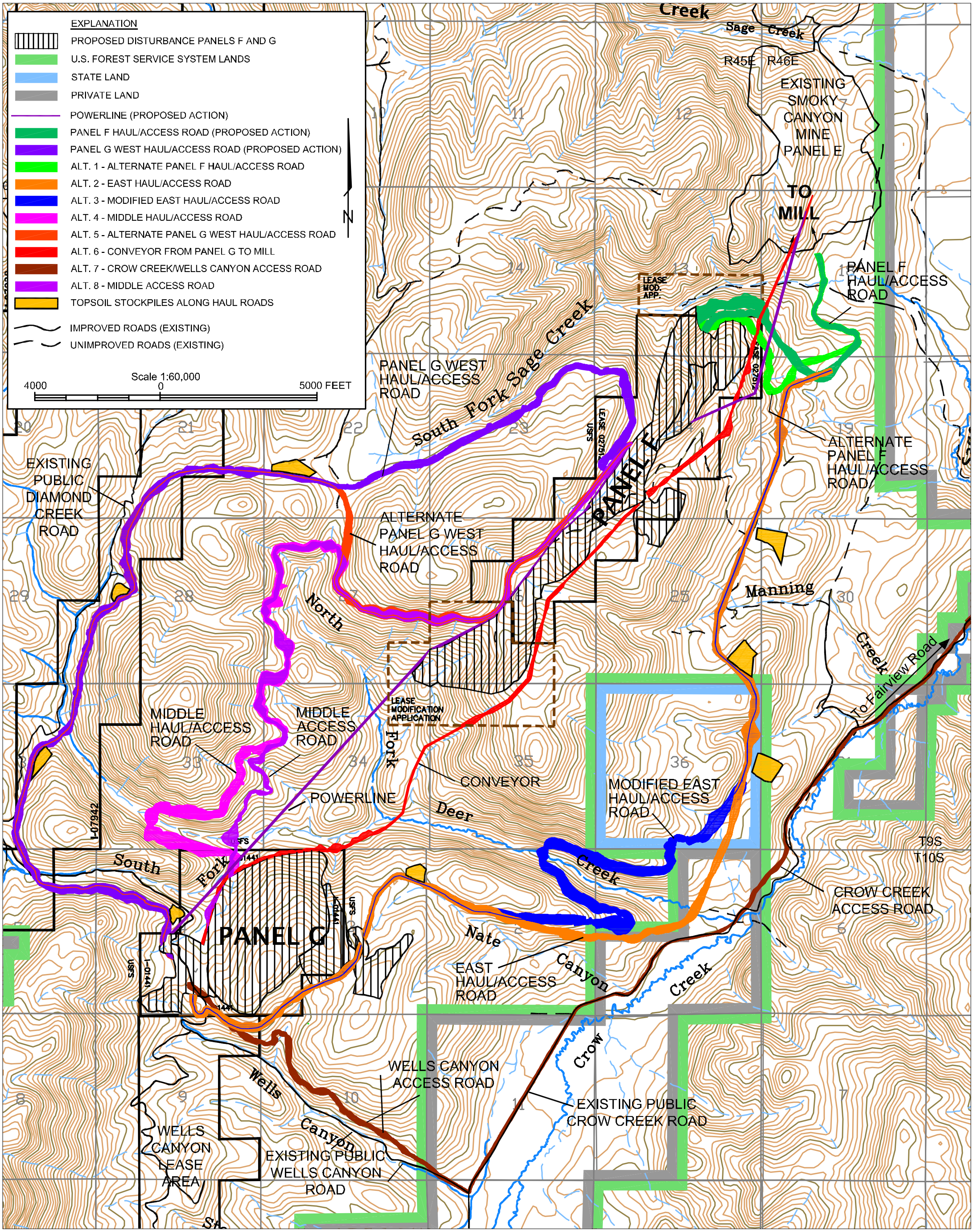


Figure 2.6-8a
Transportation Alternatives
Smoky Canyon Mine Panels F and G

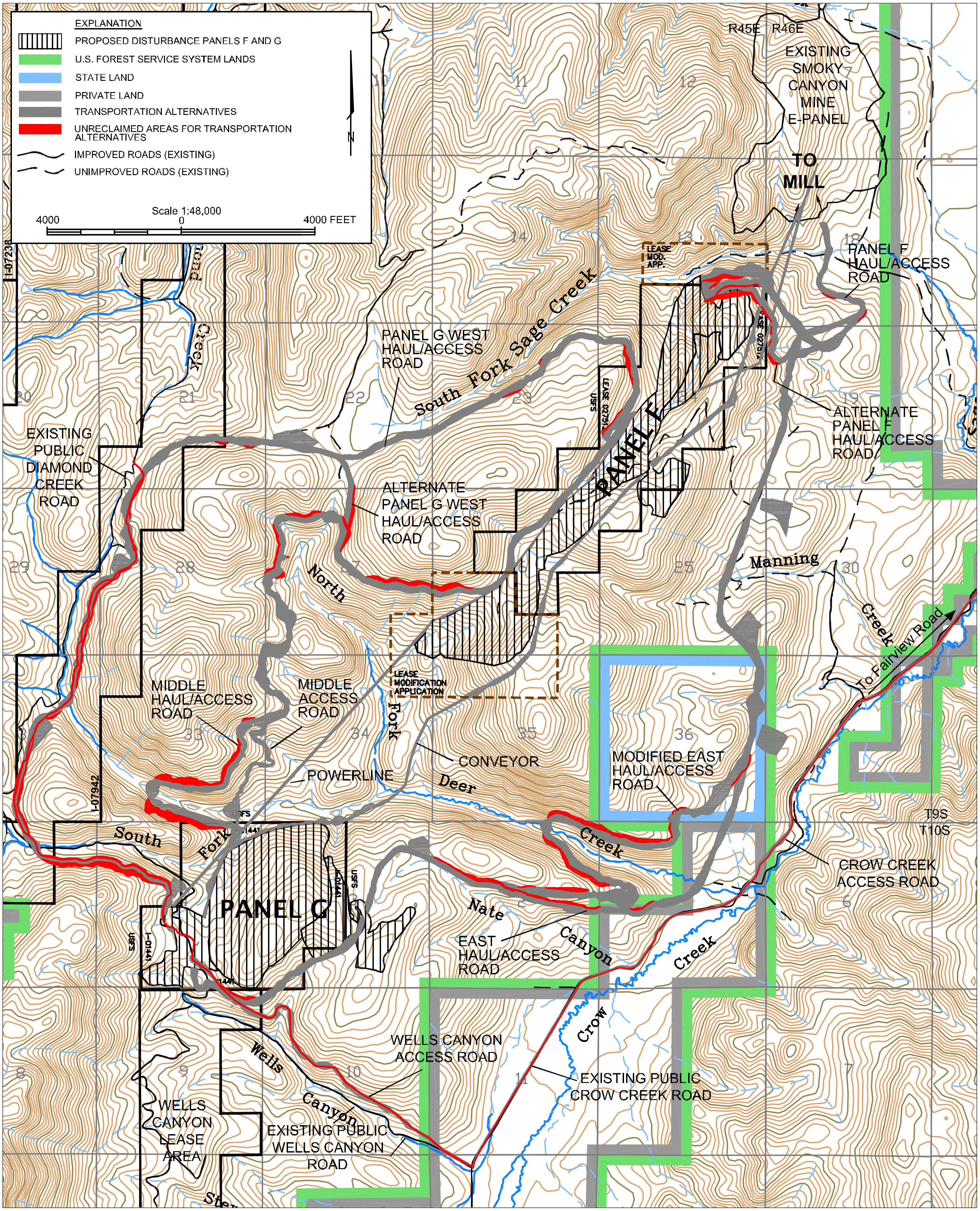


Figure 2.6-8b
Unreclaimed Areas for Transportation Alternatives
Smoky Canyon Mine Panels F and G

TABLE 2.6-3 SUMMARY COMPARISON OF TRANSPORTATION ALTERNATIVE DIMENSIONS

#	ALTERNATIVE	LENGTH (MILES)	TOTAL ACRES	UNRECLAIMED ACRES	MILES IN IRAS *	ACRES IN IRAS *
1	Alternate Panel F Haul/Access Road	2.1	46	5	0.4	10
2	East Haul/Access Road	7.4	216	7	2.8	75
3	Modified East Haul/Access Road	8.4	276	21	4.5	141
4	Middle Haul/Access Road	6.4	192	34	6.2	189
5	Alternate West Haul/Access Road	8.0	226	28	4.7	131
6	Conveyor	6.1	61	0	5.3	53
7	Crow Creek/Wells Canyon Access Road*[1]	15.1	114	0	0.4	5
8	Middle Access Road	5.9	99	0	5.8	97

*Note: Miles and Acres in IRAs are only for the portions of the roads outside of existing lease boundaries, also includes topsoil stockpile areas.
*[1] New disturbance only

Also similar to the Proposed Action, the alternative haul/access roads would have the same general road cross-section as described for the Proposed Action (**Figure 2.4-2**). The environmental protection measures and BMPs described for the Proposed Action haul/access roads would equally apply to each of the alternate haul/access roads.

Alternative 1 – Alternate Panel F Haul/Access Road - This road alternative would follow the same alignment as the Proposed Action from Panel E across South Fork Sage Creek to a point southeast of the creek crossing. From this point, this alternative alignment would be further to the west and south than the Proposed Action Panel F Haul/Access road connecting Panels E and F in order to completely avoid crossing any of the Sage Creek IRA outside existing leases (**Figure 2.6-9**). This alternative addresses scoping input that an alignment alternative should be considered for a road that avoids the IRA. A USFS SUA would be required for this alternative. It is shorter than the Proposed Action Panel F Access/Haul Road and would have 21 acres less disturbance. Because this road would enter the Panel F lease at a higher elevation than in the Proposed Action Panel F Haul/Access Road, the ore could not be extracted to as great a depth, and this alternative would result in the recovery of approximately 1.2 MM tons less phosphate ore than the Proposed Action.

Alternative 2 –East Haul/Access Road - This haul/access road alternative would connect Panels F and G via a route out of the south end of Panel G and then northward up the unnamed drainage immediately east of Panel G to a summit from which it would turn eastward down the north slope of Nate Canyon to the mouth of Deer Creek and then generally northward along the east face of the mountain range to join the access road between Panels E and F (**Figure 2.6-8a**). This haul/access road alternative would have the least amount of disturbed area in the Sage Creek IRA of the haul/access roads under consideration but would be the closest to the residents and visitors in the Crow Creek area (**Figure 2.6-8a**). This alternative has the fewest number of creek crossings of any of the alternatives.

Alternative 2 would require a 300-foot long culvert crossing of perennial Deer Creek, which is also a fishery, and would also require culvert crossings of the ephemeral drainage upstream of Quakie Hollow and Manning Creek.

The road corridor would extend along the entire east side of the Webster Range from Panel G to Panel E. This road would cross private land in the lower Deer Creek Canyon area, and a private landowner easement would be required for construction in this area.

Alternative 3 – Modified East Haul/Access Road – This alternative would avoid building the East Haul/Access Road (Alternative 2) on private land. This would be possible by installing switchbacks in the road within Deer Creek Canyon and crossing Deer Creek about one mile upstream of the Crow Creek Road stream crossing. The rest of this alignment would be the same as the East Haul/Access Road. Compared to the East Haul/Access Road, this modified road alignment would be less visible to persons along Crow Creek Road. It would also reduce the overall climb of the loaded haul trucks out of Deer Creek Canyon. Under this alternative, the crossing of Deer Creek would be accomplished with a 390-foot long culvert. It would involve constructing road cuts and fills in Deer Creek Canyon, which, although designed to minimize direct physical impacts to the stream, would also be difficult to fully reclaim (**Figure 2.6-8b**). The section of this road that would be located up Deer Creek Canyon would be constructed on steep (60+ percent), rocky side slopes that would require full bench (cut) construction and end hauling of material. This road would also have a greater length in the IRA compared to the East Haul/Access Road (**Table 2.6-3** and **Figure 2.6-9**).

Alternative 4 - Middle Haul/Access Road - This alternative would connect Panels F and G with a haul/access road along the eastern slope of Freeman Ridge in the middle Deer Creek watershed area (**Figure 2.6-8a**). It would require road fills and culverts that are 440 and 510 feet long to cross the main and south forks of Deer Creek, respectively. Constructing this road in the steep sandstone slopes in this area would result in large road cuts and fills that would be more difficult to reclaim than the Proposed Action West Haul/Access Road and Alternative 2, the East Haul/Access Road. The sections of this road that would be located on steep (60+ percent) rocky side slopes would require full bench (cut) construction and end hauling of material. It is the shortest of the five haul/access roads from Panel G but has a disturbed area in the Sage Creek IRA greater than either the East or West Haul/Access roads (**Table 2.6-3**). It would be more isolated from the general public than the other two haul road routes but would impact the perennial North Fork Deer Creek watershed more than either of the other haul/access roads.

Alternative 5 –Alternate Panel G West Haul/Access Road – This would be an alternative alignment to the northern portion of the Proposed Action Panel G West Haul/Access Road. It would extend from the south end of Panel F along the north slope of North Fork Deer Creek and cross over into upper South Fork Sage Creek Canyon at Sage Meadow where it would join the Proposed Action Panel G West Haul/Access Road from Panel G. It would then course south through the Deer Creek and South Fork Deer Creek drainages to Panel G on the same corridor as the Proposed Action Panel G West Haul/Access Road. The main difference between this route and the Proposed Action Panel G West Haul/Access Road is that this alignment would disturb less of the South Fork Sage Creek watershed and eliminate the long, north-aspect road section in this area, allowing for easier winter maintenance (**Figure 2.6-8a**).

Alternative 6 - Conveyor from Panel G to Mill - This alternative would eliminate construction of a haul road connecting Panels F and G and would transport ore from Panel G to the mill with a conveyor along a 50-foot wide corridor (**Figure 2.6-8a**). This conveyor would be built from the staging area at Panel G down along the west edge of the Panel G pit, then down the south slope of Deer Creek Canyon to its bottom where it would span the creek, then course up the north slope of the canyon to Panel F. The conveyor would follow along the east side of Panel F and span South Fork Sage Creek upstream of the haul/access road from Panel E to F. It would then enter the Panel E disturbance area and generally follow the existing haul/access road from Panel E all the way to a crushed ore stockpile at the existing Smoky Canyon mill. A service road would be needed in conjunction with the conveyor; it would be a graded surface one-lane

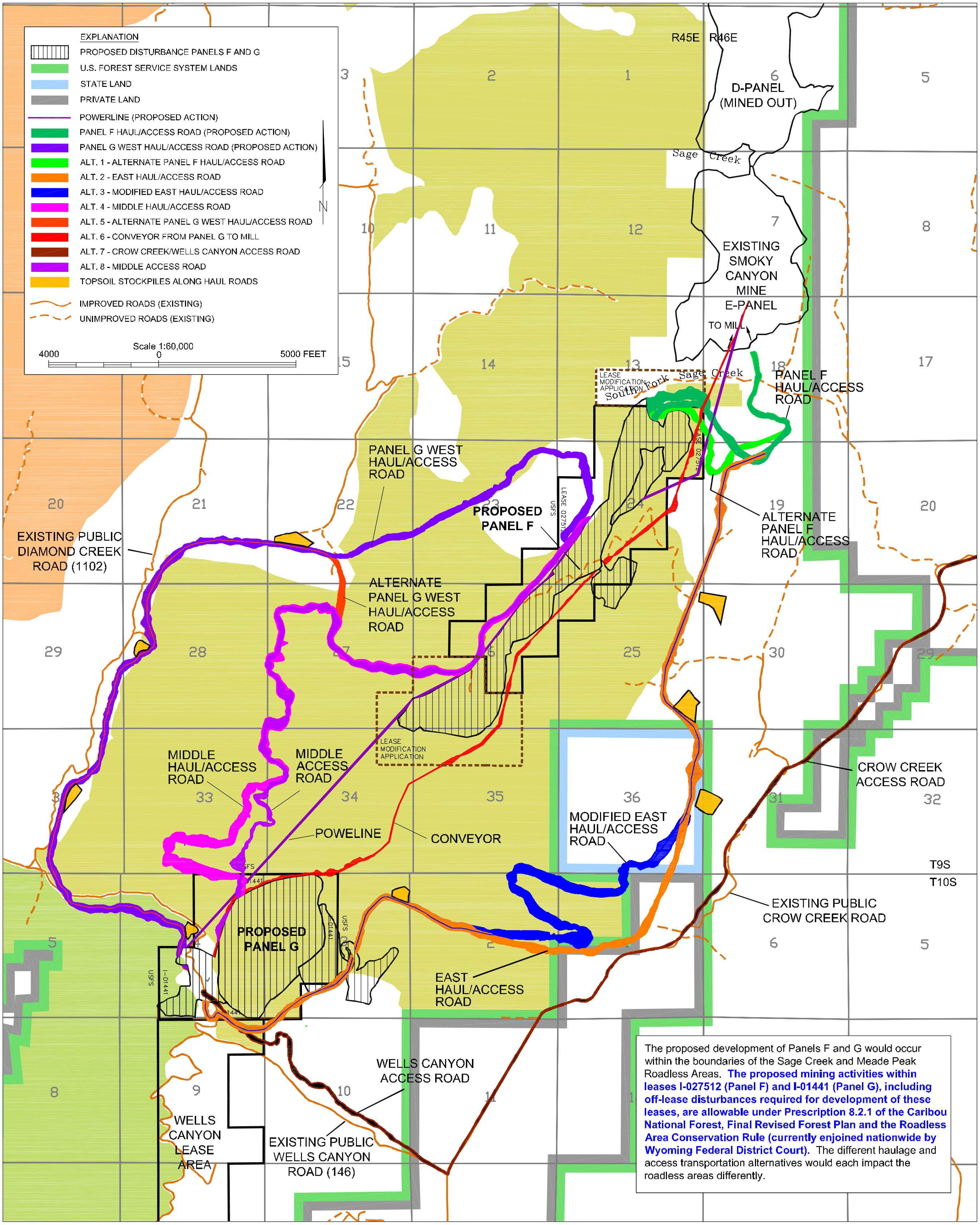


Figure 2.6-9
Transportation Alternatives with IRAs
Smoky Canyon Mine Panels F and G

road, just wide enough for a service truck and would parallel the conveyor. The service road would not cross Deer Creek or South Fork Sage Creek; rather it would terminate on either side of these creeks. The conveyor structure would span these creeks. The characteristics of this conveyor and its right of way are shown on **Figure 2.6-10**.

The Panel G ore would need to be dry crushed at Panel G before being placed on the conveyor. This crushing facility would consist of a ROM ore stockpile, a grizzly/hopper, and the crusher. Electric power for the Panel G facilities would be provided with a high voltage cable fixed to the conveyor support structure along the conveyor right-of- way. This alternative would have less surface disturbance than any of the haul/access road alternatives but would also require implementation of either the Wells Canyon/Crow Creek access road (Alternative 7) or the Middle Access Road (Alternative 8).

One of these access roads (described below) would be required in conjunction with this alternative in order to transport equipment to Panel G and allow for employee, supply, and vendor access.

Alternative 7 - Crow Creek/Wells Canyon Access Road – Building the conveyor from Panel G would also require construction of either this alternative or Alternative 8. This is because, in addition to hauling ore to the mill on the conveyor, equipment, personnel, and supplies would need to be transported to and from Panel G. This access function provided by any of the haul/access roads would be lost if the conveyor was built instead of a haul/access road. The Crow Creek/Wells Canyon Access Road would involve upgrading the existing Crow Creek county road from the mouth of Crow Creek Valley near Fairview, Wyoming to the mouth of Wells Canyon, a distance of approximately 15 miles (**Figures 2.6-11a and 2.6-11b**). Coordination and approvals from both county road departments in Wyoming and Idaho would be required. Upgrading the existing road would involve general grading, widening, and straightening the sharpest curves. Existing culverts would also need to be replaced with longer culverts. The final road surface would be 30 feet wide and covered with crushed rock for all-weather use. A new 30-foot wide access road would be built up Wells Canyon to the Panel G staging area from the Crow Creek road. This new road would be located on the north side of the canyon above the ephemeral stream channel in the canyon bottom, where much of the existing USFS road is currently located. Both Wells Canyon and Crow Creek Roads would remain open to public traffic under this alternative. Easements, rights-of-way, or private property acquisitions may be necessary to accommodate portions of the Crow Creek Road re-alignment and the east end of the Wells Canyon Road. After mining is completed, the Wells Canyon Road would be reclaimed back to a lower standard (20-24 feet wide), and the existing Wells Canyon Road would be decommissioned and reclaimed. The partially reclaimed, lower standard would serve as the permanent Forest Route 146. Portions of the Crow Creek Road that would be cut off during the realignment and upgrade would also be decommissioned and reclaimed following the construction of the new road.

Alternative 8 – Middle Access Road – Building the conveyor would require construction of either this alternative or Alternative 7. This alternative would involve building an access road from Panel G northward across South Fork Deer Creek, Deer Creek, and North Fork Deer Creek to enter Panel F on its south end (**Figure 2.6-8a**). It would then join the haul/access road along the length of Panel F. The final surface of this access road would be 50 feet wide and would be covered with crushed rock for all-weather use. The width of the road corridor disturbance would vary depending on the amount of cut and fill. The road would cross the various stream channels with culverts including a 580- and 360-foot long culvert, respectively, for the crossings of the main and south forks of Deer Creek. It would eliminate the impacts of road construction along Crow Creek and in Wells Canyon but, unlike the Crow Creek/Wells Canyon Access Road, would impact environmental resources of the Deer Creek watershed.

2.6.3 No Action Alternative

Under this alternative, Panels F and G would not be approved for mining, and none of the transportation or mining alternatives would be needed or implemented. This would eliminate the local environmental impacts from the mining of Panels F and G. The existing, approved mine panels would be mined and reclaimed as previously permitted. The Smoky Canyon Mine staff would decrease as operations cease due to lack of regulatory permit approval. This would require mining, processing, and supporting administrative employees to seek alternate employment. These employees are located not only at the Smoky Canyon Mine and the Don Plant processing plant in Pocatello, but also in company headquarters located in Boise, Idaho.

Under the No Action, Simplot would consider other means to maintain ore production, which are described below. It should be noted that none of the following are considered economically feasible in order to maintain processing capability at the associated Don Plant in Pocatello. As such, the most likely scenario of the No Action alternative would be the closure of the mine and plant. The impacts of a closure would mimic the recent closing of the Astaris Mine and phosphorus processing plant, and total economic losses to the area could be measured in the hundreds of millions of dollars.

<u>Purchase Ore Elsewhere for the Don Plant</u> – If mining at the Smoky Canyon Mine did not continue, the operation of the Don Plant would be terminated unless suitable ore was obtained from alternate sources and shipped to the plant. Simplot currently does have other phosphate reserves, but they are not permitted or as ready to mine as those at Panels F and G. It would take years to permit and construct a new mine and associated infrastructure to replace the Smoky Canyon Mine. Replacement sources of feedstock for the plant could not be readily purchased on the open market because:

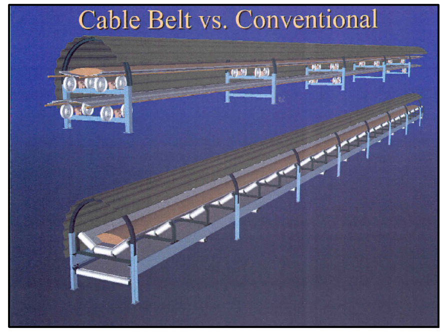
- The Don Plant is designed to receive beneficiated ore concentrate and not raw ore. This limits the potential suppliers to only those able to provide beneficiated ore concentrates. The Don Plant would need to construct a rail-based ore delivery and handling system and a new mill and tailings pond for beneficiating raw ore.

- The processing systems at the Don Plant are specifically designed to only handle ore from the Smoky Canyon Mine. Other sources of ore in southeast Idaho would not be as compatible with the Don Plant process. Therefore, the process may have to be modified.

- The few other phosphate mines in southeast Idaho are also vertically integrated operations with their own milling and processing facilities. Large quantities of additional phosphate ore are not readily available on the open market for purchase by Simplot.

- If Simplot could locate an alternate source of ore at a competitive cost for the Don Plant, then the Don Plant would remain in operation, maintaining the current level of staffing.

Conveyor Design

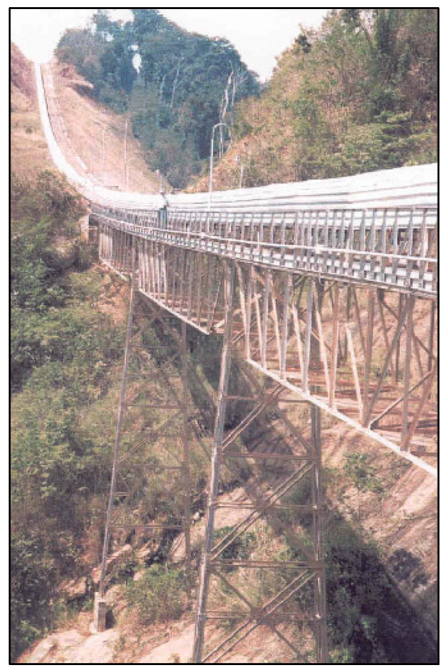


The conveyor alternative that is being considered for the Smoky Canyon Mine would be a cable belt type or a conventional conveyor. A substantial proportion of modern, long conveyors installed around the globe are of the cable belt design. A conventional conveyor requires more structures and idler rollers to support the loaded belt than a cable type conveyor, which has strong drive cables to support the belt along more widely spaced idlers. This reduces the bulk of the support structures and idler noise along the right-of-way. A conveyor at Smoky Canyon would not be used during winter when ore would be stockpiled.

Right-of-Way

Conveyor rights-of-way are graded like roads to have smooth grade transitions and curves. Conveyors can operate on steeper slopes than haul trucks, so cuts and fills along the conveyor right-of-way are less than for a haul road. The conveyor is supported on concrete "sleeper-type" foundations built along one side of the right-of-way, and an access road is built on the other side. Electrical power can be routed along the same corridor mounted on utility poles, in conduits located on the conveyor structure, or buried cable. The conveyor corridor for Smoky Canyon would typically be approximately 50 feet wide.

Stream Crossings



A conveyor right-of-way does not require disturbance of stream channels because they can be crossed with a variety of bridge designs. This would be the case for any conveyor right-of-way built over Deer Creek, Manning Creek, or South Fork Sage Creek. A single vehicle wide maintenance service road would need to parallel the conveyor. This service road would not cross any creeks.

Applicability

Use of a conveyor to transport ore from Panel G to the Smoky Canyon Mill would replace transporting ore from the panel with haul trucks. It would require purchasing and installing the new conveyor equipment as well as an ore crushing system at Panel G to feed the conveyor.

The conveyor would eliminate the need to construct a haul/access road to Panel G, but this would require construction of a new access road into Panel G. This access is needed for mine employees, moving heavy equipment into the site, and deliveries of fuel and other mining supplies. This would be done either by using the Crow Creek and Wells Canyon routes (Alternative 7) or by building a new access road connecting Panels F and G (Alternative 8). Under Alternative 7, the Crow Creek road would require upgrading from its present condition for the increased, year-round traffic, and the existing Wells Canyon road would be replaced with a new access road up Wells Canyon.

Figure 2.6-10
Conveyor Characteristics
Smoky Canyon Mine Panels F and G

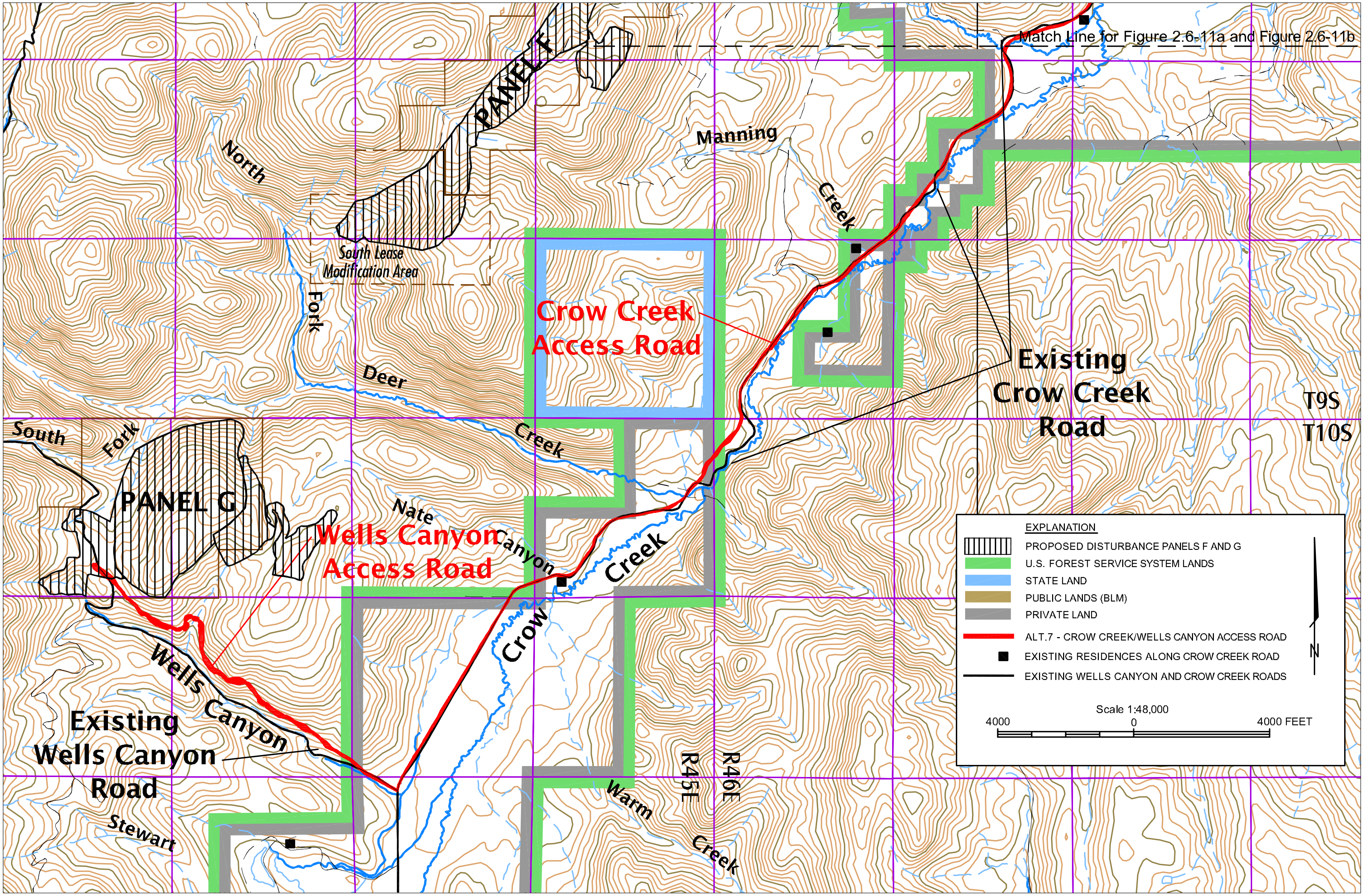


Figure 2.6-11a
Crow Creek/Wells Canyon Access Road
South Half
Smoky Canyon Mine Panels F and G

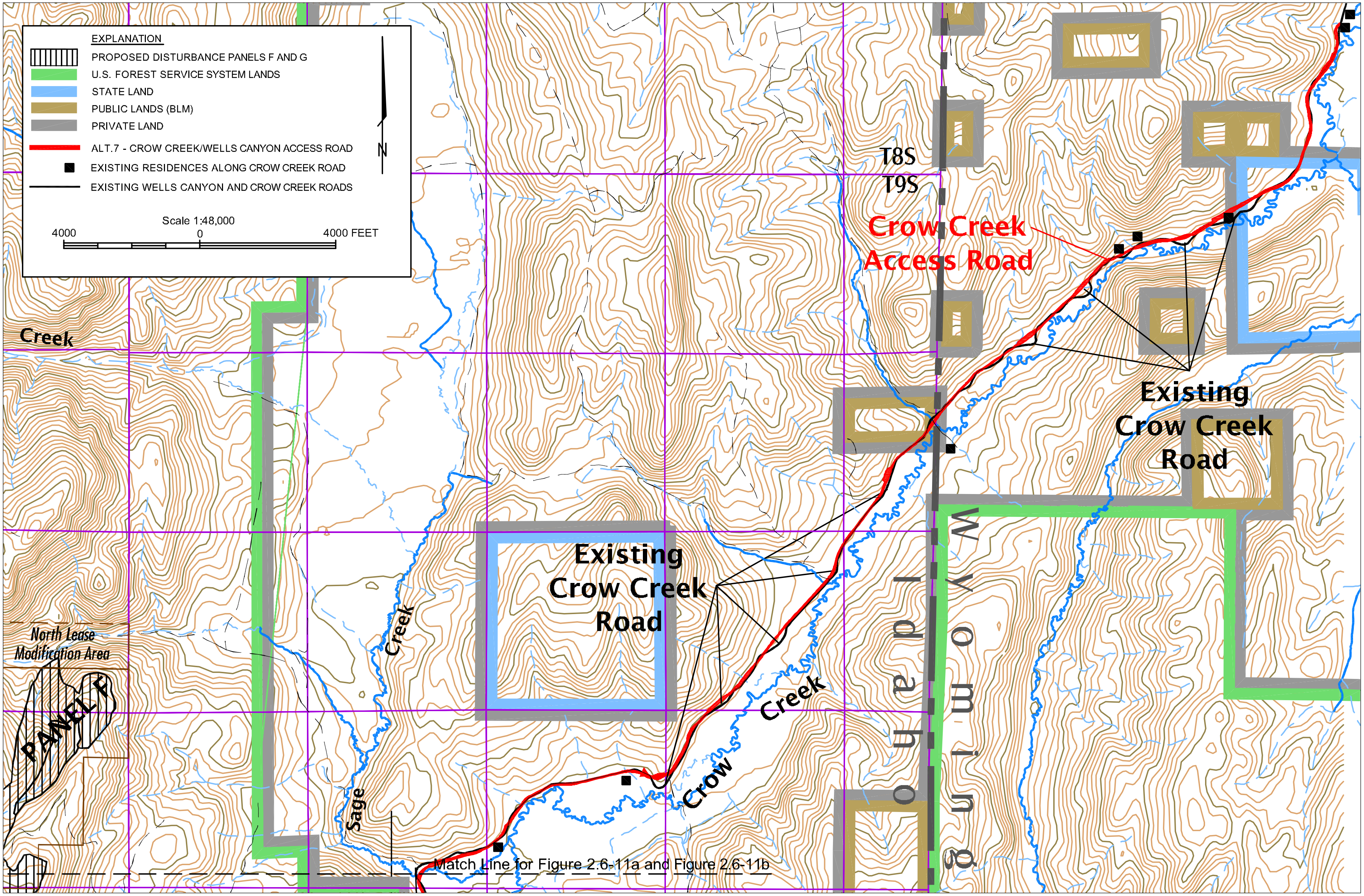


Figure 2.6-11b
Crow Creek/Wells Canyon Access Road
North Half
Smoky Canyon Mine Panels F and G

Mine Other Simplot Leases Instead of Panels F and G – Although this action may reduce environmental impacts at Panels F and G, it may not be significantly better environmentally on a regional basis. Simplot currently holds leases in the Sulfur Canyon/Swan Lake Gulch and Dairy Syncline Project Areas, but currently has no existing mining, milling or transportation infrastructure in place at either lease area. Development of either of these leases would require new and extensive construction of mining operation and support facilities, haul roads, and ore processing or transportation systems; these operations would have their own set of environmental impacts. In addition, it would be impossible to permit these leases in a time frame that would not result in an idling or potential closure of the Don Plant in Pocatello.

2.7 Alternatives Eliminated from Detailed Analysis

This section describes alternatives to the Proposed Action that were considered but were not adopted for consideration or detailed review. A range of alternatives to be evaluated in an EIS should meet certain key principles derived from NEPA case law including:

- The overall range of alternatives should be governed by the "rule of reason". When there are potentially a large number of alternatives, only a reasonable number of examples, covering a full spectrum should be analyzed.
- All alternatives considered must achieve the objectives of the Purpose and Need.
- Alternatives must be "reasonable," i.e. they must be technically and economically feasible.
- Alternatives that are speculative and geographically remote need not be considered.
- Alternatives with environmental impacts that are obviously worse than the Proposed Action or other alternatives under consideration can be eliminated.

The following alternatives that were removed from further evaluation in the EIS were eliminated for one or more of the above-listed principles. These alternatives and the reasons why they were eliminated from further consideration are briefly discussed in the following sections. If economic or technological considerations were to change significantly before certain portions of the ultimately selected alternative are implemented, then alternatives which are presently considered infeasible may become feasible and could be reevaluated in the future in a separate NEPA document.

2.7.1 Eliminated Mining Alternatives

Underground Mining – Use of underground mining methods offers the potential benefit of eliminating the development of open pits and the associated overburden disposal issues. However, underground mining of phosphate ore has not been practiced in southeast Idaho or northeast Utah since 1976, and there are no underground phosphate mines currently operating in the United States. Additionally, Simplot's entire operation is set up to conduct surface mining. Underground mining would require outlays of capital for all new machinery. Extensive retraining would be required or new hiring of professional, technical, and labor personnel. The economics of modern open pit mining practices, by using more cost-efficient mining methods and equipment, allows for increased recovery of the phosphate resource compared to underground methods.

Underground mining is not without its own set of potential impacts that are not shared with open pit methods including:

- Increased safety hazards to mine workers,
- Increased mine worker population,
- Replacing surface miners with underground miners,
- Increased electrical power needs for mine ventilation and other equipment,
- Increased mining costs per ton of ore extracted,
- Potential long-term subsidence (caving) of ground over the mined out areas, and
- Interception of groundwater in underground openings.

This alternative was eliminated from further consideration because it is not considered to be economically feasible or practical and did not meet the Purpose and Need for continued economically viable development of federal phosphate resources.

Relocation of the Smoky Canyon Mill to Panel G – The need for transportation of Panel G ore across public land all the way to the existing Smoky Canyon mill drives the need for the proposed ore transportation routes across the Sage Creek and Meade Peak IRAs. If the Panel G ore could be mined and milled locally at the mine panel, this would negate the need for the transportation of the ore north, and haul/access roads or conveyor across the IRAs could be eliminated. In addition, diesel fuel and other ore haulage costs would be conserved, and air emissions from this haul traffic would be eliminated. Some drawbacks of this alternative include:

- Off site transportation impacts from the Crow Creek/Wells Canyon access road would be greater for this alternative than Alternative 7 because mill employees and mill vendor deliveries would be added to the mine traffic.
- A larger power line (115 kV) would be needed to satisfy the electric motor horsepower of the relocated mill. This would require a currently unneeded new power line right of way from the Fairview substation to the Panel G location.
- Pipelines for water supply, beneficiated ore slurry, and tailings would have to be extended from the existing Smoky Canyon mill site to the new Panel G mill. Thus, a pipeline transportation corridor between Panel G and the existing mill site would still be required.
- A new tailings pond would need to be located near Panel G with connecting tailings and reclaim water pipelines. It is unlikely that such a new tailings pond site would be readily available in the area. Because there is capacity in the currently operating, permitted ponds, this would result in unnecessary disturbance for relocating a tailings pond area.
- There would be an interruption in beneficiated ore delivery to the Don Plant while the Smoky Canyon mill was relocated from Smoky Canyon to Panel G. This would result in a temporary shutdown of the Don Plant with consequent socioeconomic impacts.
- The capital expenditure necessary to relocate the mill and tailings impoundment is not economically feasible when compared with the amount of ore available in the Panel G lease.

This alternative was eliminated from further evaluation because it did not reasonably expand the range of alternatives already under consideration and did not comply with the Purpose and Need.

Enhanced Anoxic Attenuation in Pit Backfills - This alternative addresses scoping concerns over groundwater impacts from infiltration of precipitation into seleniferous pit backfills. Evidence from other mining locations and laboratory testing by Simplot indicates a potential for lower release rates of dissolved selenium in phosphate pit backfills where certain conditions of moisture content, atmospheric gas flux with low oxygen content (anoxic), and selenium-reducing microbial communities can be developed. At the present time, this type of contaminant attenuation is not considered likely in external overburden fills because of the lack of anoxic conditions.

Research is currently being conducted by Simplot and other companies to determine if such conditions can be developed and naturally maintained in the backfills of future phosphate pits. If this could be accomplished, the groundwater impacts of this mining approach could be lessened because the seepage being released from the pit backfills would contain a lower concentration of dissolved selenium. Adoption of this mitigative measure would not affect surface disturbance areas at the mine panels.

Although preliminary results of the research to date indicate attractive theoretical characteristics and benefits for this backfilling approach, the work has not progressed to the point where the effectiveness of this measure is predictable enough to be relied upon for environmental impact analyses. The Agencies have decided to not evaluate this alternative in detail in this document but retain the option to consider this approach in the future if and when the technology has developed to an appropriate point.

2.7.2 Eliminated Transportation Alternatives

Tunnel from Panel F to Panel G – This alternative would involve construction of a tunnel from Panel F to Panel G for a conveyor to transport ore. Such a long tunnel would be prohibitively expensive to construct and would expose mine workers to hazards from underground mining. This action would also have significant groundwater quantity impacts because the tunnel would be lower than the water table under Deer Creek, and the dewatering of the tunnel could remove significant amounts of groundwater from this area. Such dewatering could reduce natural groundwater discharge in lower Deer Creek Canyon. This is not considered to be an economically feasible alternative for many of the same reasons as the Underground Mining Alternative discussed above.

Haul/Access Road Down and Back Up Deer Creek – This alternative would require building a haul/access road down the south-facing slope of Deer Creek Canyon from Panel F, crossing lower Deer Creek with a road fill, and then building the haul/access road back up the north slope of Deer Creek Canyon to Panel F. This route was conceptually evaluated by Simplot and is discussed in their April 21, 2003 mine plan submittal. The extensive road cuts produced by this road alignment would be in solid rock on the extremely steep canyon slopes on both sides of Deer Creek Canyon and would affect much of the length of the canyon. Such road cuts and fills would have major visual impacts and would be practically impossible to reclaim back to topographic and aesthetic values. Extensive road fills would expose much of Deer Creek to sedimentation impacts from erosion of disturbed surfaces. This alternative was eliminated from further evaluation because it did not reasonably expand the range of alternatives already under consideration, and it had obvious environmental and operational impacts that were worse than the Proposed Action and the other alternatives already under evaluation.

1400-Foot Culvert Haul/Access Road from Panel E to Panel F – This alternative would involve building a haul/access road up the north side of South Fork Sage Creek Canyon to the north end of the pit in Panel F. This alternative was conceptually evaluated in the April 21, 2003 Simplot mine plan. The steep and rocky canyon walls would require large cuts and fills to construct the road. The road cuts would be practically impossible to reclaim close to original contour. Approximately 1400 feet of South Fork Sage Creek would need to be placed in a culvert under the road fill, which would negatively impact stream hydrological functions in this long reach during mine operations. Reclamation of this road would be extremely difficult because of the amount of fill and cut that would need regrading and revegetation treatment. Approximately 1400 feet of culvert would be removed, and the stream channel in this reach would need to be reconstructed. This alternative was eliminated from further evaluation because its environmental impacts were obviously worse than the Proposed Action road connecting Panels E and F or the alternative already under consideration for this road.

Conveying Ore from Panel F to Mill – This alternative was discussed in the April 21, 2003 Simplot mine plan submittal. This action would eliminate the need for a haul road from Panel E to Panel F, but a conveyor corridor and access road would still need to be constructed. The conveyor would increase capital costs for the Project and also eliminate the ability to backfill Panel E with Panel F overburden because overburden cannot be transported on the conveyor. A larger external overburden disposal site would be required for the initial pits in Panel F that is not required if this overburden is hauled back to Panel E for backfilling purposes. This alternative was eliminated from further evaluation because its main environmental impacts (not backfilling Panel E and a larger external overburden fills) were obviously worse than the Proposed Action or other alternatives already under consideration.

Hauling Ore from Panel G with Commercial Trucks on Public Roads – This alternative requires the use of a contractor to operate highway-legal trucks and trailers to haul ore down a new Wells Canyon haul/access road, out a widened Crow Creek road to Star Valley, north up Star Valley to the Stump Creek road, along the existing access road in Tygee Valley and up the Smoky Canyon road to the Smoky Canyon mill. Such trucks are now widely used in Nevada to transport large quantities of gold ore over large public roads. This alternative could be less costly in capital but more costly in operating costs for Simplot than any of the other haulage alternatives. It would have less disturbance-type environmental impacts than any of the haul road alternatives that cross the Sage Creek IRA because it would not require building roads across the Forest. There would be new disturbance from widening and re-aligning the existing roads along the haulage route. It would have greater air emission impacts from the exhaust of the greater number and longer truck trips needed to move the ore with lower efficiency and greater fuel consumption than using 150-ton mining trucks as included in the Proposed Action and Panel G transportation alternatives evaluated. It would have the greatest off-site (i.e., on public roads) transportation impacts (noise, dust, safety, and road maintenance) of any of the transportation alternatives and would also require construction of the Wells Canyon haul/access road and a much wider Crow Creek road to accommodate all the truck traffic. This alternative would have the greatest impacts on residents and the public along Crow Creek and would add considerable transportation impacts to residents and the public in Star Valley, along Stump Creek road, and in Tygee Valley that would not be present in any of the other transportation alternatives. This alternative was eliminated from further evaluation because its environmental impacts (primarily to public transportation and safety) were obviously worse than the Proposed Action or other alternatives already under consideration.

Haul/Access Road East of Sage Creek IRA from Panel G – This alternative would involve building a haul/access road down Wells Canyon, north parallel to the Crow Creek road to approximately Deer Creek where it would join the already proposed East Haul/Access road alignment. It would have less environmental impacts on the Sage Creek IRA than any of the other mine truck haulage alternatives and addresses concerns related to road building within the IRA. It would have greater impacts on the residents and public in the southern portion of Crow Creek Valley than the other East Haul/Access Road alternatives already under consideration. This road would cross more private land with multiple owners than the other East Haul/Access Road alternatives, and landowner permission would be required. This alternative was eliminated from further evaluation because its environmental impacts to residents and the public in Crow Creek Valley were obviously worse than the Proposed Action or other alternatives already under consideration.

Haul/Access Road in Upper North Fork of Deer Creek Canyon from Panel G – This alternative would consist of a road built from the south end of Panel F roughly west into the upper watershed of North Fork Deer Creek and through the unnamed topographic pass across Freeman Ridge to join the West Haul/Access Road. This route would present major disturbance impacts in the upper portion of the North Fork Deer Creek watershed and would require construction of a high-elevation crossing of the south end of Freeman Ridge where no road access currently exists. This alternative was eliminated from further evaluation because its environmental impacts to the North Fork Deer Creek watershed were obviously worse than the Proposed Action or other alternatives already under consideration.

Slurry Pipeline From Panel G to the Mill - This alternative would involve transporting ore from Panel G to the existing Smoky Canyon mill facility with a buried slurry pipeline similar to that currently used to transport phosphate concentrate from the mill to Pocatello. A slurry pipeline would consist of an 8 to 10-inch diameter steel pipe buried 4-feet deep in a trench along the pipeline corridor. Pipeline construction would temporarily disturb the pipeline corridor, but most of this disturbance would immediately be reclaimed. Pipeline construction activities would be confined to a 50-foot wide right of way. A new 115kV power line would need to be built into Panel G from Fairview, Wyoming. This power line would extend from the existing substation near Fairview, Wyoming to Panel G, along an undetermined route.

One pipeline route that was considered went down Wells Canyon from Panel G to the Crow Creek Road then along that road to the Manning Canyon road and north along an existing USFS road to South Fork Sage Creek Canyon where it would cross the creek and follow existing haul roads to the Smoky Canyon mill. A second route considered went west from Panel G along the existing USFS road in South Fork Deer Creek Canyon then north along the Diamond Creek Road to Timber Creek, and then east over the summit between Timber and Smoky Creeks to the Smoky Canyon Mill. Finally, a third route was considered that crossed the Sage Creek IRA between Panels F and G and then followed the haul road from Panel F to the mill.

Ore from Panel G would be ground in a mill located at Panel G. The ore/water slurry would be pumped into agitated slurry surge tanks at the grinding mill and then into the head end of the slurry pipeline. Slurry would exit the pipe at the existing Smoky Canyon mill into a set of slurry surge tanks. Slurry would be introduced from these tanks into the existing Smoky Canyon mill for beneficiation. Water would be pumped from a 1,000-gpm well at Panel G to the Panel G SAG mill facility. Water from a surge tank at Panel G would be introduced into the mill to mix with ore as it is ground. Approximately 750 gpm of water would be used to grind and slurry the ore. This water would be shipped to the Smoky Canyon mill with the ore slurry and would replace an equal amount of water in the water balance for that facility. There would be no planned discharge of either slurry or water to the environment at any point along the proposed slurry pipeline system.

An access road for mine workers and suppliers would need to be constructed into Panel G for this alternative. Options for this access road would consist of either Transportation Alternative 7 or 8 as previously described in this document.

The environmental benefits of this alternative include: potential minimization of disturbance impacts to IRAs, immediate reclamation of most of the disturbed area along the pipeline corridor, reduction of long-term impacts to streams because the pipeline would be placed under the stream channels, and minimal impacts to persons and wildlife during pipeline operations.

This alternative has the following economic and environmental problems:

- Approximately 10 percent of the phosphate value in the ore would be lost at the Smoky Canyon mill because a fine fraction of the high-grade ore would be lost in the mill circuit and would be discharged to the tailings pond instead of being captured and pumped to Pocatello.

- To compensate for the reduced phosphate recovery at the mill, the Panel G mine plan would need to be redesigned to only mine higher-grade material, resulting in a lower overall ore recovery than the Proposed Action.

- The overall reduction in recovered P_2O_5 from the Panel G mine would be approximately 350,000 tons, which equates to a loss to the economy of $62,000,000.

- Royalties paid to the federal government, and partially distributed to the state and local economies would be reduced.

- Net additional costs for this alternative (after capital and operating costs are considered) over the Proposed Action and other transportation alternatives are approximately $34,000,000.

- The net additional costs stated above do not include approximately $5,000,000 for construction of a 115kV power line.

- The slurry line would require operation of a 1,000 gpm water well at Panel G that would require additional water rights and would remove an average of 750 gpm of groundwater (1,210 acre-feet per year) from the Deer Creek watershed.

Over the relatively short life of this type of development, Simplot would not recover the capital costs of this alternative. Economic analysis of similar projects have shown that a slurry pipeline operation has a greater capital cost in the beginning with lower operational costs over time. Under the right circumstances, the long-term operation of a pipeline is both economically practical and feasible. However, the few years that this mine would operate and with the poorer ore quality in Panel G, it cannot support a slurry alternative. After a detailed economic and technical review by Agency engineers, this alternative was eliminated from further consideration because it was not economically or technically feasible and did not comply with the Purpose and Need.

West Access Road via Timber Creek, Diamond Creek, and SF Deer Creek – This would be an alternative to the Crow Creek/Wells Canyon Access Road or the Middle Access Road for access to Panel G as part of the conveyor ore transportation alternative. It would involve upgrading the existing upper Wells Canyon, Diamond Creek, and Timber Creek roads by widening and straightening for use as year-round access for both vendor delivery and employee vehicles from the existing Smoky Canyon access road. This alternative would reduce transportation impacts to the Crow Creek and Wells Canyon areas, but would dramatically increase public traffic on the Timber Creek, Diamond Creek, and upper Wells Canyon roads that are currently used primarily for recreation. This alternative would not require construction across the Deer Creek drainage within the Sage Creek IRA, but would increase public access to the margins of the IRAs along its route.

The existing USFS roads to be widened under this alternative already border on riparian, wetland, and perennial aquatic habitats along Deer, Diamond Creek, and Timber Creeks. Widening of the roads in these areas would have direct impacts to these resources during road construction. Increased vehicle use of the roads year-round would have the potential for increased sedimentation impacts to the aquatic habitats. A dramatic year-round increase in vehicle traffic on these roads would interfere with the current recreational users and likely increase recreational access to the IRAs along the route. This alternative was eliminated from further evaluation because its environmental impacts (to riparian and aquatic resources and recreation access) were obviously worse than other employee/vendor access routes associated with non-haul truck road related transportation alternatives already under consideration.

2.8 Features Common to the Proposed Action and Action Alternatives

The following features are common to the Proposed Action and all Action Alternatives. Some of these features are not applicable to the No Action Alternative.

- Mining of Panels F and G ore bodies would use the same methods as currently used.
    - Operation of the mill, concentrate slurry pipeline, and tailings ponds would continue in the same manner as currently practiced.
    - Operation of the Smoky Canyon administrative, maintenance and support facilities would continue as currently practiced.
- There would be new stream crossings of South Fork Sage and Deer Creeks and associated tributaries.
- There would be projected continued employment of approximately 214 persons at the mine, not including persons employed at the Pocatello fertilizer plant.
- Consumption of electricity, petroleum, reagents, and supplies would continue at approximately the current rate.
- All surface disturbances would be reclaimed in accordance with federal, state and local regulations.
- Environmental protection measures, BMPs and monitoring activities currently used would be practiced at the new operations.

2.9 Summary Comparison of Alternatives

Table 2.9-1 provides a tabular summary and comparison of impacts from the mining components of the Proposed Action and the mining alternatives (A – F). **Table 2.9-2** provides a tabular summary and comparison of impacts from the transportation components of the Proposed Action and the transportation alternatives (1 – 8). Detailed descriptions of impacts for specific resources are included in Chapter 4.

2.10 Monitoring, Mitigation, and Agency-Preferred Alternative

2.10.1 Required Monitoring and Mitigation

In addition to BMPs, mine and road design features, the Mine and Reclamation Plan, and Environmental Protection Measures (**Section 2.5**) proposed by Simplot, which are already included as part of the Proposed Action and any action alternative, the Agencies have determined that certain monitoring programs and mitigation measures are necessary. These programs and measures are in response to potential environmental impacts identified in Chapter 4 of this EIS. These monitoring programs and mitigation measures described by resource below would apply to the eventual agency-preferred alternative (except the No Action Alternative). If a resource is not listed, no specific monitoring program or mitigation measures have been proposed beyond what has already been included as part of the Proposed Action or action alternative.

Due to the multiple alternatives under consideration in this Draft EIS, preparing detailed monitoring plans for each resource, as necessary, would be excessive at this time. Therefore, the Agencies have determined that a detailed monitoring plan would be prepared for the agency-preferred alternative as a condition of the Record of Decision. The monitoring plan would include all sampling and monitoring programs required for the applicable environmental resources and describe: objectives, compliance thresholds, monitoring locations and frequency, specific data to be collected, field and laboratory methods, quality control and quality assurance practices, reporting, and responses to apparent non-compliance conditions.

Reporting and Review

Simplot would provide monitoring reports to the Agencies on at least an annual (Fiscal Year) basis or other bases as determined by the Agencies. Reports would also be provided if requested, on time intervals consistent with other regulatory agency requirements to meet applicable laws and regulations (e.g. Clean Water Act, Clean Air Act, etc.). Simplot would participate as requested by the Agencies in any annual BMP review and evaluation that may be undertaken. These would be consistent with Table 5.4 of the RFP.

Air

Under Mining Alternative F, IDEQ would require Simplot to use low-nitrogen oxide generators or ‘ignition timing retard” practices to reduce the NOx emissions.

Mitigation to be applied to Transportation Alternative 7 for dust abatement includes providing bus service for Panel G mine employees once per shift.

For all mining and transportation alternatives, dust would be controlled on roads and mining areas with applications of water and/or magnesium chloride.

TABLE 2.9-1 COMPARISON SUMMARY OF THE MINING COMPONENTS OF THE PROPOSED ACTION AND THE MINING ALTERNATIVES

	PROPOSED ACTION (PA)				ALTERNATIVE A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	
IMPACT	PANEL F	PANEL G	DIRECT POWER LINE	PA MINING TOTAL	NO N. LEASE MOD.	NO. S. LEASE MOD.	NO SEL. EXTERNAL OVERBDN	NO EXT. OVERBDN	INFILTRATION BARRIER	POWER LINE ON ROADS	NO POWER LINE	NO ACTION
GEOLOGY AND TOPOGRAPHY												
Disturbed Acres	515	513	28	1,056	1,054	918	Same as PA Total	Same as PA Total	1,193	1,028	1,028	0
Acres Seleniferous Overburden	435	384	0	819	817	681	725	763	819	Same as PA Total	Same as PA Total	0
External O/B Disposal	Yes	Yes	NA	Yes	Yes	Yes	Yes	No	Yes	Same as PA	Same as PA	No
Acres Not Reclaimed	38	8	0	46	Same as PA Total	17	38	0	Same as PA Total	Same as PA Total	Same as PA Total	0
Chert/Soil Cap	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	Yes	Same as PA	Same as PA	NA
AIR AND NOISE												
Tons Total Emission	3,705	4,717	Negligible	8,422	8,413	7,500	8,546	8,695	8,613	Same as PA Total	9,786	0
dBA Noise add to Crow Creek Area	52	50	Helicopter	50 - 52	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	None
WATER RESOURCES												
% Crow Ck. HUC 5 Dist.	0.5	0.5	Negligible	1.0	0.5	0.3	Same as PA Total	Same as PA Total	1.3	Same as PA Total	Same as PA Total	0
% SF Sage Watershed Disturbed	8	0	Negligible	8	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	9	Same as PA Total	Same as PA Total	0
% Manning Watershed Disturbed	6	0	Negligible	6	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	9	Same as PA Total	Same as PA Total	0
% Deer Ck. Watershed Disturbed	2	3	Negligible	5	Same as PA Total	3	Same as PA Total	Same as PA Total	6	Same as PA Total	Same as PA Total	0

TABLE 2.9-1 COMPARISON SUMMARY OF THE MINING COMPONENTS OF THE PROPOSED ACTION AND THE MINING ALTERNATIVES (Cont'd)

	PROPOSED ACTION (PA)				ALTERNATIVE A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	
IMPACT	PANEL F	PANEL G	DIRECT POWER LINE	PA MINING TOTAL	NO N. LEASE MOD.	NO. S. LEASE MOD.	NO SEL. EXTERNAL OVERBDN	NO EXT. OVERBDN	INFILTRATION BARRIER	POWER LINE ON ROADS	NO POWER LINE	NO ACTION
WATER RESOURCES												
% Wells Cyn. Watershed Disturbed	0	11	Negligible	11	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	12	Same as PA Total	Same as PA Total	0
Springs Impacted[1]	9	11	0	20	Same as PA Total	16	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	0
Exceed GW Standard	Yes	Yes	NA[2]	Yes	Yes	Yes	Yes	Yes	No	NA	NA	No
Exceed SW Standard	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	No	NA	NA	No
SOILS												
Acres Soil Disturbance	515	513	28	1,056	1,054	918	Same as PA Total	Same as PA Total	1,193	1,028	1,028	0
Acres Not Reclaimed	38	8	0	46	Same as PA Total	17	38	0	Same as PA Total	Same as PA Total	Same as PA Total	0
VEGETATION												
Acres Forest Disturbed	466	472	21	959	957	841	Same as PA Total	Same as PA Total	1,093	938	938	0
Acres Sage Disturbed	41	30	2	73	Same as PA Total	53	Same as PA Total	Same as PA Total	75	71	71	0
Acres Aspen Disturbed	268	161	17	446	Same as PA Total	345	Same as PA Total	Same as PA Total	540	429	429	0
Acres not Reclaimed	38	8	0	46	Same as PA Total	17	38	0	Same as PA Total	Same as PA Total	Same as PA Total	0
WETLANDS												
Feet Waters of U.S. Dist.	8,750	2,850	0	11,600	Same as PA Total	10,500	Same as PA Total	Same as PA Total	12,470	Same as PA Total	Same as PA Total	0
Acres Wetlands Disturbed	0.60	0.39	0	0.99	Same as PA Total	0.42	Same as PA Total	Same as PA Total	1.39	Same as PA Total	Same as PA Total	0

TABLE 2.9-1 COMPARISON SUMMARY OF THE MINING COMPONENTS OF THE PROPOSED ACTION AND THE MINING ALTERNATIVES (Cont'd)

	PROPOSED ACTION (PA)				ALTERNATIVE A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	
IMPACT	PANEL F	PANEL G	DIRECT POWER LINE	PA MINING TOTAL	NO N. LEASE MOD.	NO. S. LEASE MOD.	NO SEL. EXTERNAL OVERBDN	NO EXT. OVERBDN	INFILTRATION BARRIER	POWER LINE ON ROADS	NO POWER LINE	NO ACTION
WILDLIFE												
Acres of Wolf and Lynx Habitat Disturbed	515	513	28	1,056	1,054	918	Same as PA Total	Same as PA Total	1,193	1,028	1,028	0
Acres of Wolverine, Predators, Raptors, Owls, and Big Game Habitat Disturbed	466	472	21	959	957	841	Same as PA Total	Same as PA Total	1,093	938	938	0
Acres of Sage Habitat for Migratory Birds and Grouse Disturbed	41	30	2	73	Same as PA Total	53	Same as PA Total	Same as PA Total	75	71	71	0
Acres of Riparian Habitat for Migratory Birds, Bats and Amphibians Disturbed	0.5	0.4	0.3	1.2	Same as PA Total	0.7	Same as PA Total	Same as PA Total	1.6	0.9	0.9	0
Acres of Disturbance within the Reported Boreal Toad Migration Distance Area	320	0	9	329	329	191	Same as PA Total	Same as PA Total	406	320	320	0

TABLE 2.9-1 COMPARISON SUMMARY OF THE MINING COMPONENTS OF THE PROPOSED ACTION AND THE MINING ALTERNATIVES (Cont'd)

	PROPOSED ACTION (PA)				ALTERNATIVE A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	
IMPACT	PANEL F	PANEL G	DIRECT POWER LINE	PA MINING TOTAL	NO N. LEASE MOD.	NO. S. LEASE MOD.	NO SEL. EXTERNAL OVERBDN	NO EXT. OVERBDN	INFILTRATION BARRIER	POWER LINE ON ROADS	NO POWER LINE	NO ACTION
FISHERIES AND AQUATICS												
Feet of Intermittent Channel Disturbed	12,187	5,443	2,719	20,350	20,329	17,202	Same as PA Total	Same as PA Total	22,239	17,631	17,631	0
Acres AIZs Disturbed	30.3	15.0	4.5	49.8	49.7	40.4	Same as PA Total	Same as PA Total	55.6	45.3	45.3	0
SW Standard for Selenium Exceeded	Yes	Yes	NA	Yes	Yes	Yes	Yes	Yes	No	Same as PA	Same as PA	No
LIVESTOCK GRAZING												
Acres of Allotments Disturbed	515	513	28	1,056	1,054	918	Same as PA Total	Same as PA Total	1,193	1,028	1,028	0
Water Sources Impacted	9	8	0	17	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	0
RECREATION												
Acres of RM and SPM ROS Areas Disturbed[3]	515	513	28	1,056	1,054	918	Same as PA Total	Same as PA Total	1,192	1,028	1,028	0
Forest Trails Disturbed	401 402	404	None	401 402 404	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	0
Big Game Hunt Area Temporarily Reduced	Yes	Yes	No	Yes	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	0

TABLE 2.9-1 COMPARISON SUMMARY OF THE MINING COMPONENTS OF THE PROPOSED ACTION AND THE MINING ALTERNATIVES (Cont'd)

	PROPOSED ACTION (PA)				ALTERNATIVE A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	
IMPACT	PANEL F	PANEL G	DIRECT POWER LINE	PA MINING TOTAL	NO N. LEASE MOD.	NO. S. LEASE MOD.	NO SEL. EXTERNAL OVERBDN	NO EXT. OVERBDN	INFILTRATION BARRIER	POWER LINE ON ROADS	NO POWER LINE	NO ACTION
INVENTORIED ROADLESS AREAS												
Acres On - / Off-lease Disturbance in SCRA	355 160	380 34	8 13	743 207	743 191	743 69	Same as PA Total	Same as PA Total	838 207	722 207	722 207	0
Acres On- / Off-lease Disturbance in MPRA	0 0	25 0	1 0	26 0	Same as PA Total	Same as PA Total	Same as PA Total	Same as PA Total	32 0	25 0	25 0	0
VISUAL / AESTHETICS												
Acres of Modification and Partial Retention Disturbed	515	513	28	1,056	1,054	918	1,056	1,056	1,192	1,028	1,028	0
Acres of Permanent Disturbance	38	8	0	46	Same as PA Total	17	38	0	Same as PA Total	Same as PA Total	Same as PA Total	0
CULTURAL RESOURCES												
Cultural Sites Impacted	None	Site CB-342	None	Site CB-342	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	None
Heritage Impacts	Minor - Moderate	Minor - Moderate	Negligible	Minor - Moderate	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	None
NATIVE AMERICAN CONCERNS												
Acres of Temporary Access Loss	515	513	28	1,056	1,054	918	Same as PA Total	Same as PA Total	1,193	1,028	1,028	0
Acres of Unreclaimed Disturbance	38	8	0	46	Same as PA Total	17	38	0	Same as PA Total	Same as PA Total	Same as PA Total	0

TABLE 2.9-1 COMPARISON SUMMARY OF THE MINING COMPONENTS OF THE PROPOSED ACTION AND THE MINING ALTERNATIVES (Cont'd)

	PROPOSED ACTION (PA)				ALTERNATIVE A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F	
IMPACT	**PANEL F**	**PANEL G**	**DIRECT POWER LINE**	**PA MINING TOTAL**	**NO N. LEASE MOD.**	**NO. S. LEASE MOD.**	**NO SEL. EXTERNAL OVERBDN**	**NO EXT. OVERBDN**	**INFILTRATION BARRIER**	**POWER LINE ON ROADS**	**NO POWER LINE**	**NO ACTION**
SOCIOECONOMICS												
Years of Potential Employment	NA	NA	NA	16	Same as PA Total	13.7	12.8	8.3	12.3	Same as PA Total	9.5	0
Estimated Ore Reserves Reduction	NA	NA	NA	NA	Same as PA Total	Reduced by 13.7%	Reduced by 19.3%	Reduced by 46%	Reduced by 22%	Same as PA Total	Reduced by 38%	None
Reduction in Royalty Payments[4]	None	None	NA	None	800 to 1,000	2,900 to 3,600	5,100 to 6,400	12,300 to 15,400	6,000 to 7,400	None	10,400 to 13,000	No Royalty Income
Potential Effect on Crow Creek Property Values	Minor	Minor	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Negligibl e	Negligible	None
TRANSPORTATION												
Change in Public Traffic Volume	None	None	None	None	None	None	None	None	None	None	Add 50 Vendor Deliveries	None
ENVIRONMENTAL JUSTICE												
	None	None	None	None	None	None	None	None	None	None	None	None

[1] Includes springs that would be physically disrupted, potentially reduced in flow, or affected in water quality.
[2] Not applicable
[3] RM = Roaded Modified, SPM = Semi-primitive Motorized, ROS = Recreation Opportunity Spectrum
[4] $1,000s
AIZ = Aquatic Influence Zone

TABLE 2.9-2 COMPARISON SUMMARY OF THE TRANSPORTATION COMPONENTS OF THE PROPOSED ACTION AND THE TRANSPORTATION ALTERNATIVES

	PROPOSED ACTION (PA)		TRANSPORTATION ALTERNATIVES								
IMPACT	PANEL F HAUL/ACCESS ROAD	PANEL G HAUL/ACCESS ROAD	ALT. 1 ALT. PANEL F	ALT. 2 EAST PANEL G	ALT. 3. MOD. EAST	ALT. 4 MIDDLE HAUL	ALT. 5 ALT. WEST	ALT. 6 CONV.	ALT. 7 CROW - WELLS	ALT. 8 MIDDLE ACCESS	NO ACTION
GEOLOGY AND TOPOGRAPHY											
Disturbed Acres	67	217	46	216	276	192	226	61	114	99	0
Acres Not Reclaimed	4	21	5	7	21	34	28	0	55	0	0
AIR AND NOISE											
Tons Total Emission	1,207	1,504	960	1,460	1,564	1,358	1,522	661	824	632	0
dBA Noise add to Crow Creek Area	52.4	None	52.4	71.5	71.5	50.6	None	40	70	None	None
WATER RESOURCES											
% Crow Ck. HUC 5 Dist.	0.1	0.2	<0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0
Acres Deer Ck. Watershed Disturbed	0	112	0	23	83	162	155	29	1	79	0
Culverts in Perennial Streams	0	2	0	1	1	0	2	0	4	0	0
Culverts in Intermittent Channels	1	5	3	10	10	14	9	2	21	14	0
Tons / Year Sediment	0.5	8.5	0.7	4.5	5.1	7.8	10.7	0.4	1.0	2.1	0
Acres Meade Pk. Shale Disturbed	0	10	0	3	3	10	10	2	1	9	0
Springs Impacted[1]	0	2	0	1	1	1	2	0	0	2	0

TABLE 2.9-2 COMPARISON SUMMARY OF THE TRANSPORTATION COMPONENTS OF THE PROPOSED ACTION AND THE TRANSPORTATION ALTERNATIVES (CONT'D)

	PROPOSED ACTION (PA)		TRANSPORTATION ALTERNATIVES								
IMPACT	**PANEL F HAUL/ACCESS ROAD**	**PANEL G HAUL/ACCESS ROAD**	**ALT. 1 ALT. PANEL F**	**ALT. 2 EAST PANEL G**	**ALT. 3. MOD. EAST**	**ALT. 4 MIDDLE HAUL**	**ALT. 5 ALT. WEST**	**ALT. 6 CONV.**	**ALT. 7 CROW - WELLS**	**ALT. 8 MIDDLE ACCESS**	**NO ACTION**
SOILS											
Acres Soil Disturbance	67	193	46	216	276	192	226	61	114	99	0
Acres not Reclaimed	4	21	5	7	21	34	28	0	55	0	0
Reveg. Limitation	Slight to Severe	Moderate to Severe	Slight to Severe	Slight to Severe	Slight to Severe	Mod. to Severe	Mod. to Severe	Slight to Severe	Slight to Severe	Mod. to Severe	None
Cut Slope Stability Hazard	Low to Moderate	Low to moderate	Low to Mod.	Low to High	Low to High	Low to Mod.	Low to Mod.	Low to Mod.	Low to Mod.	Low to Mod.	None
VEGETATION											
Acres Forest Disturbed	59	203	44	138	170	152	184	49	8	74	0
Acres Sage Disturbed	7	2	2	55	61	12	4	7	76	5	0
Acres Aspen Disturbed	47	65	35	95	104	114	89	23	8	57	0
Acres not Reclaimed	4	21	5	7	21	34	28	0	55	0	0
WETLANDS											
Feet Waters of U.S. Dist.	230	540	230	300	390	1,200	490	0	162	940	0
Acres of Wetlands Disturbed	0.14	1.43	0.14	0.62	0.67	0.07	1.43	0	20	0.62	0
WILDLIFE											
Possible Habitat Fragmentation	Big Game Amphibians	Big Game Amphibians	B Game Amphibs	B Game Amphibs	B Game Amphibs	B Game Amphibs	B Game Amphibs	B Game	B Game Amphibs	B Game Amphibs	None
Risk of Collisions w/ Wildlife	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No

TABLE 2.9-2 COMPARISON SUMMARY OF THE TRANSPORTATION COMPONENTS OF THE PROPOSED ACTION AND THE TRANSPORTATION ALTERNATIVES (CONT'D)

	PROPOSED ACTION (PA)		TRANSPORTATION ALTERNATIVES								
IMPACT	PANEL F HAUL/ACCESS ROAD	PANEL G HAUL/ACCESS ROAD	ALT. 1 ALT. PANEL F	ALT. 2 EAST PANEL G	ALT. 3. MOD. EAST	ALT. 4 MIDDLE HAUL	ALT. 5 ALT. WEST	ALT. 6 CONV.	ALT. 7 CROW - WELLS	ALT. 8 MIDDLE ACCESS	NO ACTION
WILDLIFE											
Acres of Wolf and Lynx Habitat Disturbed	67	217	46	216	276	192	226	61	114	99	0
Acres of Wolverine, Predators, Raptors, Owls, and Big Game Habitat Disturbed	59	203	44	138	170	152	184	49	8	74	0
Acres of Sage Habitat for Migratory Birds and Grouse Disturbed	7	2	2	55	61	12	4	7	76	5	0
Acres of Riparian Habitat for Migratory Birds, Bats and Amphibians Disturbed	0.7	0.8	0.7	1.9	0.8	0	0.8	1.5	24	0.6	0
Acres of Disturbance within the Reported Boreal Toad Migration Distance Area	0	120	0	0	0	116	119	14	0	72	0

TABLE 2.9-2 COMPARISON SUMMARY OF THE TRANSPORTATION COMPONENTS OF THE PROPOSED ACTION AND THE TRANSPORTATION ALTERNATIVES (CONT'D)

	PROPOSED ACTION (PA)		TRANSPORTATION ALTERNATIVES								
IMPACT	PANEL F HAUL/ACCESS ROAD	PANEL G HAUL/ACCESS ROAD	ALT. 1 ALT. PANEL F	ALT. 2 EAST PANEL G	ALT. 3. MOD. EAST	ALT. 4 MIDDLE HAUL	ALT. 5 ALT. WEST	ALT. 6 CONV.	ALT. 7 CROW - WELLS	ALT. 8 MIDDLE ACCESS	NO ACTION
FISHERIES AND AQUATICS											
Feet of Intermittent Channel Disturbed	230	450	672	2,684	2,851	3,613	662	1,682	883	2,702	0
Feet of Perennial Channel Disturbed	0	475	0	290	275	0	475	0	2,086	0	0
Acres AIZs[2] Disturbed	0.7	14.9	1.7	4.7	10.1	9.2	15.4	6.2	11	9.7	0
Culverts in Perennial Channels	0	(1) 280' (1) 260'	0	(1) 300'	(1) 390'	0	(1) 280' (1) 260'	0	185', 105', 75, 70'	0	0
Tons / Year Sediment	0.5	8.5	0.7	4.5	5.1	7.8	10.7	0.4	1.0	2.1	0
LIVESTOCK GRAZING											
Acres of FS Allotments Disturbed	67	217	46	123	229	192	226	61	114	99	0
Water Sources Impacted	0	0	0	1	1	0	0	0	0	0	0
Hindrance to Livestock Movement	Low	Low	Low	Mod.	Mod.	Low	Low	Severe	None	Low	None
RECREATION											
Acres of RM and SPM ROS Areas Disturbed[3]	67	217	46	216	276	192	226	61	114	99	0
Forest Trails and Roads Cut or Disturbed	405 FR179	092 093 102 402 403 404 FR146	405 FR179	093 402 FR146 FR740	093 402 FR146 FR740	093 102 402 403 404	093 102 402 403 404	402 404	Old FR146	093 102 402 403 404	None

TABLE 2.9-2 COMPARISON SUMMARY OF THE TRANSPORTATION COMPONENTS OF THE PROPOSED ACTION AND THE TRANSPORTATION ALTERNATIVES (CONT'D)

	PROPOSED ACTION (PA)		TRANSPORTATION ALTERNATIVES								
IMPACT	**PANEL F HAUL/ACCESS ROAD**	**PANEL G HAUL/ACCESS ROAD**	**ALT. 1 ALT. PANEL F**	**ALT. 2 EAST PANEL G**	**ALT. 3. MOD. EAST**	**ALT. 4 MIDDLE HAUL**	**ALT. 5 ALT. WEST**	**ALT. 6 CONV.**	**ALT. 7 CROW - WELLS**	**ALT. 8 MIDDLE ACCESS**	**NO ACTION**
INVENTORIED ROADLESS AREAS											
Acres On - / Off-lease Disturbance in SCRA[4]	5 19	2 64	10 0	15 59	15 125	34 155	39 58	31 22	5 0	22 75	0
Acres On- / Off-lease Disturbance in MPRA[5]	0 0	2 32	0 0	0 0	0 0	0 0	2 32	0 0	0 0	0 0	0
VISUAL AND AESTHETICS											
Acres of Modification and Partial Retention Disturbed	67	217	46	216	276	192	226	61	114	99	0
Acres of Permanent Disturbance	4	21	5	7	21	34	28	0	55	0	0
Disturbance Visible from Trail or Forest Route	092 402 404 FR179	092 093 102 403 404 FR146 FR1102	092 402 404 FR179	093 402 FR111 FR146 FR 740	093 402 FR111 FR146 FR 740	093 102 403 404 FR146	092 093 102 403 404 FR146 FR1102	092 093 402 404 FR146	093 FR111 FR146 FR740	093 102 403 404 FR146	None
CULTURAL RESOURCES											
Cultural Sites Impacted	None	CB-317 CB-342 CB-222	None	CB-342	CB-342	None	CB-317	None	CB-342	None	None
Heritage Impacts	Negligible	Negligible	Same as PA	Minor	Minor	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA	Same as PA

TABLE 2.9-2 COMPARISON SUMMARY OF THE TRANSPORTATION COMPONENTS OF THE PROPOSED ACTION AND THE TRANSPORTATION ALTERNATIVES (CONT'D)

	PROPOSED ACTION (PA)		TRANSPORTATION ALTERNATIVES								
IMPACT	PANEL F HAUL/ACCESS ROAD	PANEL G HAUL/ACCESS ROAD	ALT. 1 ALT. PANEL F	ALT. 2 EAST PANEL G	ALT. 3. MOD. EAST	ALT. 4 MIDDLE HAUL	ALT. 5 ALT. WEST	ALT. 6 CONV.	ALT. 7 CROW - WELLS	ALT. 8 MIDDLE ACCESS	NO ACTION
NATIVE AMERICAN CONCERNS											
Acres of Temporary Access Loss	67	217	46	216	276	192	226	61	114	99	0
Acres of Permanent Access Loss	4	21	5	7	21	34	28	0	55	0	0
SOCIOECONOMICS											
Potential Effect on Crow Creek Property Values	Unlikely	Unlikely	Unlikely	Likely	Likely	Unlikely	Unlikely	Unlikely	Likely	Unlikely	None
TRANSPORTATION											
Change in Public Traffic Volume	None	None	None	None	None	None	None	None	Increase FR111 FR146 FR1102	None	None
Restrict Traffic on Forest Route	FR179	FR146	FR179	FR740	FR740	None	FR146	None	Increase on FR111 FR146	None	None
ENVIRONMENTAL JUSTICE											
	None	None	None	None	None	None	None	None	None	None	None

[1] Includes springs that would be physically disrupted, potentially reduced in flow, or affected in water quality.
[2] AIZ = Aquatic Influence Zone
[3] RM = Roaded Modified, SPM = Semi-primitive Motorized, ROS = Recreation Opportunity Spectrum
[4] SCRA = Sage Creek Roadless Area
[5] MPRA = Meade Peak Roadless Area

Noise

For either Transportation Alternative 2 or 3 (East Haul/Access Road and Modified East/Haul Access Road), noise mitigation measures that Simplot would implement include: maintaining equipment exhaust systems and engine sound controls to manufacturers' specifications; and preserving forest vegetation noise buffers to the extent possible.

For Transportation Alternative 7 (Crow Creek/Wells Canyon Access Road), noise mitigation would include utilizing a bus service once per shift for Panel G mine employees.

For all mining alternatives, Simplot would not conduct blasting operations during typical sleeping hours.

Water Resources

Where haul/access roads are currently designed close to or over springs, the finally selected road would be rerouted around them, or if that is not feasible, Simplot would install culverts, drains or other mechanisms in the base of the road fills to ensure the natural spring flows would continue to flow.

Springs currently in use that are disrupted by mining or covered by road building would be replaced with alternate, permanent and generally equivalent water sources by Simplot, in accordance with the RFP requirements.

Additional surface water monitoring sites, pertaining to this Project would be added to the current water monitoring program at the Smoky Canyon Mine. An outside consultant would conduct the monitoring. Additional groundwater monitoring sites, pertaining to this Project, would be added to the current water monitoring program at the Smoky Canyon Mine. Monitoring of surface water and groundwater would be conducted in accordance with the requirements of the Record of Decision and an agency-approved, surface water and groundwater monitoring plan.

Regular inspections would be conducted along the outer toes and slopes of all overburden fills to look for indications of seeps or springs discharging from the overburden.

Simplot would conduct infiltration testing within the footprint of the seleniferous overburden disposal sites prior to placing overburden. This testing would be conducted according to a plan that would be reviewed and approved by the Agencies before implementation. The testing would be intended to demonstrate that the vertical percolation rate in the seleniferous interior of the external overburden fills is sufficient to prevent development of seleniferous external overburden seeps.

Record keeping and use of a third party quality control inspector satisfactory to the Agencies would be employed by Simplot to ensure that the external overburden disposal facilities are built as proposed.

Roads would be designed, constructed, and operated to prevent a fuel or oil spill from entering a nearby stream by implementing suitable BMPs to contain such an event.

Monitoring would take place for COPC content analysis of overburden proposed for use as construction material according to an agency-approved geochemical sampling program.

Monitoring of the construction and functioning of Alternative D would be conducted in accordance with the Record of Decision and an agency-approved infiltration barrier construction and operation monitoring plan. This plan would include monitoring of construction to provide data showing the infiltration barrier was built in accordance with agency-approved plans and specifications. It would also include monitoring of the operation of the infiltration barrier to provide data showing the cap is functioning as designed. Operational monitoring would include collection of representative data on saturated and unsaturated soil moisture conditions within each functional layer of the cap and in a number of locations within the overburden under the cap for comparison with assumed/modeled conditions used in design studies. Soil moisture, data collection methods and instruments would allow monitoring of seasonal and daily conditions within the materials and to ensure the materials would be capable of long term use.

Monitoring the formation of erosional rills on the external overburden fills and backfilled pit surfaces and areas below them would be implemented. Corrective actions would be taken to insure that rills do not persist or enlarge into gullies on or below the overburden faces. This is important because formation of gullies would indicate an enlargement of the drainage network or increase in surface drainage density, which could result in enlargement and/or degradation of channel stability in downstream reaches of streams that could be sensitive to these effects.

Soils

Simplot would reduce the loss of soil fertility within the Project Area by incorporating slash into the salvaged growth medium to increase the organic matter content, mixing soil types containing few coarse fragments together with soils containing high coarse fragment content in order to dilute the total coarse fragment percentage, and timing salvage operations to optimize revegetation.

Prior to seeding, applied topsoil would be loosened, if it were compacted during application, to allow unrestricted root growth in the reclamation vegetation.

Monitoring the effectiveness of erosion and sedimentation control measures and other soil resource BMPs would be conducted according to the conditions of the Record of Decision and an agency-approved soil resource monitoring plan.

In addition to monitoring effectiveness of proposed Environmental Protection Measures and BMPs, the soil resource monitoring plan would include:

Monitoring of vegetation germination and growth for assessment of erosion potential based on percentage of ground cover and seedling establishment effectiveness (see monitoring requirement under Vegetation below).

Soil sampling and analysis for initial nutrient amendment assessment for reclamation activities and to evaluate areas of low production after reclamation activities have concluded.

Vegetation

Vegetation monitoring to determine reclamation success on reclaimed sites would be conducted annually and reported to the CTNF by Simplot until reclamation is accepted and the reclamation bond is released (RFP standard under Prescription 8.2.2). The timing, level, and type of monitoring would be conducted in accordance with the requirements of the Record of Decision, agency conditions for release, and an agency-approved plan.

Simplot would use the most adapted and genetically appropriate plant material available for all seeding and planting activities. If feasible, collection of plant material (i.e. seed, transplants, roots) should be practiced to ensure an optimal match between plant material used and site conditions - increasing the likelihood of success.

Records would be kept of items such as seed or tree source, seeding methods, tree planting methods, species used, substrate, date of seeding or planting, etc. The boundaries of seeding or planting areas would be mapped in enough detail so they can be easily located again in the future. Accurate record keeping is necessary in order to determine if revegetation methods have been successful and cost effective, or if changes should be made.

The measurement of selenium and other COPCs in forage is required for any decisions on range management and the ultimate release of mined lands back to multiple use. Sampling would be conducted in accordance with the requirements of the Record of Decision, agency conditions for release, and an agency-approved plan.

Simplot would continue their program of monitoring and controlling noxious weed infestations. Only certified weed-free seed, mulch, straw bales, etc. would be used. Simplot would develop a plan for annual noxious weed treatment.

Wetlands

Jurisdictional channels and wetlands affected by temporary impacts that can be reclaimed would be restored to their approximate pre-construction conditions as mining or uses of affected areas are completed. Any waters and wetlands that would be permanently impacted would be mitigated on- or off-site or through compensatory mitigation, as required by the U.S. Army Corps of Engineers. The Corps may require compensatory mitigation even if the impacts are temporary due to temporal losses. Mitigation for temporal losses usually involves less than 1 to 1 replacement costs since the waters or wetlands would ultimately be restored. The type and amount of mitigation required would be determined in consultation with the Corps and Simplot would adhere to the agreed upon mitigation requirements.

Wildlife

Raptor-nesting surveys would be conducted during the nesting/breeding season prior to any new disturbance during the season to ensure compliance with Executive Order 13186 (protection of migratory birds) and the RFP. Simplot would perform surveys for northern goshawk, flammulated owls, boreal owls, great gray owls, and other raptors prior to any new disturbance to ensure compliance with the RFP protection around nest guidelines. If an active nest(s) were discovered, the CTNF would determine the feasibility of potentially rescheduling the activity until fledgling from the nest had occurred.

Simplot would perform a survey to identify boreal toad populations in any potential toad habitat that would be disturbed, which had not yet been surveyed. This survey would be developed cooperatively by CTNF wildlife or fisheries biologists and Simplot. If boreal toads were discovered during these surveys, potential mitigation measures would be developed. In addition, in the event the West (Proposed Action) or Modified West Haul/Access Road (Transportation Alternative 5) were selected, Simplot would survey the area south of the existing boreal toad breeding site in Sage Meadows to determine whether gradient and topography make migration of toads into this area, including montane habitat south of these roads, possible.

If Transportation Alternative 6 (the conveyor) were selected, Simplot may be required to install additional crossings to provide sufficient clearance for wildlife passage under the conveyor.

Fisheries
Simplot would implement a monitoring program to evaluate impacts to aquatic resources. This program would be developed cooperatively by a CTNF fisheries biologist and Simplot, and would involve aquatic habitat and population monitoring in appropriate locations upstream and downstream of roads and active mining disturbances in fish-bearing streams.

Grazing Management
Water Sources - In the case of springs that are currently used as water sources for grazing livestock, Simplot would establish mitigation protocols satisfactory to the CNF on a case-by-case basis. These protocols may involve hauling or pumping water from outside sources until construction of new stock ponds or improvements of nearby springs can be made.

Trailing - Where haul roads cross existing Forest Trails used for driving livestock, trails up and over any road fills or cuts would be constructed by Simplot to allow safe passage for livestock at these locations across the haul road. In the case of the conveyor, sufficient ground clearance would be constructed where the conveyor crosses designated Forest Trails that would allow locations for livestock passage. If Transportation Alternative 6 (the conveyor) were selected, the Forest Service may require that additional crossings be provided with sufficient clearance for livestock passage under the conveyor.

Livestock would be prevented from grazing on reclaimed mine disturbances until these areas are accepted for grazing management by the CNF.

Recreation and Land Use
Where Forest Trails are disrupted by mining operations, Simplot would post signs along the trails at the margins of the mining areas informing hikers about the mining activities and potential hazards within the mine area. If mine activities were such that travel through the mine area on the trail is not safe, the trail would be posted with signs indicating the trail is temporarily closed.

Trails would be re-established through mine areas as soon as practicable and would be well marked by Simplot to indicate the location of the designated trails through the mine disturbance. At locations where haul/access roads cross existing Forest Trails, trails for non-motorized access would be built across the haul/access roads by Simplot to allow convenient and safe, non-motorized crossing of the haul/access roads. Signs would be posted at these crossings warning visitors how to cross the haul/access roads safely and to avoid lingering or moving along the length of the haul/access roads. Signs would be posted on the haul/access roads at these crossings warning drivers on the haul/access roads to exercise caution.

Where established Forest Trails are crossed by the conveyor in Transportation Alternative 6, hiking, equestrian, and livestock access across the conveyor corridor would be maintained by Simplot with underpasses beneath the conveyor. If Transportation Alternative 6 (the conveyor) were selected, the Forest Service may require that additional crossings be provided with sufficient clearance for passage under the conveyor.

Forest Trail 404 connecting the Wells Canyon Road (FR 146) and the Deer Creek Trail 093 would be rebuilt by Simplot during initial mine development of Panel G a safe distance away from the disturbance limits of Panel G.

Cultural Resources

The known eligible sites near mining activities would continue to be avoided by current mining activities and would be monitored annually, by a professionally trained archaeologist under the supervision of the CTNF Forest Archaeologist, for possible impacts.

Monitoring of CB-222 (Trapper's cabin), under the supervision of the CTNF Forest Archaeologist, is recommended in order to assess the potential for indirect effects of improving a public access road near the site (Panel G West Haul/Access Road).

The two unevaluated ("insufficient information to evaluate") cultural resource sites would require additional study/testing prior to implementation of the Proposed Project if the chosen alternatives would impact them. In order to evaluate the sites and mitigate impacts, the proposed mitigation measures would include:

- An overlay of historic and current grazing allotments with known arborglyphs sites and livestock trails,
- Interviews of current permittees of the seven allotments and possibly local ranchers about current and past corridors and trails (as well as campsites, water sources, etc.),
- Development of a thematic context statement. Research of names in arborglyphs and development of histories on local ranching families, ethnicities, settlement, etc.,
- Core sampling of select trees to support age/dating issues, and
- GPS coordinates for arborglyph group locations.

These mitigation measures would not only provide the needed data to evaluate the sites for the NRHP, but would also mitigate the adverse impacts if the sites were deemed eligible.

Transportation

Where the haul/access roads cut off existing Forest Routes (FR179 and FR740), turnaround areas would be built by Simplot at the temporary termination of the Forest Routes to allow safe and convenient turning of vehicles. At these locations, trails for non-motorized access would be built across the haul/access roads to allow convenient and safe, non-motorized crossing of the haul/access roads (see Recreation and Land Use).

To reduce environmental effects of mine employee traffic under Alternative 7 (Crow Creek/Wells Canyon Access Roads), Simplot would employ a bus service to make one round trip per shift from one or more parking/pickup locations in Star Valley to Panel G.

To reduce the potential for oil spills getting into Crow Creek under Alternative 7, in the event of a fuel tanker accident on the road in this area, Simplot would require all fuel vendors to participate in a spill-response training program and make sure that all vendor trucks carry some spill response materials. Specific Simplot personnel at Panel G would be specially trained in responding to fuel spills along the Crow Creek Road. Spill response supplies and equipment (booms, absorbents, etc.) necessary to respond to a significant fuel spill along Crow Creek would be pre-positioned at Panel G or some location along Crow Creek for ready use.

2.10.2 Agency Preferred Alternative

A preferred alternative for this Project has been selected by the Agencies. However, consideration given to public comments on the DEIS may result in changes to this alternative. The Agencies' preferences currently consist of the following:

- Proposed Action Mining both Panels F and G

  Mine plan approval would include mining of both Panel F and Panel G.

- Mining Alternative B – No External Seleniferous Overburden

  Mine plan approval would be provided contingent on the application of this alternative. Alternative B as described requires the placement of all seleniferous overburden as backfill in the depleted pits for both Panels F and G and would include both the Panel F North and South Lease Modification Areas.

  Selection of this alternative would require Simplot to place seleniferous overburden as pit backfills and in temporary stockpiles adjacent to the pits. At the end of ore removal, seleniferous overburden placed outside the open pits would be returned to the pits and incorporated into the pit backfills. Rehandling seleniferous overburden in Alternative B would reduce the area where a cover/cap would be applied as detailed in Alternative D. Dinwoody formation can provide a local source for material to construct a barrier cap. Implementation of Alternative B in conjunction with Alternative D reduces the quarry size for Dinwoody formation and construction costs to cover seleniferous overburden disposed as backfill and in external piles as proposed by Simplot. While Simplot would incur a cost to rehandle and backfill seleniferous overburden, the additional cost necessary to mine, haul, reclaim, and place Dinwoody formation for cover material on the additional acreage is estimated to offset backfill rehandling costs. External overburden fills containing chert and limestone would remain as a component of Alternative B.

- Mining Alternative D – Infiltration Barrier over Seleniferous Overburden Fills

  Impact analysis in Chapter 4 for the Proposed Action predicts State and federal surface and ground water standards for selenium would be exceeded. In order to comply with Clean Water Act standards and the Idaho Groundwater Water Rule, the mine plan, as described in the Proposed Action, would need to be mitigated. Compliance could be achieved through the use of an infiltration barrier over the seleniferous overburden. All areas of seleniferous overburden fills would be covered to reduce infiltration into the overburden. Cap design would be required to perform at a standard established from infiltration models of the overburden fills. Infiltration reduction by the cover would reduce leachate rates to assure compliance with water quality standards. Groundwater impacts would be reduced at the downgradient lease boundaries and emerging surface water in South Fork Sage Creek Spring, Books Spring, lower Deer Creek, and Crow Creek.

  Alternative B combined with Alternative D would be expected to reduce the effects on water quality in groundwater and surface water below values shown in this DEIS for Alternative B alone, or Alternative D combined with the Proposed Action.

- Mining Alternative E – Power Line Along Haul/Access Roads

Placing the electric power line along the selected haul/access roads would eliminate the need for a separate right-of-way disturbance to provide electric power to the mine panels.

- Proposed Action Panel F Haul/Access Road

The Panel F Haul/Access Road included in the Proposed Action would allow maximum recovery of the ore reserves in the northern portion of Panel F.

- Transportation Alternative 2 – East Haul/Access Road

The East Haul/Access Road would result in less unreclaimed disturbance than all the other Panel G haul/access road alternatives. It would have only one culvert crossing of a perennial stream (Deer Creek) and would be located the furthest east (downstream) of all the transportation alternatives leaving the greatest portion of the Deer Creek watershed unaffected by the road. Compared to the other Panel G haul/access roads, it would have the least disturbance area to Meade Peak Shale and the lowest annual sediment yield. It would disturb fewer acres of Aquatic Influence Zones (AIZs) than any of the transportation alternatives and would also disturb the least amount of footage of Waters of the U.S. It would share status with the conveyor – Middle Access Road combination of having the second lowest disturbance area of wetlands of all the transportation alternatives. It would have the least amount of disturbed area in the Sage Creek IRA of the haul/access roads under consideration and would also disturb the lowest acreage of USFS grazing allotments. In contrast to the benefits it would be the closest haul/access road to the Crow Creek area and would thus have the highest level of noise, visual, access, and socioeconomics impacts to local residents as described in more detail in **Table 2.9-2** and **Chapter 4**.

As currently described, this alternative crosses private land east of the proposed mine. Implementation of this alternative is contingent on Simplot's ability to secure a right-of-way across the private parcel of land. If Simplot is unable to secure a right-of-way, this transportation alternative may become infeasible. In that case, an alternative on public lands would be selected to replace the Agencies' preferred route.

Smoky Canyon Mine
Panels F & G Draft EIS

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Chapter 3
Affected Environment

3.1 Geology, Minerals and Topography

3.1.1 Regional Geologic Setting

The Study Area is within the middle Rocky Mountain and Basin and Range physiographic provinces and is in the central part of the Over-Thrust Belt, a major orogenic zone extending through the North American continent in a general north-south trend. **Figure 3.1-1** shows the general geology map of the Project Area (**Figures 3.1-2** and **3.1-3** are east-west cross sections through the Panels F and G areas).

Rocks present in the Study Area are marine sediments deposited during Mississippian, Pennsylvanian, Permian, and Triassic time in a basin that extended across much of eastern Idaho, northern Utah, western Wyoming, and southwestern Montana. Carbonate deposition gave way to deposition of fine-grained clastic material in a deep water setting, which included deposition of reduced sulfide and organic rich, black shales. The Middle Permian Phosphoria formation is present over a wide area of this basin and comprises one of the largest resources of phosphate rock in the world with the richest phosphorite accumulations being found in the Meade Peak member in southern Idaho and western Wyoming (Perkins and Piper 2004).

Compressional forces during the Cretaceous Period resulted in major folding and faulting of the Paleozoic and Mesozoic sediments throughout the Rocky Mountain region. These sediments were folded on a regional scale into north-south trending anticlines and synclines that expose the phosphate resources within the Meade Peak member of the Phosphoria formation along steeply dipping fold limbs. Rocks outcropping in the Study Area lie within the Meade thrust plate, one of several thrust plates developed as part of the Rocky Mountain Overthrust Belt (Evans 2004). Sedimentary rocks were thrust an estimated 18 to 20 miles along bedding planes during early compression associated with the Laramide orogeny, with subsequent folding late in the single compressive event (Cressman 1964). A number of thrust fault traces are present east of the proposed mine panels. Block faulting began as part of the Basin and Range Province about 17 million years ago and continues to affect the region today.

3.1.2 Stratigraphy

A generalized stratigraphic section for the area is presented on **Figure 3.1-4**. Detailed stratigraphic descriptions are provided by Cressman (1964), Montgomery and Cheney (1967), McKelvey et al. (1959), Lowell (1952), and Deiss (1949). The following are brief descriptions of primary sedimentary units in the Study Area, from oldest to youngest (Maxim 2004a).

Brazer Limestone

The Mississippian Brazer Limestone is about 1,300 feet thick and consists of massively-bedded, cliff-forming, limestone with interbeds of sandstone and siltstone. Some 150 to 250 feet below the top of the Brazer Limestone is a 50-foot thick softer, swale-forming siliceous shale bed. The Brazer Limestone outcrops at the base of the mountain slope east of Panel G (Boulder Creek Anticline) and along Freeman Ridge and Snowdrift Mountain to the west of Panels F and G (Snowdrift Anticline).

Wells Formation

The Pennsylvanian and Permian Wells formation is divided into two members. The upper member is approximately 1,000 feet thick and consists of fine-grained sandstone with interbeds of limestone and dolomite. The 100-feet thick Grandeur Limestone member of the Park City formation is present at the top of this member and is locally mapped as part of the Wells formation. The lower member of the Wells formation is a 500-feet thick medium-bedded, gray cherty limestone with interbeds of sandstone. The Wells formation forms ridges that crop out along the east side of Panels F and G on the east side of the Webster Syncline, and also along the west flank of the Webster Syncline forming Freeman Ridge and Snowdrift Mountain (**Figure 3.1-2**). This thick formation of sandstone and limestone contains the primary regional aquifer in the Study Area with recharge occurring on the mountain slopes and discharge occurring at lower elevations on the east margin of the Webster Range (**Figures 3.1-2** and **3.1-3**). The West Sage Valley Branch and Meade thrust faults shown on **Figures 3.1-1** to **3.1-3** form the eastern boundary of the Wells formation and Brazer Limestone outcrops in the Study Area. The fault planes extend miles to the west in the subsurface beneath the entire Study Area.

Phosphoria Formation – Lower Meade Peak Member

The Permian Phosphoria formation is divided into two members, the Meade Peak member and the overlying Rex Chert. Rocks in the Meade Peak member locally consist of about 75 to 120 feet of dark, carbonaceous, argillaceous and phosphatic shale and mudstone, which host phosphate ore beds. The phosphatic ore is generally found in the Upper Ore and Lower Ore zones, which are separated by the Center Waste Shale. The Upper Ore is overlain by the Hanging Wall Mudstone and the Lower Ore is underlain by the Footwall Mudstone. The Phosphoria formation outcrops on both flanks of the Webster Syncline (**Figures 3.1-1** to **3.1-3**). The overall package of units that comprise the Meade Peak member has low permeability and is not typically water-bearing, except where faulted and fractured. The Meade Peak member generally is considered a barrier (aquitard) to groundwater movement between more permeable units above (Rex Chert) and below (Wells formation). Some zones within the Meade Peak member are known to contain selenium and metals that can be mobilized when exposed to water and oxygen. The contact between the Lower Meade Peak and the underlying Grandeur Limestone is marked by the thin (typically less than 1 foot thick), fossiliferous, grey-black chert known as the 'Fishscale' bed.

The Meade Peak member has been altered in some locations of the Project Area, especially within the Panel F deposit where rocks have been offset along transverse fault structures. Unaltered rock is "hard, carbonaceous, calcareous to dolomitic, and lower in phosphorite than altered phosphorite, whereas the altered rock is partially consolidated, low in organic matter and carbonate, and 3-10 percent higher in phosphate content" (Derkey et al. 1984). Studies by Derkey et al. (1984) and Grauch et al. (2004) suggest that alteration within the Meade Peak member is highly variable and locally gradational. This variation is especially evident within the Center Waste Shale of the Panel F deposit.

Phosphoria Formation – Upper Rex Chert Member

The upper Rex Chert member of the Phosphoria formation consists of about 150 feet of medium-bedded resistant chert and cherty limestone, interbedded with non-resistant cherty shale and mudstone. The resistant Rex Chert forms ridges whereas the Meade Peak Member forms covered swales and slopes. Locally, the Rex Chert is water-bearing and forms part of a local groundwater flow system. In the northern part of Panel F, the Rex Chert is locally replaced by the Franson Limestone member of the Park City formation.

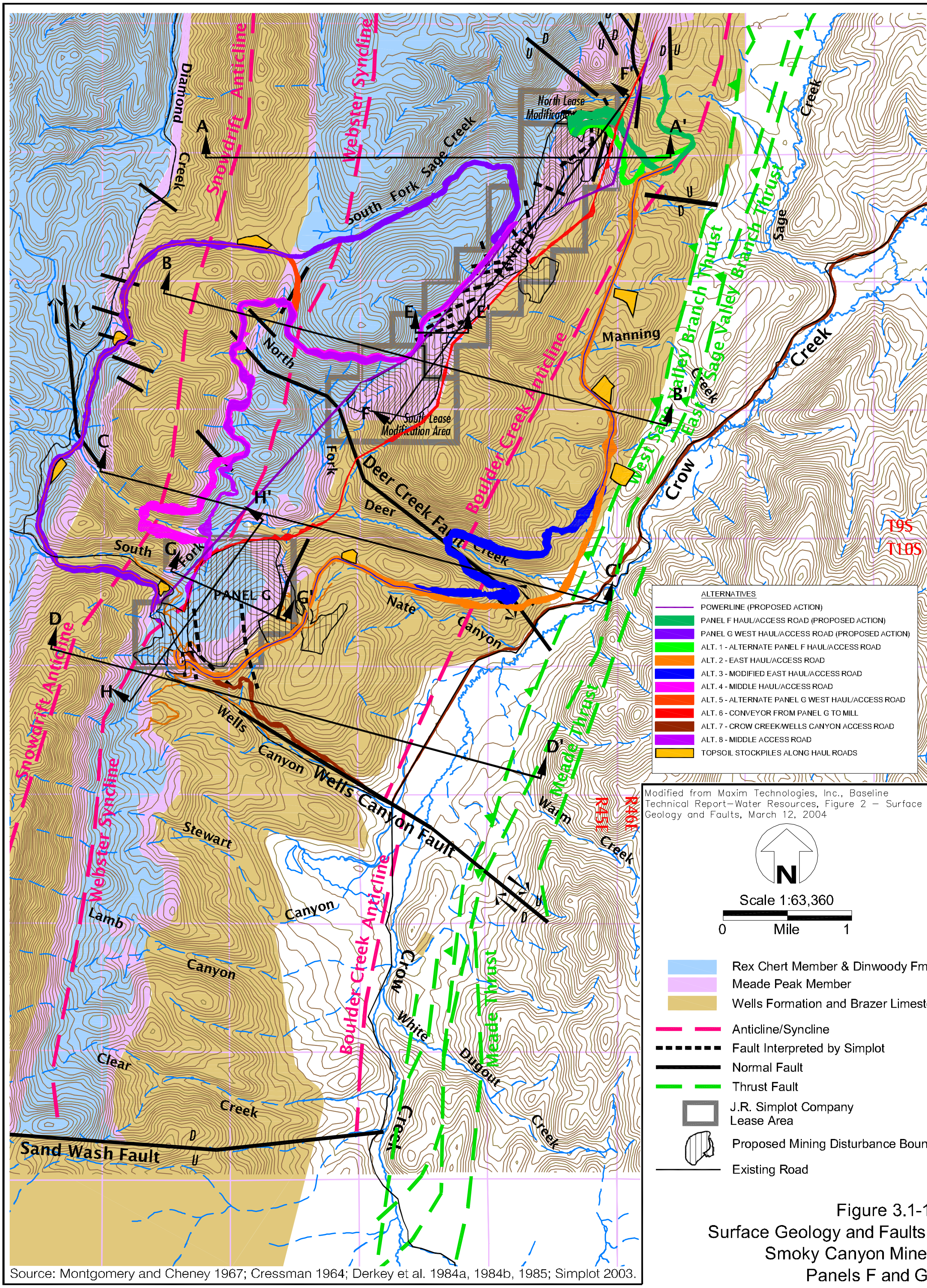
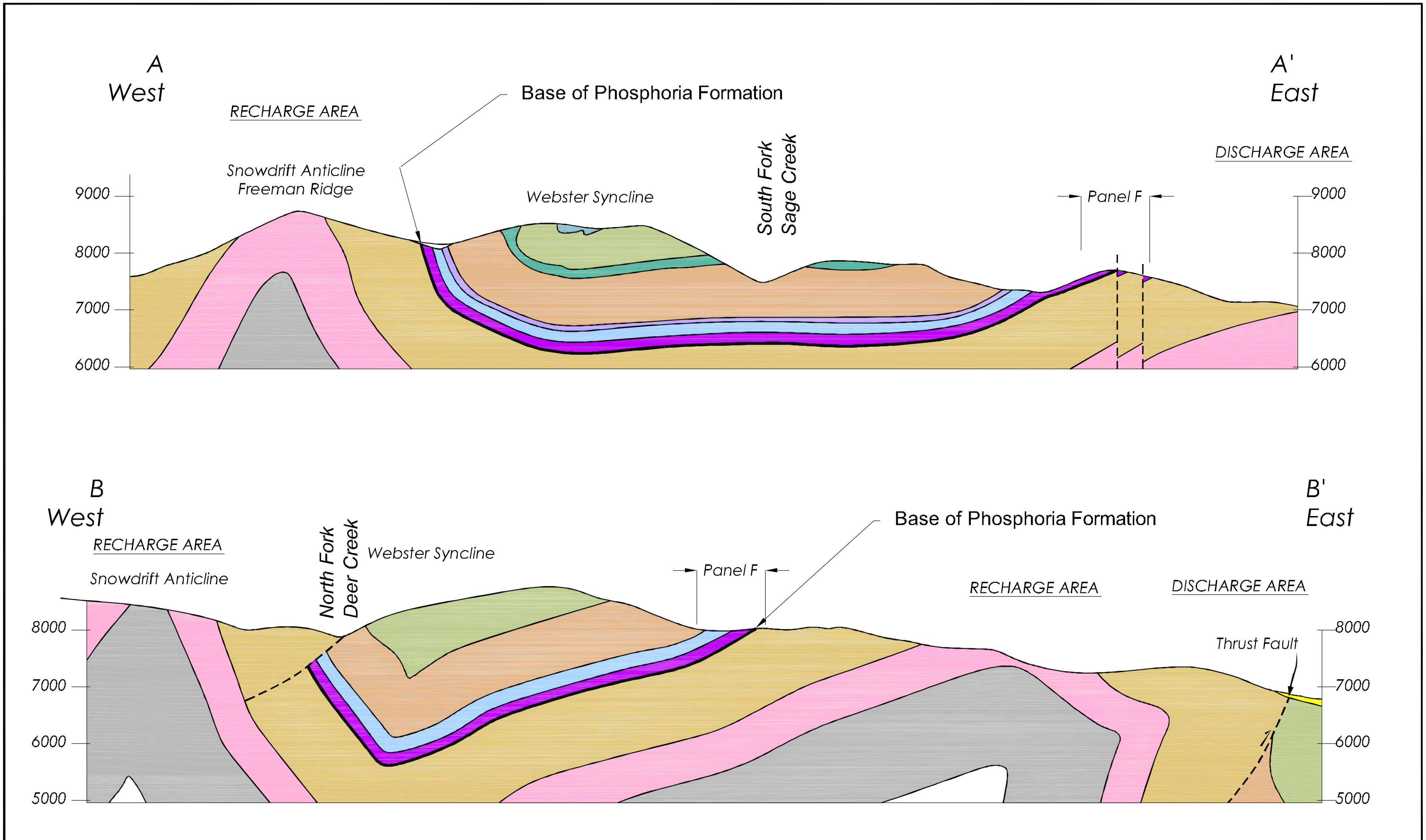


Figure 3.1-1
Surface Geology and Faults
Smoky Canyon Mine
Panels F and G



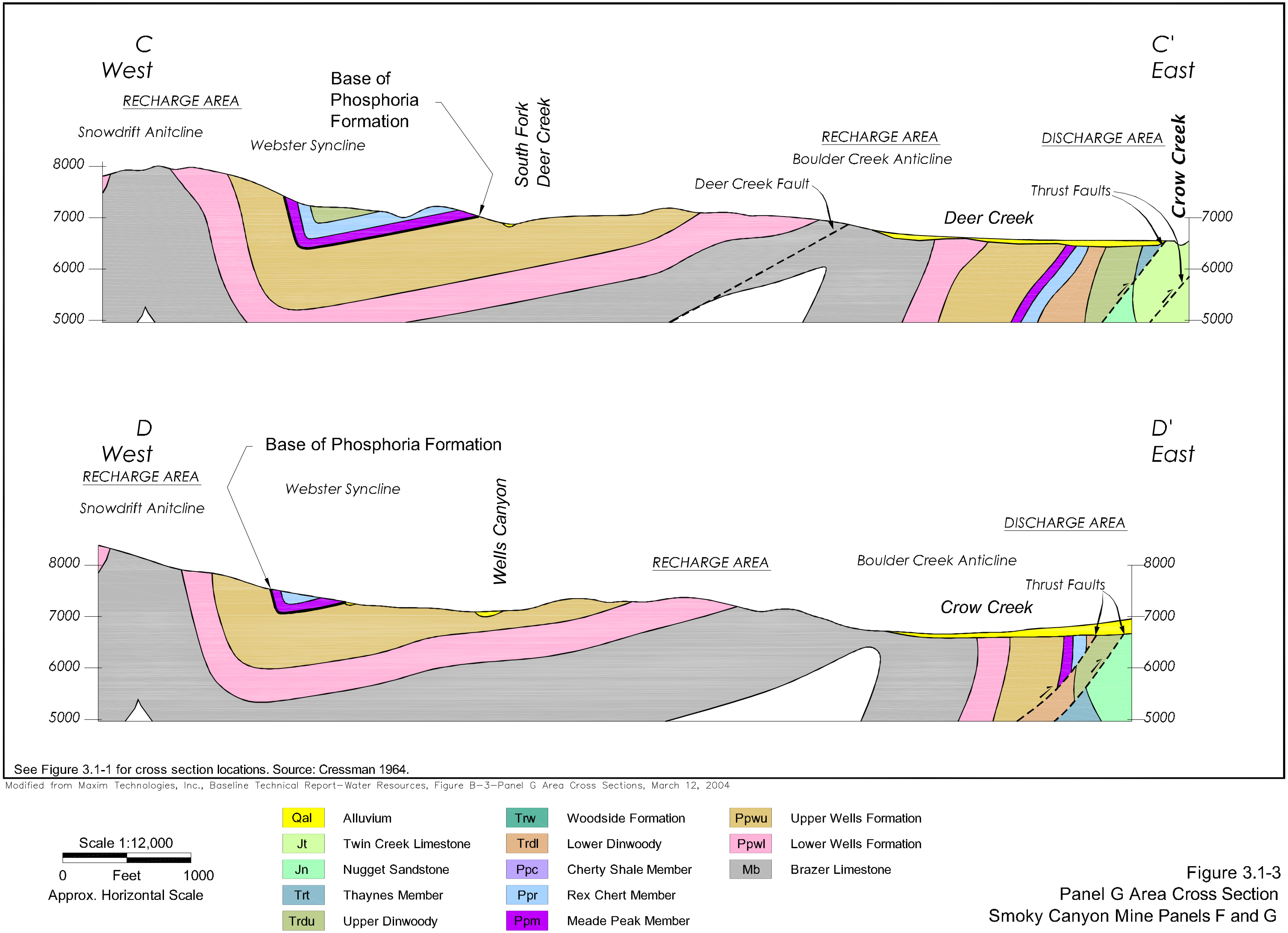
See Figure 3.1-1 for cross section locations. Source: Montgomery and Cheney 1967 (A-A'); Cressman 1964 (B-B')

Modified from Maxim Technologies, Inc., Baseline Technical Report–Water Resources, Figure B-2–Panel F Area Cross Sections, March 12, 2004

Scale 1:12,000
0 Feet 1000
Approx. Horizontal Scale

- Alluvium
- Twin Creek Limestone
- Nugget Sandstone
- Thaynes Member
- Upper Dinwoody
- Woodside Formation
- Lower Dinwoody
- Cherty Shale Member
- Rex Chert Member
- Meade Peak Member
- Upper Wells Formation
- Lower Wells Formation
- Brazer Limestone

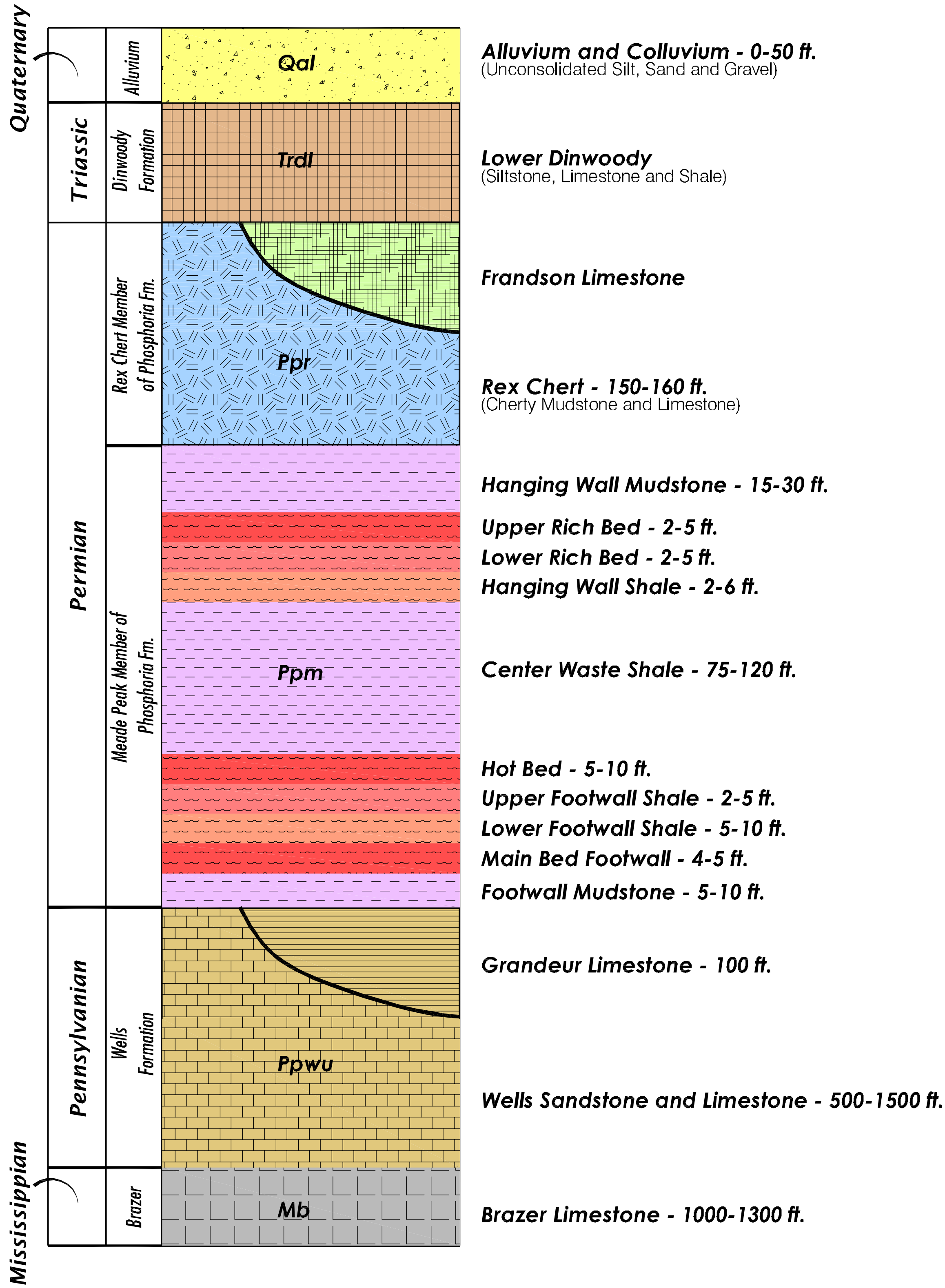
Figure 3.1-2
Panel F Area Cross Section
Smoky Canyon Mine Panels F and G



See Figure 3.1-1 for cross section locations. Source: Cressman 1964.

Modified from Maxim Technologies, Inc., Baseline Technical Report–Water Resources, Figure B–3–Panel G Area Cross Sections, March 12, 2004

Figure 3.1-3
Panel G Area Cross Section
Smoky Canyon Mine Panels F and G



Notes: Not to Scale. Red Units are Ore Bearing (Phosphatic)

Modified from Maxim Technologies, Inc., Baseline Technical Report–Water Resources, Figure 3–Stratigraphic Section, March 12, 2004

Figure 3.1-4
Stratigraphic Section
Smoky Canyon Mine Panels F and G

Dinwoody Formation

The Triassic Dinwoody formation is divided into upper and lower members that together are as much as 1,600 feet thick. It is composed of interbedded, calcareous siltstone, limestone, shale, and clay. The lower member contains more clay and shale beds than the upper member where limestone is more common. The Dinwoody formation outcrops along the western side of Panel F within the Webster Syncline (**Figure 3.1-2**).

Alluvium

Unconsolidated alluvium and colluvium of Quaternary age are present on slopes and along drainages. These deposits consist of gravel, sand, silt, and clay, with widely varying dimensions. In the drainages, thickness of alluvium typically is less than 10 to 20 feet. Greatest thickness of alluvium is assumed to be in portions of Crow Creek Valley.

3.1.3 Structural Setting

Two major thrust plates, the Absaroka and Meade plates, are recognized in the region. Six major thrust faults associated with these plates have been identified to the east of the Webster Range (**Figure 3.1-1)**. The Boulder Creek Anticline and the Webster Syncline are major north-south trending folds existing across the Project Area and were probably formed contemporaneously with thrusting (Cressman 1964, Montgomery, and Cheney 1967).

East-west trending tear faults and normal faults, which probably occurred during Cenezoic-age Basin and Range faulting, offset the thrust faults, fold axes, and individual rock units. Three major normal faults have been mapped in the Study Area: Deer Creek Fault, Wells Canyon Fault, and Sand Wash Fault (**Figure 3.1-1**). These three normal faults extend deep into the sedimentary section. Other normal faults shown on **Figure 3.1-1** have shorter lateral extent. Panel F has experienced greater faulting in the northern part of the deposit. As a result, considerably more alteration is observed in the Meade Peak sediments of Panel F.

Surface outcrop areas of the Wells formation and Meade Peak member of the Phosphoria formation are shown on **Figure 3.1-1**. Panels F and G are located along the outcrop of Meade Peak rocks, with the Wells formation outcropping immediately east of the mine panels. Younger rocks of the Rex Chert member (Phosphoria formation) and Dinwoody formation crop out along the west side of Panels F and G. As shown on **Figure 3.1-1**, the outcrop of units along the Webster Syncline is narrower (i.e., steeper dip of beds) in the Panel G area compared to the broader width of outcrop along the syncline limb west of Panel F.

3.1.4 Seismicity and Geotechnical Stability

Seismicity

The Project Area lies within a Zone III seismic region (UBC 1991) extending from northern Arizona through the Wasatch Front in Utah to the Yellowstone and Hebgen Lake regions in Wyoming and Montana. The Idaho Geological Survey has mapped the southeastern part of Idaho, east of the Snake River Plain as having the highest of three seismic shaking rankings (IGS 2004). About 20 earthquakes capable of damaging structures (greater than 5.0 on the Richter Scale) have occurred within this seismic region from 1880 through 1994 (USGS, BLM, and USFS 1975; UISS 2000).

Although several earthquakes have occurred in recent years, there is no reported evidence they have caused surface features such as scarps, displacement of streams, or creation of sagponds

(USFS 1981; Mariah Associates 1990). USGS (2004a) and Idaho Geological Survey (2004) maps of Quaternary faults do not indicate any such faults being present in the Project Area. The closest earthquake recorded between 1880 and 1994 occurred approximately three miles north of the Smoky Canyon Mine near Draney Peak and had a Richter Scale magnitude of 5.9 (Schuster and Murphy 1996). Other significant earthquakes in the vicinity of the Project Area include one that occurred in 1930 near Grover, Wyoming about 12 miles to the southeast of Smoky Canyon, and two along the Utah/Idaho border in 1914 and 1963. These three earthquakes were assigned intensities (Modified Mercali Scale) of 6, 7, and 7, respectively. An earthquake in the area occurred April 21, 2001 centered about 27 miles northwest of Afton, Wyoming. The preliminary magnitude of this earthquake was 5.3. Within a 100-kilometer radius of the mine site, two additional seismic events that exceed 4 on the Richter scale have been reported since 2001. These include an event of magnitude of 5.4 in 2001 and another registering 4.2 in 2002 (Maxim 2004a).

Geotechnical Stability

Factors related to geotechnical stability of highwalls and overburden disposal site slopes have been identified through past operations at the Smoky Canyon Mine. Factors related to stability of highwalls include the type and strength of rock, degree of rock alteration, steepness of the final highwall slope, presence of any groundwater, spacing and orientation of fractures and faults, and blasting practices. Stronger rock, which is less fractured and altered, will produce more stable highwalls than weaker or more altered or fractured rock. Groundwater discharges from a highwall can also destabilize it. In general, highwalls at Smoky Canyon have proven to be stable over the duration of the mining operations. Mine designs are adapted as needed to respond to indications of highwall instability.

Factors related to stability of overburden fill slopes include the topography of the surface underlying the overburden pile, stress such as shock loading or overloading, slope heights, reduction of material strength by introduction of water, and the scheduling of reclamation contouring. Past instability of overburden fill slopes at the Smoky Canyon Mine has been related to high fill heights and excess water content due to excess incorporation of snow or snow melt into the material. Mine practices have been modified based on experience to preclude future slope failures.

In addition to the geotechnical stability of the mine facilities themselves, the haul/access roads outside the mine panels that are included in the Proposed Action and action alternatives have their own slope stability considerations. Landslide prone soil areas have been mapped in the Soil Survey of the CNF (USDA 1990). Cutslope stability hazard ratings for road construction have been assigned to soil families assuming roads are built on uniform slopes with cuts greater than 5 feet high, a 1H:1v final cut grade, and revegetation following construction. Additional discussion of these soils, and the soils map are found in **Section 3.4** of this document.

3.1.5 Overburden Characterization

Mineralogical and chemical characterization of overburden expected to be produced from the Panels F and G operations has been completed to help anticipate potential environmental effects from handling and disposing of this material (Maxim 2004b and 2004l). Baseline geochemistry analyses of whole rock metal content, acid generation potential, paste chemistry, and total organic carbon content were completed for 225 samples from 52 drillholes, for the purpose of characterizing geochemistry of overburden lithologies and spatial variability in chemistry as a function of geology. The relative volumes of different overburden lithologies are shown in **Table 3.1-1**.

TABLE 3.1-1 PANELS F AND G OVERBURDEN DESCRIPTION

GEOLOGIC UNIT	RUN OF MINE PERCENTAGE
PANEL F	
Chert	37.7
Franson Limestone	3.6
Hanging Wall Mud	5.8
Center Waste Shale	52.9
Total	100
PANEL G	
Chert	37.6
Hanging Wall Mud	10.2
Center Waste Shale	52.2
Total	100

Potential for Acid Rock Drainage (ARD)

ARD is produced when sulfide minerals contained in rock chemically react with oxygen and water to produce sulfuric acid and other reaction products. This acidic condition can lead to the dissolution of metals that are more soluble in water at low pHs. Other minerals in rock (primarily carbonates) can neutralize acid and cause the precipitation or co-precipitation of dissolved constituents. The potential for generation of ARD is a function of the amount of sulfide minerals present in mine waste and the amount of available minerals to neutralize any generated acid (Lapakko 1993). To assess the potential for acid rock generation, the amount of oxidizable sulfide minerals, or Acid Generation Potential (AGP), and the amount of neutralizing materials, or Acid Neutralizing Potential (ANP), in the material being assessed are typically measured. A ratio of these measurements (ANP:AGP) determined by the acid base accounting (ABA) test indicates the potential for acid to be generated. Although any material with an ANP:AGP ratio above 1.0 could be considered non-acid generating, the BLM ARD risk threshold is based on an ANP:AGP ratio of 3:1 (BLM and USFS 2000).

Representative samples of cuttings from rotary drill holes completed in 2001 and 2003 by Simplot were collected to test ANP:AGP of the major stratigraphic potential overburden units proposed to be mined. One of the Panel G Center Waste Shale samples had an ANP:AGP value less than 1 while 7 had values between 1 and 3. The remaining 16 (67 percent) had ANP:AGP values greater than 3. One of the 16 Panel G Footwall Mud samples had ANP:AGP values between 1 and 3. All other Panel G overburden samples had ANP:AGP values greater than 3. Only 5 of 20 altered and 7 of 20 unaltered Center Waste Shale samples from Panel F had ANP:AGP values between 1 and 3. All other Panel F samples had ANP:AGP values greater than 3. ABA data for both Panels F and G were similar and indicated that overburden would not present a significant risk of ARD. These data indicate that local oxidation of sulfide minerals may occur, but the overall ABA value for all overburden indicates it is unlikely to promote ARD. This is in line with conditions at the existing Smoky Canyon Mine and other phosphate operations in southeast Idaho.

Trace Elements and Sources

Selenium and other metals and metalloids occur in the Phosphoria formation in elevated concentrations relative to average crustal abundances (USFS et al. 1976, Desborough et al. 1999, Herring et al. 1999, Munkers et al. 2000).

Assay Data on Selenium

Herring et al. (2000) sampled measured sections in the Phosphoria formation at the Smoky Canyon Mine and assayed these samples for various metals and selenium. They showed selenium occurs in the Meade Peak Phosphatic Shale member of the Phosphoria formation primarily in the Hanging Wall Mudstone, Center Waste Shale and Footwall Mudstone beds where selenium concentrations ranged from 6 to 708 mg/Kg. The selenium concentration in the Rex Chert member was 1 mg/Kg. They also noted that selenium concentrations varied greatly between samples. This variability is due to different degrees of alteration and weathering based on depth below the ground surface and structural features such as fractures and faults.

Munkers (2000) discussed drill core assays of the Phosphoria formation obtained from the Smoky Canyon Mine. These data showed that the largest concentrations of selenium occurred in the Center Waste Shale. Most of these concentrations were below 150 mg/Kg, but three zones in this unit had concentrations as high as 250 to 300 mg/Kg.

Selenium in the Phosphoria formation occurs in several forms. The USGS has identified selenium associated with organic matter (kerogen) in carbon-rich rocks and also with the mineral pyrite (Desborough et al. 1999). Munkers et al. (2000) noted that most of the selenium in the Smoky Canyon Mine rocks occurs as selenide (Se^{-2}) in ionic substitution for sulfur in pyrite; however, native selenium (Se^{0}) has also been identified (Munkers et al. 2000). These forms of selenium are insoluble; however, upon exposure to surface conditions and weathering, selenide and elemental selenium can be oxidized to more soluble forms. In the overburden in the vicinity of Pole Creek north of the Project Area, Möller (1997) found that approximately two percent of the selenium in samples analyzed from the overburden disposal facility occurred as the more soluble form, selenite (Se^{+4}), although its chemical or mineralogical occurrence was not described. The most soluble forms of selenium, selenate (Se^{+6}), and certain organo-selenium compounds are not found in the undisturbed overburden material.

Cadmium commonly occurs in ionic substitution for zinc in the sulfide mineral sphalerite (ZnS). Desborough (1977) found cadmium to occur in sphalerite in the Meade Peak Member in Coal Canyon, Wyoming. Munkers et al. (2000) reported that sphalerite is common in siltstones in overburden samples from the Meade Peak Member collected at the Smoky Canyon Mine. Accordingly, and by extension, it is probable that cadmium occurs in sphalerite in the Middle Waste Shale; however, concentration in organic compounds is also probable.

The mineralogical occurrence of other metals in the Middle Waste Shale has not been well documented; however, Desborough (1977) studied metal occurrences in vanadium-rich zones in the Meade Peak member in eastern Idaho and western Wyoming. He determined that trace elements and metals occurred in sulfide minerals (zinc in sphalerite), oxides (molybdenum, titanium and vanadium), silicates (chromium), and organic compounds (chromium, silver, vanadium), as well as an indeterminate occurrence for nickel. Lead, arsenic, and other metals and metalloids were not studied. A similar diversity of mineralogical and organic-compound occurrences can be assumed, although it has not been documented, for the occurrence of metals in the Center Waste Shale at the Smoky Canyon Mine. The absence of low pH conditions in the overburden, and waters that pass through it, substantially inhibits the leaching and mobilization of most metals and metalloids, other than selenium.

The USGS (Perkins and Foster 2004) studied affinities and distribution of selenium and other elements in the Meade Peak member and determined that, in unweathered rocks, sulfides (mainly pyrite and sphalerite) host the majority of the cadmium, copper, selenium and zinc and a large proportion of the nickel and vanadium. Most of the non-sulfide fraction of these elements in unweathered rocks is associated with organic matter and oxyhydroxides, and a small amount of the selenium is present in elemental form. Silicates and oxides host the majority of the chromium and vanadium in unweathered rocks. In weathered rocks, acid-soluble oxyhydroxides are the primary hosts for all these elements except chromium and uranium, which are associated with relatively stable minerals.

Cadmium, manganese, nickel, and selenium were measured in whole rock assays from Panels F and G samples. Samples of potential overburden were collected as previously described, and assayed to assess the total content of metals and metalloids present in the overburden. A total of 114 samples from drill holes in the proposed Panel F were tested along with 102 samples from Panel G, representing the stratigraphic units that would comprise overburden to be mined under the Proposed Action and action alternatives.

Lithology-related trends in selenium concentration are similar at both Panels F and G with the greatest selenium concentrations observed in Center Waste Shale (**Table 3.1-2**). A greater mean selenium concentration was calculated for unaltered Center Waste Shale compared to altered Center Waste Shale from Panel F. Selenium concentrations decrease in the following order at each lease area; Center Waste Shale > Footwall Mudstone (Panel G) > Hanging Wall Mudstone. Wells formation, Rex Chert, and Franson Limestone (Panel F) had mean selenium concentrations ranging from 1.5 to 3.6 mg/Kg and were considerably lower than the other lithologies (Maxim 2004b).

In **Table 3.1-2**, Franson Limestone is described only for Panel F because it does not occur in the overburden of Panel G. Likewise, Center Waste Shale is present in distinctly different alteration states in Panel F, which is not present to a significant degree in Panel G.

TABLE 3.1-2 WHOLE ROCK SELENIUM CONCENTRATIONS (MG/KG)

	FRANSON LIMESTONE	REX CHERT	HANGING WALL MUD	CENTER WASTE SHALE	CENTER WASTE SHALE (ALTERED)	CENTER WASTE SHALE (UNALTERED)	FOOTWALL MUD	WELLS FORMATION
PANEL F								
Number of Samples	15	20	20	0	20	20	0	19
Minimum	0.7	1.3	2.1		3.4	3.9		0.7
Mean	2.2	3.3	20.7		56.3	87.3		2.6
Maximum	10	5.9	76.5		370	400		7.2
Standard Deviation	2.6	1.3	21.1		82.9	99.5		1.7
PANEL G								
Number of Samples	0	23	18	24	0	0	16	21
Minimum		0.6	2.9	6.4			4.9	0.5
Mean		1.5	12.7	68.3			14.9	3.6
Maximum		3.5	74.5	177			24.9	11.2
Standard Deviation		0.8	16.6	51.2			6.3	3.5

From: Maxim 2004b

Paste Extract Test Data

Electrical conductivity (EC), pH, cadmium, manganese, nickel, and selenium were measured from saturated paste extracts. Samples of potential overburden from Panels F and G were collected as previously described and analyzed to assess which metals and metalloids would be expected to be leachable from overburden. A total of 114 samples from drill holes in Panel F were tested along with 102 samples from Panel G, representing the stratigraphic units that would comprise overburden to be mined under the Proposed Action and Action Alternatives.

Metal concentrations measured in saturated paste extracts were generally low, with many samples having concentrations that were at or below detection limit levels. Cadmium was not detected in paste extracts from any sample (**Table 3.1-3**). Detections of nickel were limited, with only Panel G Center Waste Shale samples registering detections for more than 3 samples.

TABLE 3.1-3 METAL DETECTIONS IN PANELS F AND G SATURATED PASTE EXTRACTS

	FRANSON LIMESTONE	REX CHERT	HANGING WALL MUD	CENTER WASTE SHALE	CENTER WASTE SHALE (ALTERED)	CENTER WASTE SHALE (UNALTERED)	FOOTWALL MUD	WELLS FORMATION
PANEL G								
Number of Samples Analyzed	0	23	18	24	0	0	16	21
NUMBER OF DETECTIONS								
Cadmium (DL = 0.1[1])		0	0	0			0	0
Manganese (DL = 0.1)		13	1	9			0	0
Nickel (DL = 0.1)		0	2	11			1	1
Selenium (DL = 0.01)		0[2]	7	22			6	1
PANEL F								
Number of Samples Analyzed	15	20	20	0	20	20	0	19
NUMBER OF DETECTIONS								
Cadmium (DL = 0.1)	0	0	0		0	0		0
Manganese (DL = 0.1)	0	8	6		0	5		0
Nickel (DL = 0.1)	0	0	0		1	3		1
Selenium (DL = 0.01)	0	0	10		15	19		2

[1] Detection limits reported in mg/Kg.
[2] Selenium was reported at the detection limit in one Deer Creek chert sample.
From: Maxim 2004b

Manganese was not detected in paste extracts from any Footwall Mudstone, Wells formation, or Franson Limestone sample. Mean manganese concentrations for Panel G were the greatest in paste extracts from Rex Chert and Center Waste Shale (0.2 mg/Kg for both rock types). For Panel F samples, Rex Chert had the greatest mean manganese concentration (0.2 mg/Kg).

Selenium was detected most frequently in paste extracts of Center Waste Shale, including altered and unaltered Panel F samples. Selenium was not measured above the detection limit in Rex Chert or Franson Limestone samples. Saturated paste selenium concentrations

(**Table 3.1-4**) generally followed the same trend as whole rock total selenium concentrations (i.e. Center Waste Shale > Hanging Wall Mudstone > Footwall Mudstone > Wells formation ≈ Rex Chert ≈ Franson Limestone). However, for Panel F samples, altered Center Waste Shale produced paste extracts with selenium concentrations that were considerably lower than those of unaltered Center Waste Shale and Panel G Hanging Wall Mudstone (Maxim 2004b).

The USGS (Herring 2004) conducted leaching experiments with Meade Peak rock samples obtained from a number of locations in southeastern Idaho and also noted that less-altered rock tended to produce higher leachate concentrations of selenium and other elements compared to altered rock, which typically had much lower leachate concentrations.

TABLE 3.1-4 SATURATED PASTE EXTRACTABLE SELENIUM CONCENTRATIONS (MG/KG)

	FRANSON LIMESTONE	CHERT	HANGING WALL MUD	CENTER WASTE SHALE	CENTER WASTE SHALE (ALTERED)	CENTER WASTE SHALE (UNALTERED)	FOOTWALL MUD	WELLS LIMESTONE
PANEL G								
Number of Samples	0	23	18	24	0	0	16	21
Minimum		< 0.01	< 0.01	< 0.01			< 0.01	< 0.01
Mean[1]		0.01	0.05	0.31			0.02	0.01
Maximum		0.01	0.44	1.23			0.17	0.01
Standard Deviation		0	0.10	0.39			0.04	0
PANEL F								
Number of Samples	15	20	20	0	20	20	0	19
Minimum	All samples below detection		< 0.01		< 0.01	< 0.01		< 0.01
Mean			0.06		0.11	0.38		0.01
Maximum			0.26		0.71	1.3		0.02
Standard Deviation			0.08		0.17	0.45		0.002

[1] Mean values were calculated using the detection limit (0.01 mg/Kg) for samples with selenium concentrations that were below detection.
From: Maxim 2004b

Electrical conductivity (EC) measurements provide an indication of total solute release from rock samples. Saturated paste EC data indicate that solute release from Panels F and G samples was greatest from Center Waste Shale followed by Hanging Wall Mudstone and Footwall Mudstone. EC was greater in unaltered Center Waste Shale than in altered Center Waste Shale.

Saturated paste pH measurements ranged from 4.9 to 8.7 with mean values for individual lithologies ranging from 6.8 to 8.3. For each lease area, Center Waste Shale samples registered the lowest pH values, and Wells formation limestone registered the greatest, which is in agreement with ABA data.

3.1.6 Applicable Regional and Site-Specific Studies for COPCs

In addition to generally applicable literature for selenium and other COPCs relative to this Project, there are directly applicable, regional, and site-specific studies that are summarized in this section. Taken together, these regional and site-specific studies provide a broad understanding of the sources, release mechanisms, transportation pathways, potential receptors, and known and potential effects of selenium and other COPCs in the phosphate production area of Southeast Idaho. This existing understanding, combined with applicable site-specific data, is the basis for the evaluation of potential environmental effects from selenium and other COPCs for the Panels F and G Proposed Action and Alternatives.

U.S. Geological Survey Regional Studies
In response to a request from the BLM, the USGS initiated in 1997 a series of geologic, geo-environmental, and resource studies in the Western Phosphate Field. The results of these studies have been released in a series of individual publications available from the USGS along with a book that discusses the history, geology, geochemistry, economics, and environmental aspects of the Western Phosphate Field (Hein ed. 2004). The USGS book contains a number of chapters that provide selenium-related information that is generally applicable throughout the phosphate production area of Southeastern Idaho.

The occurrence of various COPCs in the Meade Peak member are discussed in Chapter 8 (Grauch et al. 2004) of the USGS book. Cadmium, nickel, selenium and zinc were found to be most abundant in sulfide mineralization and in oxyhydroxide minerals in more weathered rock. Selenium also appeared to be associated with natural organic materials in the rock. The significance of these findings are that: 1) the COPCs can be transported from the rocks into the environment as dissolved and adsorbed species; and 2) release of these elements from rocks will be strongly dependent on pH, Eh, and exchangeable ion contents in the water pathway.

Presser et al. (2004b) described a number of sites in Southeastern Idaho that have been impacted by selenium released from phosphate mines. Temporal analysis of water quality monitoring at phosphate mines indicated that selenium concentrations at overburden seeps typically varied during the year with peak selenium concentrations often occurring during the spring. This leads to varying selenium concentrations in receiving streams. Selenium concentrations in macrophytes and forage fish from certain locations in Southeastern Idaho were shown to exceed published risk thresholds for higher trophic levels species (USDI 1998). They referred to dietary exposure of selenium leading to the deaths of sheep and horses at six sites since 1996. Selenium concentrations in forage plants on some phosphate mine overburden fills were found to exceed published thresholds for dietary toxicity for horses and sheep with concentrations in alfalfa being greater than grasses.

Presser et al. (2004b) described selenium loading during 2001 and 2002 in the Blackfoot River watershed, which contains most of the phosphate mines in Southeastern Idaho. There was typically little difference between total and dissolved selenium in the water samples, indicating selenium was being transported largely in dissolved species. Selenite represented less than 10 percent of the dissolved selenium, which was typically a mixture of selenate and organic selenide. Over 70 percent of the selenium load in the watershed occurred during the high-flow season, mostly as selenate. During low flow, the organic selenide concentration increased, suggesting elevated biotic productivity and enhanced selenium uptake in food webs. They referred to 1998 risk assessment findings by the IDEQ indicating some stream segments in the Blackfoot River watershed were being impacted by selenium contamination exceeding the EPA Ambient Water Quality Criteria, Freshwater Continuous Criterion Concentration (0.005 mg/L, 40 CFR 131.36).

Stillings and Amacher (2004) presented data collected from a natural wetland formed from phosphate mine drainage. Selenium concentrations at the overburden seep were higher in the spring of 1999 following a winter with heavy snowfall than the following year after a winter with less snowfall. Selenium concentrations in the water decreased with distance from the source while selenium concentrations in wetland sediments were greatest near the source and decreased with distance. This suggests that selenium sequestration in wetland sediments is an important factor for selenium attenuation. Most of the selenium in the sediment was adsorbed and/or coprecipitated with iron oxides, although organic matter also sequestered selenium. Selenium concentrations in wetland vegetation showed a trend similar to the sediment with higher concentrations closest to the source, indicating plant uptake as another factor in attenuation of selenium in the wetland environment.

Hamilton et al. (2004) discussed occurrences of selenium and other trace elements in water, sediment, aquatic plants, aquatic invertebrates, and fish from nine stream sites in the Blackfoot River watershed in 2000. Selenium concentrations in water were below the limit of detection for all sites except East Mill Creek where both the upper and lower sites had selenium concentrations above the 0.005 mg/L water quality criterion. Stream sediment selenium concentrations were also highest in East Mill Creek. Selenium concentrations in aquatic plants correlated well (0.97, $P<0.0001$) with sediment concentrations and indicated selenium transfer from the streams to the local food webs. Selenium concentrations in aquatic invertebrates showed a strong correlation (0.94, $P<0.002$) with concentrations in aquatic plants. Comparison of the invertebrate data with hazard assessment protocols by Lemly (1995) indicated probable adverse effects to larval fish in certain streams. Fish tissue selenium concentrations were highest in speckled dace and lowest in redside shiners. The selenium concentrations in fish tissue followed the same pattern of accumulation as in surficial sediments, aquatic plants, and aquatic invertebrates. The speckled dace is a bottom browser that feeds on invertebrates and plant material. They discussed the importance of collecting data from a variety of ecosystem components (water, sediment, vegetation, invertebrates, and fish) and considering the synergistic effects of all these components when trying to determine if certain aquatic ecosystems are at risk from selenium contamination. They concluded that the available data support the premise that selenium concentrations in several aquatic ecosystem components were sufficiently elevated to cause adverse effects to aquatic resources in the Blackfoot River watershed.

Mackowiak et al. (2004), presented information on uptake of selenium and other COPCs into plants and the implications of this for grazing animals in Southeastern Idaho. Data were presented from samples of vegetation taken at a phosphate mine overburden site, a wetland below an overburden fill, and also from samples taken at undisturbed sites both on and off the outcrop pattern of the Meade Peak member. Plants at the undisturbed sites all had selenium concentrations less than 2 mg/Kg, within the maximum tolerable dietary content (2 mg/Kg, National Research Council 1980) for most classes of livestock, and well below the 5 mg/Kg critical threshold value for animal forage diet (National Research Council 1980). Mean vegetation selenium content from the overburden fill site was 38 mg/Kg. Alfalfa contained nearly 80 mg/Kg, which was about four times more than grasses at the same site. Mean selenium values for legumes, grass and tree species growing on the overburden were all greater than the 5 mg/Kg threshold. In contrast, forb and shrub species had lower mean selenium values close to the threshold. From the data collected, they concluded that forage selenium concentrations from the overburden site were a concern with regard to toxicity effects in grazing animals. Acute or chronic poisoning was predicted for grazing animals selectively ingesting certain high-concentration forage species from several sites at the overburden fill.

The delay in onset of acute poisoning post-ingestion (12 to 36 hours) might result in these animals becoming ill or dying in areas that are away from the primary vegetation contamination areas. They indicated capping seleniferous overburden with non-seleniferous material has merit for long-term mitigation, but studies demonstrating the optimal capping thickness that prevents root penetration into the seleniferous material have not yet been done. Attenuating mobile selenium with iron materials was suggested as being potentially useful for remediation of contaminated sites. They indicated that the lowest-cost method for mitigating accumulation of selenium in forage plants growing on overburden fills was selective control of plant species used in revegetation. Good candidates for low selenium uptake species include certain grasses and native forbs and shrubs. Existing reclamation revegetation on overburden sites can be manipulated with herbicides and physical treatments to change the existing species mix to ones that are more favorable.

University of Idaho Studies

University of Idaho researchers have conducted studies supported by the Idaho Mining Association (IMA) to investigate potential effects of selenium on wildlife and livestock. The results of these studies were not peer reviewed or approved by the BLM, USFS, or IDEQ.

Hardy (2003) studied the effects of dietary selenium on cutthroat trout obtained from the Blackfoot River and the Henry's Lake Fish Hatchery. These fish were studied over a 2 to 2.5 year period at the Hagerman Fish Culture Experiment Station where the fish were raised in a clean environment and fed a diet containing elevated selenium levels.

Fessler (2003) researched selenium toxicity in sheep on reclaimed phosphate mine areas in Southeastern Idaho. The sheep were first all exposed to normal (low) levels of selenium. Then the low and high selenium groups were exposed to selenium forage concentrations on reclaimed phosphate mines that would fall within various published "toxic" levels for four weeks after which they were again grazed on normal selenium forage and water for two weeks (depuration phase). During the study, one of the test groups escaped the enclosure, so the selenium exposure of these animals was uncertain.

Dr. John Ratti collected over 500 bird eggs in 1999 and 2000 from reference sites and drainages affected by phosphate mining sites in Southeastern Idaho (Garton et al. 2002a, 2002b).

Regional Studies by Idaho Mining Association and Idaho Department of Environmental Quality

Following livestock losses associated with excessive selenium uptake in 1996, the five active phosphate mining companies in Southeast Idaho joined together with the IMA to form the IMA Selenium Subcommittee. An Interagency/Phosphate Industry Selenium Working Group was subsequently established to facilitate cooperation between the mining industry, tribal entities, and state, federal, and local agencies. The IMA Subcommittee retained the services of Montgomery Watson, a consulting firm, to conduct a series of regional studies throughout the phosphate mining area of Southeast Idaho with the intent of characterizing the extent and magnitude of selenium and other COPC releases to a variety of environmental media. These investigations included sampling of surface waters, groundwater, sediments, soil, vegetation, aquatic biota, and wildlife for a range of constituents of concern including: cadmium, manganese, nickel, selenium, vanadium, and zinc. The results of these investigations are documented in the following reports:

- Fall 1997 Interim Surface Water Survey Report, Montgomery Watson (1997).
- 1998 Regional Investigation Report, Sampling and Analysis Plan, Southeast Idaho, Phosphate Resource Area, Montgomery Watson (1998).
- Final 1998 Regional Investigation Report, Southeastern Idaho Phosphate Resource Area Selenium Project, Montgomery Watson (1999).
- Draft 1999 Interim Investigation Data Report, Southeastern Idaho Phosphate Resource Area Selenium Project, Montgomery Watson (2000).
- Draft 1999-2000 Regional Investigation Data Report for Surface Water, Sediment and Aquatic Biota Sampling Activities, May – June 2000, Southeastern Idaho Phosphate Resource Area Selenium Project, Montgomery Watson (2001).

The agencies disagreed with some of the content in the last two reports related to the 1999 and 2000 investigations, and these reports were not finalized or approved by the agencies.

The 1997 results from these studies showed that surface water samples collected from or near phosphate mine facilities contained elevated concentrations of selenium with about half the samples exceeding the water quality criterion (0.005 mg/L).

The 1998 studies were expanded to include surface water, groundwater, stream sediments, soils, vegetation, and trout fillets. Over 70 percent of the surface water samples collected at mine sites exceeded the EPA selenium ambient water quality criterion, and 20 percent of the stream samples outside of mine areas exceeded the criterion. Seeps emanating from overburden fills and French drains had the highest concentrations of selenium. In general, sediment, soil, and vegetation sample analyses indicated elevated levels of the COPCs at mine facilities compared to sample locations remote from mines.

In 1999, additional investigations were conducted to collect surface waters at select stream locations and to characterize selenium and cadmium concentrations. Ten of the 12 surface water samples collected in May exceeded the EPA criterion. Investigations of selenium concentrations in elk and cattle tissue were also conducted. The elk liver and skeletal muscle sampling program found that elk harvested by hunters near phosphate mines typically had higher tissue selenium concentrations than those taken away from mines. Of the 160 elk livers analyzed, 156 had liver selenium concentrations less than the maximum concentration observed by IDFG in other parts of Idaho (6 – 7 mg/Kg ww). The four livers with higher concentrations exhibited selenium concentrations ranging from 7.4 to 13 mg/Kg. A screening human health risk assessment indicated there was not a human health concern with consumption of elk liver containing 13 mg/Kg selenium (MW 2000).

In August 2000, the IDEQ took over coordination of future area-wide investigations, for regulatory purposes, to establish agency oversight of investigations and to formulate regional cleanup guidelines to assist lead agencies in implementing future site-specific remedial efforts. The IDEQ subsequently retained Tetra Tech, Inc. to conduct additional area-wide investigations as necessary, conduct an area wide human health and ecological risk assessment, and prepare an area wide risk management plan. Tetra Tech first evaluated the existing data to identify data gaps (Tetra Tech 2001a). Another early product of this work was completion of the conceptual site model for the Project (Tetra Tech 2001b). All the existing information and risk assessment prepared by the IMA was reviewed for applicability in preparing a human health and ecological risk assessment (Tetra Tech 2001c).

The IDEQ ecological conceptual site model is reproduced here as **Figure 3.1-5**. A separate conceptual site model was prepared for the human health risk assessment. The source of the COPCs was identified as phosphate mine overburden. Potential transport media and pathways were described as:

- Wind erosion and dust transportation to eventual deposition on surfaces downwind.
- Percolation of precipitation recharge through overburden to seeps, drains, groundwater, and potentially surface water.
- Storm water runoff transporting dissolved COPCs and particles eroded from exposed overburden surfaces to surface streams and places of sedimentation. COPCs can subsequently be exchanged between surface water and sediments downstream of the sources.

Terrestrial and aquatic plants can uptake COPCs from contaminated water, soil, and sediments. In the case of selenium, its concentration in plants can be greater than its concentration in the water, soil, or sediment. For ecological receptors, the most important exposure pathways (greatest ecological risk) include: ingestion of particles (dust, soil, sediment), surface water, and ingestion of contaminated plants or prey.

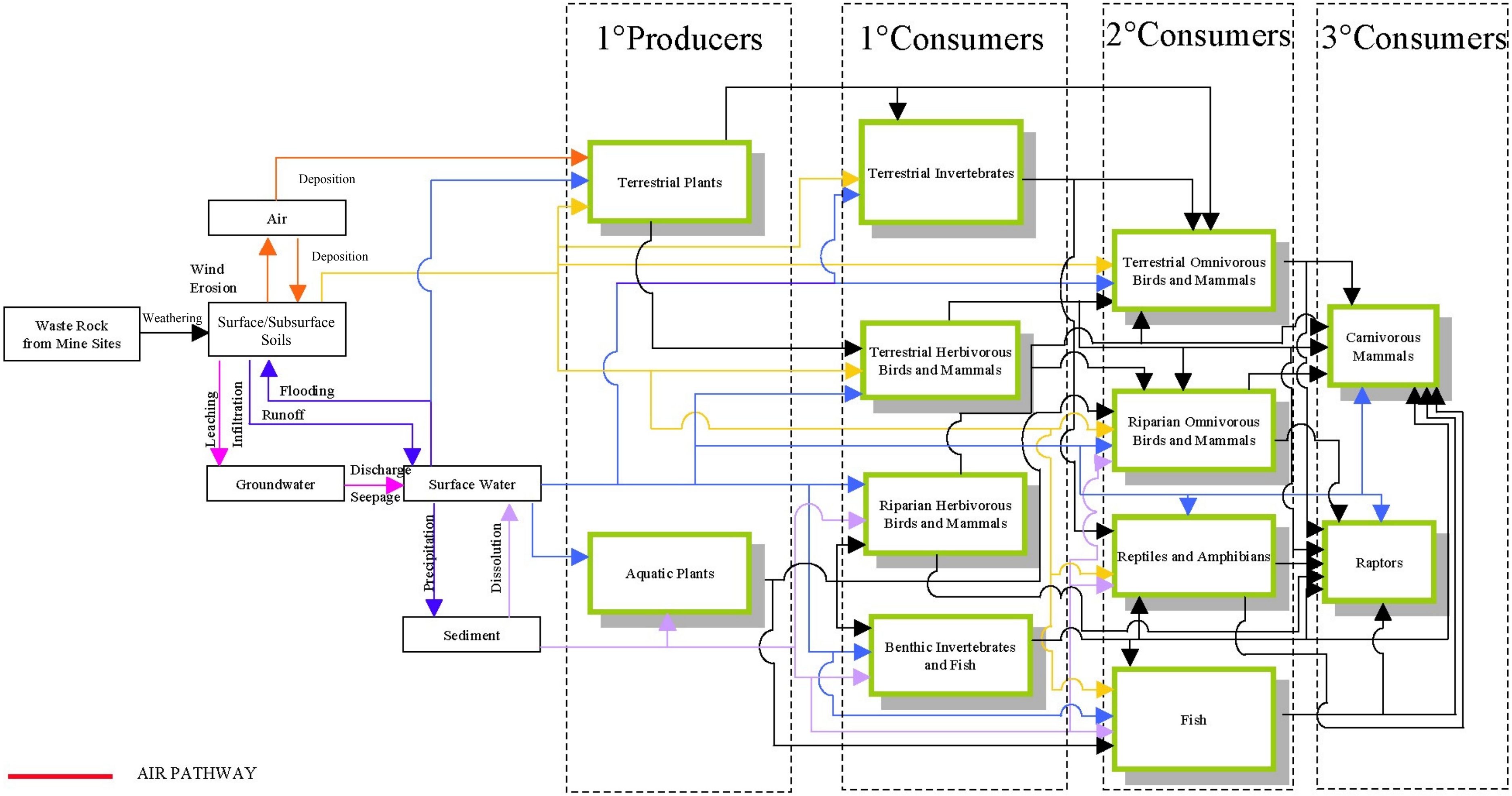
Three potentially exposed human populations were identified as recreational hunters and fishers, Native Americans, and subsistence lifestyle receptors. The complete exposure pathways included ingestion of wildlife and cattle that graze on contaminated forage, ingestion of fish taken from contaminated aquatic habitats (water, vegetation, and/or sediment), ingestion of contaminated terrestrial or aquatic plants by Native Americans, and ingestion of contaminated homegrown produce by subsistence lifestyle receptors.

Following evaluation of all data, including that from additional area-wide investigations conducted during 2001, a draft Human Health and Ecological Risk Assessment was released by IDEQ in July 2002 for a formal 45-day public review and comment period. The Final Human Health and Ecological Risk Assessment was released by IDEQ in December 2002 (Tetra Tech 2002a). The 165-page document is a detailed analysis of the area wide data including nine extensive appendices of technical information and responses to public comments. The major conclusions of the risk assessment were:

- There is a low probability of significant human health effects based on current conditions. Potentially significant human health risks were indicated only in the case of subsistence use of resources in a limited number of highly impacted areas, which was considered highly unlikely.

- There is a low probability of population level impacts to regional wildlife based on current conditions and the low percentage of impacted areas in comparison to unaffected surrounding habitat.

- There is a high probability of subpopulation and/or individual effects occurring for ecological receptors residing in the vicinity of highly impacted areas. For example, small animals such as rodents, with home ranges of only a few acres, have a higher probability of adverse effects if they live in impacted areas.



AIR PATHWAY

GROUNDWATER PATHWAY

SURFACE WATER PATHWAY

SEDIMENT PATHWAY

FOOD INGESTION PATHWAY

SOIL PATHWAY

Figure 3.1-5

Ecological Conceptual Site Model

Smoky Canyon Mine Panels F and G

- There is a potential for risks to aquatic and riparian ecological receptors residing in highly impacted areas as indicated by significant exceedances of conservative benchmarks for surface water, sediment, and fish tissue concentrations.

The COPCs for future site-specific studies are: cadmium, chromium, nickel, selenium, vanadium, and zinc. The IDEQ recommended that chromium, nickel and vanadium be excluded from mine-specific surface water and vegetation analyte lists but remain on soil and sediment lists. Selenium and cadmium are considered to be the primary hazard drivers on a regional basis.

The IDEQ then prepared a draft Area-Wide Risk Management Plan that was released for public review between May through July 2003. The Final Area-Wide Risk Management Plan was released by IDEQ in February 2004 (IDEQ 2004a). The Area Wide Risk Management Plan is intended to provide discretionary guidance to agencies responsible for site-specific, non-time critical removal actions at phosphate mines under the Comprehensive Environmental Responsibility, Compensation, and Liability Act (CERCLA). This removal action process for any one site includes site-specific inspection/investigations (SI), engineering evaluation/cost analysis (EE/CA), removal action implementation, and removal closeout to include post-removal controls and monitoring. Each EE/CA and corresponding Agency Recommended Alternative will be subject to formal public comment to solicit input from stakeholders and interested parties.

Based on the results of the detailed risk management evaluation, the IDEQ recommended removing copper from the list of COPCs for all environmental media, since the observed concentrations are well below the risk-based action levels. Because of low media-specific concentrations observed in previous sampling events, IDEQ also recommended removal of chromium, nickel, and vanadium from future mine-specific surface water and vegetation analyte lists, but suggested these remain on soil and sediment analyte lists. These constituents exhibit relatively low concentrations in the regional water data and do not appear to present measurable risks associated with plant uptake. The Risk Management Plan contains four regional removal action goals with associated removal action objectives. In addition, the Plan includes Area Wide Action Levels for the COPCs in a variety of environmental media.

In June 2001, the Idaho Division of Health, Bureau of Environmental Health and Safety, issued a Health Consultation report on selenium in beef, elk, sheep and fish in the phosphate production area of southeast Idaho (BEHS 2001). The health consultation only addressed public health significance of exposure to selenium in wild game and livestock and did not address health implications to Native Americans. The BEHS concluded that sheep or cattle taken directly off seleniferous pasture to slaughter, and the liver of elk grazing on pasture with elevated selenium could present an indeterminate public health hazard but more information is needed to evaluate the risk. Elk muscle and cattle subjected to depuration before slaughter were not considered a public health hazard. Cutthroat trout from East Mill Creek did not appear to present a public health hazard.

The same agency released another Health Consultation in May 2003 on selenium in fish from the upper Blackfoot River watershed (BEHS 2003). The BEHS advised in this report that children under the age of seven should not eat more than four meals per month of Yellowstone Cutthroat and Brook Trout from East Mill Creek. No rainbow trout were captured in this stream. Idaho fishing regulations designate the upper Blackfoot River watershed as a catch and release fishery and keeping Yellowstone Cutthroat Trout from the river, or its tributaries, is illegal.

Smoky Canyon Mine Studies

The Simplot Smoky Canyon Mine conducted sampling of vegetation and growth medium in 2000 at reclaimed areas of the mine to identify any relationships between selenium concentrations in the growth medium and the reclamation vegetation (JBR 2001). Statistically designed soil and vegetation sampling was conducted in six areas of the mine having different reclamation treatments. Samples were analyzed for selenium and other COPCs. Good correlation was found between selenium concentrations in vegetation and extractable selenium concentrations in the growth medium. Selenium concentrations were lowest to highest in samples of Timothy, smooth brome grass, wheat grass, clover, alfalfa, and Sanfoin. Grass typically had low (< 5 mg/Kg) selenium concentrations even when total selenium in the growth medium was greater than 5 mg/Kg. Legumes and other forbs were responsible for most of the elevated average selenium concentrations in vegetation. Selenium concentrations in vegetation were elevated where the growth medium was seleniferous shale and were at baseline levels where seleniferous overburden had been capped with chert and salvaged topsoil. Where vegetation was rooted in ROM overburden with no topsoil, average selenium concentrations in vegetation ranged from 5.8 to 31.7 mg/Kg. Where vegetation was growing in topsoil over ROM overburden, average selenium concentrations ranged from 4.8 to 7.1 mg/Kg. Where vegetation was growing in topsoil over chert, the average selenium concentration was 0.36 mg/Kg. The IDEQ removal action level for selenium in vegetation is 5 mg/Kg (IDEQ 2004). None of the removal action levels for other COPCs were exceeded in the vegetation samples from this study.

Simplot conducted Site Investigations at the Smoky Canyon Mine during 2003 and 2004 under a CERCLA Administrative Order on Consent (AOC) with the USFS and other state and federal agencies (NewFields 2005). These investigations documented sources of COPCs at the mine, the contaminant migration pathways, and apparent impacts by comparing the concentrations of COPCs with removal action levels developed by the IDEQ in the Area-Wide Risk Management Plan (IDEQ 2004).

The results of these investigations for vegetation indicated that selenium was the only COPC that exceeded any IDEQ removal action level. Mean selenium concentrations of forage (grass and forbs) samples collected from two overburden disposal areas at the mine with thin or no topsoil exceeded the removal action level, whereas concentrations from more extensively reclaimed (thicker topsoil or chert cap) areas were at or below the removal action level. None of the browse (woody plants) samples exceeded the removal action level.

Selenium concentrations in two overburden seeps and three runoff retention ponds during parts of the year were greater than the removal action level intended to protect livestock water use (0.05 mg/L). Concentrations in the same two seeps and one retention pond were greater than the removal action level intended to protect transient wildlife that may use the water for drinking (0.2 mg/L).

Exceedances of the selenium standard in surface water (0.005 mg/L) were primarily focused to Pole Canyon Creek below the Pole Canyon Dump, Hoopes Spring, and lower Sage Creek below the confluence with Hoopes Spring. The creek below the Pole Canyon Dump is apparently affected by its being routed beneath the dump in a French drain, a former design practice no longer followed. Elevated selenium in Hoopes Spring was attributed to groundwater infiltration originating from the base of the Pole Canyon Dump. Water from Hoopes Spring contributes more than one-half the flow in lower Sage Creek, thus lower Sage Creek has also been affected by seepage from the Pole Canyon Dump. Selenium concentrations in Crow Creek below the confluence with Sage Creek did not exceed the selenium standard.

COPC concentrations in sediments were less than removal action levels at all locations, except lower Pole Canyon Creek, which contained sediments that exceeded removal action levels for all COPCs except copper.

Selenium concentrations in fish were at or below background concentrations (8.3 mg/Kg dw) as reported in the Area-Wide Risk Assessment in all locations except Hoopes Spring and lower Sage Valley where the fish concentrations ranged from 14.1 to 31.8 mg/Kg dw and 13.5 to 19.3 mg/Kg dw, respectively. According to the Site Investigation Report (NewFields 2005), EPA has identified protective concentrations ranging from 9.5 to 15 mg/Kg dw for salmonid species including rainbow and cutthroat trout. Based on measured selenium concentrations, risk to aquatic invertebrates appeared to be acceptable in all areas except lower Pole Canyon Creek.

Smoky Canyon Tailings Pond Studies

A number of baseline studies, environmental analyses (EISs and EAs), wetland mitigation plans, and closure plans have been prepared in the past for Simplot's Smoky Canyon tailings ponds. These studies have been previously introduced in **Section 2.2.2**. In addition, Simplot has entered into a site-specific Administrative Order on Consent (AOC) for the Smoky Canyon Mine with the IDEQ, EPA, BLM, USFS, and USFWS to characterize sources, contaminant migration pathways, and potential environmental and human health effects associated with the operation of the Smoky Canyon Mine. The entire mine site has been divided into Areas A (the mineral extraction and mill area on federal land) and B (the tailings impoundments area located on Simplot-owned property).

Considerable data have been collected and interpreted in the following reports for Area B to describe the tailings ponds and the environmental conditions in their vicinity:

- Groundwater and Environmental Media Investigation Work Plan, November 2002;
- Baseline Ecological Risk Assessment Work Plan, Supplemental Information on Exposure Estimation and Risk Assessment Methods, December 2002;
- Baseline Ecological Risk Assessment Report, July 2003;
- Groundwater and Environmental Media Investigation Report, September 2003; and
- Final Tailings Impoundment Recommendations Report, January 2004.

Extensive site sampling and surveying was conducted in 2002 and included water, sediment, vegetation, invertebrates, fish, mammals, and waterfowl. Additionally, the Idaho Department of Fish and Game (IDFG) conducted surveys for bald eagles, waterfowl, and shorebirds. Recommendations were made to minimize residual water in the ponds during final closure as well as amending the growth medium and selecting specific reclamation vegetation species to reduce selenium uptake by vegetation (MFG 2004a). More specifics on the proposed tailings pond closure are included in **Section 2.3.7**.

Monitoring of surface water in Tygee Creek downstream from the tailings impoundments has indicated that there was not evidence of adverse effects from the impoundments to surface water quality. No water quality standards were exceeded, and overall water quality in the stream has improved over the historic baseline since a second tailings pond was constructed (MFG 2004). Groundwater studies indicated there was no evidence of adverse effects from the impoundments to the groundwater with little potential for migration of tailings pond water into the subsurface. Concentrations of metals and metalloids were at or near detection levels in shallow groundwater immediately down gradient of the tailings impoundments (MFG 2004).

Exposure modeling suggested that individual waterfowl or subpopulations that reside at the tailings impoundments may be exposed to concentrations that exceed toxicity benchmarks for chromium and selenium. Migratory or transient waterfowl exposure was below levels of potential concern (MFG 2004). Reduction and control of shoreline nesting habitat at the tailings ponds was requested by the IDEQ, BLM, EPA, and USFWS to protect waterfowl from excessive exposure to COPCs. Overall, mammalian populations were determined not at risk of adverse effects, but individual omnivores and predators that spend most of their lives at the ponds could be at risk from exposure to COPCs (MFG 2004). Risk to individual bald eagles was shown to be below a level of potential concern unless they obtained over 50 percent of their prey from the tailings ponds.

3.1.7 Mineral Resources

Phosphate rock minerals are the only significant global source of phosphorus. The main economic use of phosphate rock is production of phosphate fertilizers, primarily diammonium phosphate (DAP). Fertilizers are increasingly important to feed the growing world population because, although demand for food will increase, the area of cultivated land is not expected to increase significantly. For this reason, commercial fertilizers will become increasingly important to meet the nutritional requirements of the world's population (USGS 1999). The United States is the world's largest producer and consumer of phosphate rock. More detailed information on U.S. and international phosphate markets is presented in **Section 3.16**.

Phosphate rock and fertilizer production is expected to remain steady or increase slightly in Idaho and Utah for the foreseeable future because this output is primarily used domestically (USGS 2003a). Simplot began construction operations at Smoky Canyon Mine in 1982 and is the largest phosphate rock producer in Idaho. Over 50 million tons of phosphate ore reserves were projected to exist at the Smoky Canyon site before mining began (USFS 1981).

Phosphate Leasing Program and Description of Existing Rights

Domestic phosphate ore mining rights are granted under a federal leasing program, in accordance with the Mineral Leasing Act of 1920 (as amended) and applicable regulations. Mineral leases are administered by the BLM. These leases, purchased by mining companies, convey the right to mine and develop phosphate resources within the lease, in accordance with applicable federal, state and local requirements.

Mineral Economics

Costs associated with mining include removal of overburden as well as mining and processing costs of the ore. Because deeper ores require excavation of a larger pit, the ratio of overburden to ore, or stripping ratio, increases with pit depth. As ore depths increase, economic return decreases, and at a certain depth, mining of the phosphate ore becomes uneconomic. The depth at which ore recovery becomes uneconomic is also affected by ore grade, weathering, and other factors including capital costs and operational costs specific to the operation. Economics are also affected by supply and demand, foreign producers, and by proximity of deposits to processing facilities.

Proximity to existing mining and processing facilities affects mine economics due to capital expenditures and uncertainty of reserves. A large capital expense is necessary to build and staff new mining and processing facilities, so the use of existing facilities allows new deposits to be mined more economically. The Proposed Action and alternatives would use the existing facilities at the Smoky Canyon Mine to mine the phosphate ore in Panels F and G, concentrate the ore, and pipe the concentrate slurry out from the mine to the Simplot fertilizer plant in Pocatello.

3.1.8 Topographic Resources

The Project Area is located within two of the large-scale ecological units called subsections discussed in the EIS for the CNF RFP (USFS 2003b). The western portion of the Study Area is in the Webster Ridges & Valleys subsection while the rest of the Study Area is in the Pruess Ridges & Hills subsection (USFS 2003b). The Webster Ridges & Valleys subsection occurs at low to high elevations with slopes ranging from 10 to 65 percent. The Pruess Ridges & Hills subsection occurs on mid-to-high elevation sites with slopes ranging from 15 to 60 percent. These landscapes include mountainsides, canyons, ridges and valleys eroded from sedimentary rocks that are folded in generally north-south trending patterns.

The Smoky Canyon Mine existing mine panels are located on the eastern flank of the Webster Range, which is the dominant topographic feature in the Study Area. The Webster Range is a generally north-south trending mountain range that extends for about 33 miles from Lanes Creek on the north to the Pruess Range on the south. Freeman Ridge and Snowdrift Mountain are prominent ridges on the west limb of the Webster Range in the Study Area. Elevations in the Study Area range from about 6,500 feet in the lower end of the South Fork Sage Creek, Manning Creek, and Deer Creek drainages, to about 8,500 feet along Freeman Ridge west of Panels F and G.

The Boulder Creek Anticline is located on the east flank of the Webster Range. The surface topography of the Boulder Creek anticline mimics the orientation of its sedimentary units, forming a gentle ridge parallel to the Webster Range from Deer Creek on the south to Smoky Canyon on the north. The west side of this Boulder Creek Anticline ridge is a topographic swale in the overall east-facing slope of the Webster Range. Along this swale, part of the Phosphoria formation has been eroded. The Smoky Canyon Mine panels follow this exposure of the Phosphoria. South of Deer Creek, the Boulder Creek Anticline ridge is not present along the east slope of the Webster Range, but the phosphate deposits still occupy the topographic swale that parallels Freeman Ridge and Snowdrift Mountain along their east side.

Numerous east-trending drainages flow down the east side of the Webster Range and feed Tygee, Sage, and Crow Creeks. The more prominent of these drainages from north to south are Smoky Creek, Pole Creek, Sage Creek, and South Fork Sage Creek. Further south there are Deer Creek and Wells Canyon, which are tributary to Crow Creek. Crow Creek flows north and northeast out of the Study Area in a flat-bottomed alluvial valley bounded on the south by the Gannet Hills and on the north by Tygee Ridge.

3.1.9 Paleontological Resources

Sedimentary rocks of southeastern Idaho have paleontological resources consisting of vertebrate, invertebrate, and paleobotanical fossils including fish and shark remains. Fossils found in the Smoky Canyon Mine area are not unique to the Study Area or southeastern Idaho. They are found throughout the region wherever similar formations exist (JBR 2001a).

The Paleozoic and Triassic-age bedrock units are generally fossiliferous. Fossils in the Wells formation were described by G.H. Girty (Mansfield 1927) as predominantly consisting of bryozoa and brachiopods with wide distribution (BLM and USFS 2000).

The Meade Peak member of the Phosphoria formation contains abundant pelecypods, gastropods, and brachiopods, as well as ammonites, nautiloids, crinoids, bryozoa, and sponge spicules. The base of the Meade Peak member contains a thin marker bed identified as the fishscale bed, which contains disarticulated fish fossils including heliocoprion fossils (BLM and USFS 1992). The Rex Chert member of the Phosphoria formation contains brachiopods, crinoid fragments, and sponge spicules (Mansfield 1927).

3.2 Air Resources and Noise

The Study Area for air resources, relative to the Smoky Canyon Mine F and G Panels Expansion Project, consists of the immediate Study Area, the surrounding airshed (designated as Airshed 20), and out from the Study Area to a radius of 100 kilometers (60 miles) based on the Class I National Ambient Air Quality Standards (NAAQS). The NAAQS are defined in the federal Clean Air Act as levels of pollutants above which detrimental effects on human health and welfare may occur. Class I areas have the highest air quality protection standards while Class II areas have a moderate level of protection. All lands within the Project Area have been designated Class II. The nearest Class I area to the Project Area is the Bridger Wilderness, approximately 70 miles east of the CNF.

In general, the climate is typical of Rocky Mountain areas influenced by major topographic features. Nearby mountain ranges (e.g. Snowdrift Mountain and Freeman Ridge) trend primarily north to south and have an impact on local winds, as well as temperature and precipitation patterns in the immediate area. Based on the Smoky Canyon Mine's SWPPP, the annual precipitation in the vicinity of the Smoky Canyon Mine is 30-35 inches (Simplot Agribusiness 2004).

The valleys in the immediate Project Area have elevations that range from approximately 6,200 feet AMSL to 6,700 feet AMSL. These valleys have a middle-latitude steppe climate. The summers tend to be warm to hot and are typically dry. Winters are typically cold and the ground cover is snow packed.

Afton, Wyoming has a mean monthly average temperature of 61.7^{o}F in July and a mean monthly average temperature of 16.4^{o}F in January (WRCC 2004 from www.wrcc.dri.edu/summary/climsmid.html).

3.2.1 Air Resources

The State of Idaho regulates and controls air pollution through Title 39 of the Idaho Code. The USFS, which administers much of the Study Area land, protects air quality through compliance with these rules, regulations, and procedures under the IDEQ. The Smoky Canyon Mine has an air quality permit issued by the IDEQ. This air permit was issued in the early 1980s and applies to the control of haul road fugitive dust by limiting speed and applying water sprays and to the identification of the mill's boiler as a point source of emissions.

The State of Idaho has adopted EPA's NAAQS for criteria air pollutants. The criteria pollutants are ozone, carbon monoxide (CO), nitrogen oxides (NO_x), sulfur dioxide (SO_2), particulate matter with aerodynamic diameter less than or equal to 10 microns and 2.5 microns (PM_{10} and $PM_{2.5}$), and lead (Pb). The NAAQS are shown in **Table 3.2-1**.

TABLE 3.2-1 STATE OF IDAHO AND NATIONAL AMBIENT AIR QUALITY STANDARDS

POLLUTANT	AVERAGING TIME	CONCENTRATION
Ozone	1 hour 8 hours	235 µg/m^3 (0.12 ppm) 157 µg/m^3 (0.08 ppm)
Carbon Monoxide (CO)	1 hour 8 hours	40,000 µg/m^3 (35 ppm) 10,000 µg/m^3 (9.0 ppm)
Nitrogen Oxides (NO_x)	Annual Arithmetic Mean	100 µg/m^3 (0.05 ppm)
Sulfur Dioxide (SO_2)	3 hours 24 hours Annual Arithmetic Mean	1,300 µg/m^3 (0.5 ppm) 365 µg/m^3 (0.14 ppm) 80 µg/m^3 (0.03 ppm)
Particulate Matter as PM_{10} (Aerodynamic diameter $\leq$ 10 microns)	24 hours Annual Arithmetic Mean	150 µg/m^3 50 µg/m^3
Particulate Matter as $PM_{2.5}$ (Aerodynamic diameter $\leq$ 2.5 microns)	24 hours Annual Arithmetic Mean	65 µg/m^3 15 µg/m^3
Lead (Pb)	Quarterly Arithmetic Mean	1.5 µg/m^3

Note: µg/m^3 = micrograms per cubic meter; ppm = parts per million
Source: Code of Federal Regulations, 40 CFR Part 50, National Primary and Secondary Air Quality Standards

Ambient air quality standards for NO_x, SO_2, and PM_{10} must not be exceeded at any time during the year in areas with general public access. Short-term standards for CO, NO_x, and SO_2 can be exceeded only once annually. Compliance with the 24-hour PM_{10} and $PM_{2.5}$ standards is based on the 98th percentile of 24-hour concentrations averaged over three years. The ozone standard, which pertains to an area that meets the standard when the 3-year average of the annual 4th-highest daily maximum, 8-hour concentration is less than or equal to 0.08 ppm. The 1-hour standard applies only to airsheds that were in non-attainment status when the ozone rules changed in 2002.

According to EPA (1998, as cited in USFS 2003b), air quality on National Forest System lands is typically excellent. However, on occasion, pollutants from communities, industries and agricultural activities outside of the Forest can adversely affect air quality within the Forest. Management activities within the Forest, such as prescribed burning and use of unpaved forest roads, can produce particulate matter and carbon monoxide emissions.

The air quality in the vicinity of the Smoky Canyon Mine is good to excellent because of the site's remote location and relatively limited industrial activity in the area. The Air Quality Index (AQI) is a daily EPA rating system, evaluating the mix of air pollutants one is likely to breathe. If an airshed receives an AQI rating of 100, there are health-based concerns. Lincoln County, Wyoming had only 1 day with an AQI over 100 in the last 4 years. This was reported from the FMC Skull Point Mine near Kemmerer. Caribou County experienced 12 days with an AQI over 100 in 2001. According to IDEQ, these exceedances were all recorded at the fence line of Monsanto's elemental phosphorous plant in Soda Springs. No other monitors showed AQI values over 100 in the Caribou County monitoring network (EPA 2003. September 2004 from http://epa.gov/air/data/monvals).

Air quality in the Study Area is designated as in attainment or unclassifiable for all NAAQS and Idaho Ambient Air Quality Standards. No violations of the national or state air quality standards have been documented in the region since the 2001 episode. There is no record of Simplot's Smoky Canyon Mine ever receiving a Notice of Violation or having caused an NAAQS exceedance episode in regard to air quality.

The closest non-attainment area is located in the Portneuf Valley airshed in the area of Pocatello and Chubbuck, Idaho, which has exceeded NAAQS for PM_{10}. While there were three exceedances of the 24-hour PM_{10} standard in 1999, this episode did not register as a violation of the standard since no other exceedance occurred prior to December 31, 2001. The area's 24-hour PM_{10} standard has not been violated since 1993 (IDEQ 2004a). IDEQ has requested the EPA redesignate this airshed as "attainment".

The main emissions that are generated by mining operations include particulate matter generated from in-pit operations and haul truck traffic. These sources are both considered fugitive sources and are regulated by opacity standards and controlled by fugitive dust mitigation measures. Fugitive dust mitigation measures are usually stated in the sources air permit, as in Smoky Canyon's permit, or in a separate fugitive dust control plan.

Air Quality Monitoring Data

The IDEQ has conducted ambient air sampling and data collection in the region. The majority of the sampling and data collection sites within the airshed are located to the north and west of the Smoky Canyon Mine. These sites typically monitor background levels for criteria pollutants near and around Pocatello and Soda Springs, Idaho. The closest monitoring locations in Lincoln County, Wyoming are more than 50 miles south of the Project Area near industrial facilities around Kemmerer, Wyoming.

Twelve years (1990 through 2002) of PM_{10} ambient air quality data has been collected at the Caribou County monitoring locations, with monitors located in Soda Springs recording higher values than those located throughout other portions of the county (EPA 2003; September 2004 from http://epa.gov/air/data/monvals). The annual average ambient concentration of PM_{10} throughout this period has been approximately one-half of the NAAQS limit. In 2003, the 2^{nd} high, 24-hour average PM_{10} concentration exceeded the NAAQS in the Caribou County. The state of Idaho ended PM_{10} monitoring in Caribou County in 2002. $PM_{2.5}$ monitoring began in 2002. There were no exceedances of PM_{10} or $PM_{2.5}$ in 2002 or 2003. The previous exceedance for PM_{10} for this county was in 1992. However, in each of the other years within the monitoring period, average annual 24-hour PM_{10} concentrations were recorded at approximately one-third of the standard.

Air Quality Source Classification

The area surrounding the Smoky Canyon Mine Project Area is designated as Class II, as defined in the federal Prevention of Significant Deterioration (PSD) program (IDEQ 2002a). Moderate degradation of air quality is allowed to occur within certain prescribed limits above baseline levels within a Class II designated area. Industrial sources desiring to locate or expand within a Class II area must demonstrate that the increased emissions will not cause significant degradation of air quality in all classified areas and will not cause visibility degradation in Class I areas.

Within designated Class I PSD areas, the level of deterioration allowed, and therefore the standards prescribed, are much more stringent. Class I areas typically include wilderness areas and National Parks. Within 125 miles of the Smoky Canyon Mine Project, the Federal Mandatory Class I areas include: Yellowstone National Park, Grand Teton National Park, the Bridger Wilderness Area in Wyoming, and Craters of the Moon National Monument in Idaho. A general distance guideline in evaluating Class I area impacts is 60 miles. The Federal Clean Air Act legally mandates that Class I areas be evaluated for haze and visibility impacts if a new or major-modification facility is planned within 60 miles of a Class I area. A major action, (i.e. construction) or event (wildfires) are also subject to visibility and haze impacts analyses. **Table 3.2-2** presents the distances and directions to the nearest Class I areas. The Smoky Canyon Mine occurs more than 70 miles away from the nearest Class I areas, thus an evaluation for impacts to these areas was deemed unnecessary for Chapter 4.

TABLE 3.2-2 FEDERAL MANDATORY CLASS I AIRSHEDS NEAREST THE SMOKY CANYON MINE PROJECT

AREA	DIRECTION FROM PROJECT	DISTANCE FROM PROJECT (MILES)
Grand Teton National Park	Northeast	77
Bridger Wilderness Area	East	75
Yellowstone National Park	North	102
Craters of the Moon National Monument	Northwest	120

Existing Sources

Within the designated airshed (Airshed 20) of the Smoky Canyon Mine, there are four active mine sites. Mining operations emit primarily fugitive particulate matter from mining, truck hauling, and ore crushing. Heavy equipment internal combustion engines used in the mining process (loading, hauling, electrical generation, etc.) generate primarily gaseous (NO_x, SO_2, CO, and VOC) emissions and measurable quantities of fine particulate matter.

Table 3.2-3 identifies those stationary industrial air emission sources within Caribou, Bingham, and Bear Lake Counties, Idaho and Sublette and Lincoln Counties, Wyoming that have air quality permits issued by the states of Idaho or Wyoming. Operating by the regulations stated in their permits and by the regulations in the Idaho Code and Wyoming Air Quality Control Regulations, these facilities are permitted to emit PM_{10}, as well as products of combustion (NO_x, SO_2, CO, and VOC) from engines, kilns, boilers, crushing and other processes. The majority of the sources are located more than 20 miles away from the Smoky Canyon Mine. The Soda Springs area has four major sources, but based on the winds and meteorological factors, these sources have little impact on the Smoky Canyon Mine area.

Unpermitted and mobile sources of air pollutants are common in rural settings. Agricultural operations, agricultural burns, forest prescribed burns, open burning/wildfires, road traffic, off-road vehicle use, and construction in the immediate area are all sources of fugitive particulate matter in the Study Area. The EPA estimates that these types of air pollution sources contribute up to 52 percent of the particulate matter emissions in adjacent Lincoln County (EPA 2003; September 2004 from http://epa.gov/air/data/monvals).

TABLE 3.2-3 PERMITTED INDUSTRIAL EMISSION SOURCES - (WITHIN 60 MILES)

SOURCE	COUNTY, STATE
NW Pipeline Compressor Station, Peagram	Bear Lake, ID
NW Pipeline Compressor Station, Soda Springs	Bear Lake, ID
Professional Manufacturing, Inc.	Bear Lake, ID
Montpelier School District	Bear Lake, ID
Cargoll, Inc.	Bear Lake, ID
Basic American Foods Dehydrator	Bingham, ID
Smoky Canyon Mine	Caribou, ID
Kerr McGee Vanadium Chemicals	Caribou, ID
P4 Production L.L.C. (Monsanto)	Caribou, ID
Nu West Phosphates Fertilizers	Caribou, ID
FMC Dry Valley Mine (Not active)	Caribou, ID
Saddle Ridge Compressor Station	Sublette, WY
Big Piney Compressor Station	Sublette, WY
Exxon - Labarge Dehydration Facility	Sublette, WY
Amoco Pipeline - Labarge Station	Sublette, WY
Exxon Shute Creek Natural Gas Processing Plant	Lincoln, WY
PacifiCorp Naughton Power Plant	Lincoln, WY
Pittsburg & Midway Bituminous Coal & Lignite Mine	Lincoln, WY
Johnson Ready Mix	Caribou, ID
Brancroft Grain	Caribou, ID

In addition to IDEQ regulations on air quality, the CNF is subject to the Montana/Idaho State Airshed Group Smoke Management Plan, and the EPA Interim Air Quality Policy on Wildland and Prescribed Fires (USFS 2003b). The objective of compliance with these requirements is to reduce impacts from smoke and protect public health. Smoke from fire management activities and wildfire has potential to affect air quality and visibility on the CNF and surrounding areas. Fires produce carbon monoxide, nitrogen oxides, volatile organic compounds, and particulate matter.

3.2.2 Noise

To properly assess the noise resources for any area, an explanation of noise effects; consideration of the topography, climate, flora; and current ambient noise is required. The affected environment for noise impacts is usually limited to a distance of 880 yards from the source based on current wildlife studies (Fletcher 1980). However, if residential housing has the potential to be impacted, the affected environment includes the distance from the source of the noise to the residence. The basic equations for determining noise attenuation are based on the ISO 9613-2 Acoustics- Attenuation of Sound During Propagation Outdoors (ISO 1996). The equivalent continuous downwind octave-band sound pressure level at a receiver location, L_{fT}(DW) can be calculated for each point source using the following equation:

$$L_{fT}(DW) = L_w + D_c - A$$

Where Lw is the octave-band sound power level in decibels, produced by the point sound source; D_c is the directivity correction, in decibels; and A is the octave-band attenuation, in decibels. Since the sound source is radiating into free space $D_c = 0$ for these calculations. Attenuation (A) is quantified by the summation of the following factors:

$$A = A_{div} + A_{atm} + A_{gr} + A_{bar} + A_{misc}$$

With these factors representing attenuation due to:

A_{div} = geometrical divergence
A_{atm} = atmospheric absorption
A_{gr} = ground effect
A_{bar} = topography and man-made barriers
A_{misc} = miscellaneous factors, including vegetation

Noise Attributes
Noise is an unwanted sound occurrence. A noise's attributes (pitch, loudness, repetitiveness, vibration, variation, duration, and the inability to control the source) determine how it affects a receptor. The study of noise involves three important characterizing parameters: pressure, power, and intensity. The power of an oscillating sound wave is composed of kinetic and potential energies. The intensity of a sound wave is defined as the average rate at which power is transmitted per cross-sectional area in the direction of travel. Noise versus sound is a subjective measurement, thus a receptor's reaction to sound is a poor measurement of noise.

Noise Measurements
The unit of sound level measurement (i.e. volume) is the decibel (dB), expressed as dBA (decibel-A weighted). The A-weighted decibel measure is used to evaluate ambient noise levels and common noise sources. Sound measurements in dBA give greater emphasis to sound at the mid- and high- frequency levels, which are more discernible to humans. The decibel is a logarithmic measurement; thus, the sound energy increases by a factor of 10 for every 10 dBA increase.

Generally, natural noise levels will be around 35 dBA in rural areas away from communities and roads. Within a rural community, the man-made noise level ranges from 45 dBA to 52 dBA (Noise Effects Handbook 1998). The day-night sound level of residential areas should not exceed 55 dBA to protect against activity interference and annoyance (Noise Effects Handbook 1998). **Table 3.2-4** presents typical sound levels in dBA and subjective descriptions associated with various noise sources.

TABLE 3.2-4 SOUND LEVELS ASSOCIATED WITH ORDINARY NOISE SOURCES

NOISE SOURCE	NOISE LEVEL	SUBJECTIVE DESCRIPTION
Commercial Jet Take-Off	120 dBA	Deafening
Road Construction Jackhammer	100 dBA	Deafening
Busy Urban Street	90 dBA	Very loud
Standard For Hearing Protection 8-Hour Exposure Permissible Exposure Limit (PEL) (MSHA) Action Level within Active Mining Facilities	90 dBA 85 dBA	Very loud Loud - to very loud
Construction Equipment at 50 feet	80-75 dBA	Loud
Freeway Traffic at 50 feet	70 dBA	Loud
Noise Mitigation Level for Residential Areas Federal Housing Administration (FHA)	67 dBA	Loud
Normal Conversation at 6 feet	60 dBA	Moderate
Noise Mitigation Level for Undisturbed Lands (FHA)	57 dBA	Moderate
Typical Office (interior)	50 dBA	Moderate
Typical Residential (interior)	30 dBA	Faint

Noise Regulations

The Federal Noise Control Act of 1972 established a requirement that all federal agencies administer their programs to promote an environment free of noise that jeopardizes public health or welfare. Although the Occupational Safety and Health Administration (OSHA) has the most extensive regulations in regard to noise pollution, these standards are only for noise levels within the workplace.

EPA identifies outdoor noise limits to protect against effects on public health and welfare by an equivalent sound level (Leq), which is an A-weighted average measure over a given time. Outdoor limits of 55 dBA Leq have been identified as desirable to protect against speech interference and sleep disturbance for residential areas and areas with educational and healthcare facilities. Sites are generally acceptable to most people if they are exposed to outdoor noise levels of 65 dBA Leq or less, potentially unacceptable if they are exposed to levels of 65 – 75 dBA Leq, and unacceptable if exposed to levels of 75 dBA Leq or greater (Noise Effects Handbook 1998).

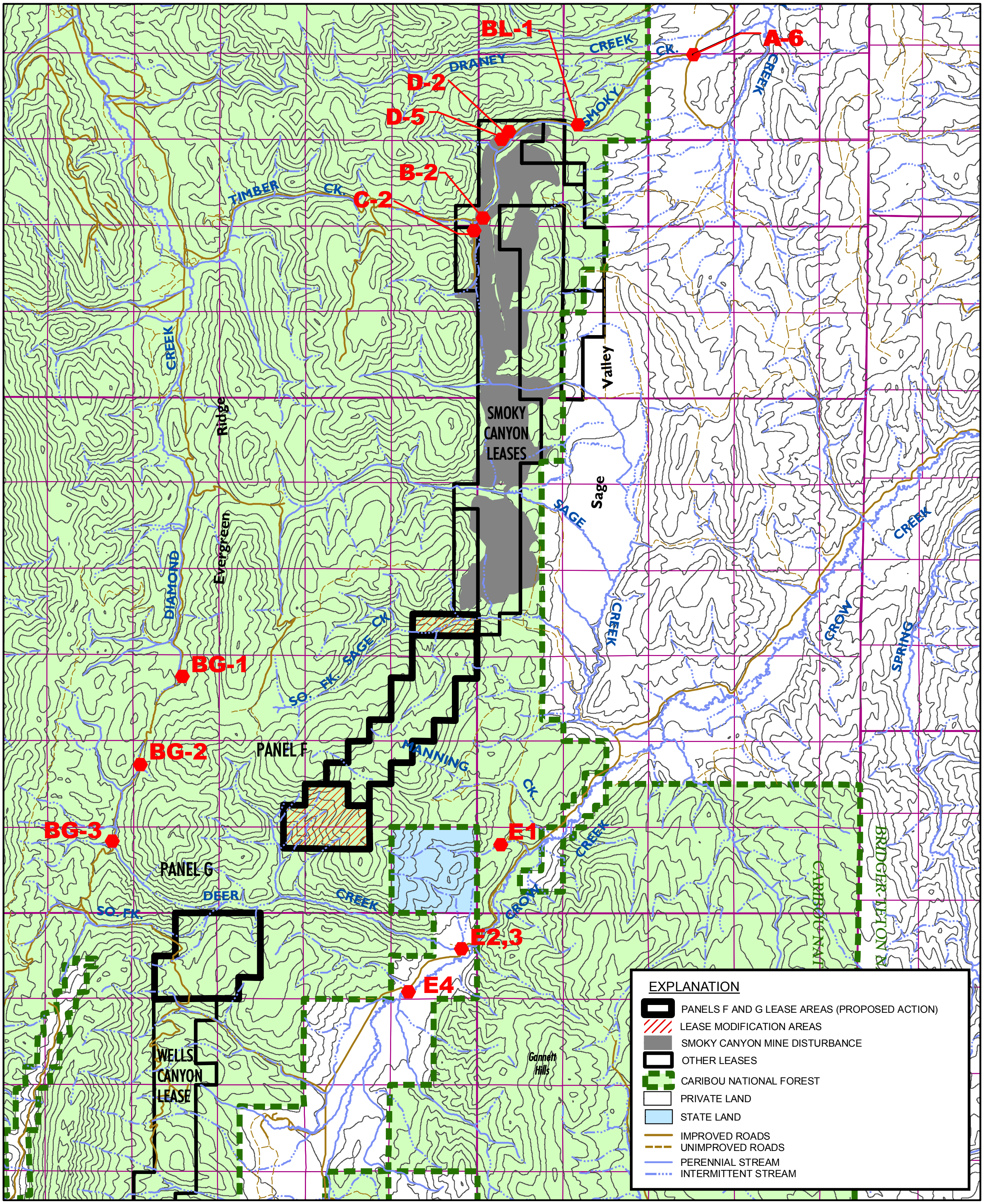
Noise Issues

Loud noise can interfere with communications, cause fatigue and tiredness, reduce efficiency, affect attitudes, and distract and disrupt human activities. Noise concerns related to residential areas are mostly 'quality of life' impacts where moderate to low intensity noise can be an annoyance. An evaluation of baseline noise conditions was accessed in order to determine the potential changes from current levels.

3.2.3 Methodology and Results

The objective for this study was to assess noise-generating activities under typical operating conditions at the Smoky Canyon Mine and to measure current, typical, noise levels at various locations within the Study Area currently unaffected by the existing Smoky Canyon Mine. At the Smoky Canyon Mine area, noise measurements were taken for existing access road traffic, haul road traffic, in-pit activities, and blasting. Haul road noise levels were further segregated into flat terrain, steep grade terrain, haul and dump traffic, and haul and access road traffic. Measurements of noise were taken at different distances. Terrain and vegetation characteristics were also considered when determining the location for sound level measurements. **Table 3.2-5** shows the Leq measurements taken at the active mining areas, under typical operating conditions. **Figure 3.2-1** displays the locations where the measurements were taken.

Background noise measurements were also collected south of the existing Smoky Canyon Mine operations within the Project Area in May 2004. **Table 3.2-6** presents the background noise measurements at various locations. No unnatural sounds were heard during the background noise measurements (i.e. road traffic, car horns, etc.). **Figure 3.2-1** displays the location where the measurements were taken. These sites were selected for comparisons to be made with future noise impacts.



Note: Base data from Caribou National Forest GIS data sets.

Location of Noise Measurements

Scale 1:100,000

0 Miles 2

Figure 3.2-1
Noise
Smoky Canyon Mine Panels F and G

TABLE 3.2-5 SOUND LEVELS ASSOCIATED WITH EXISTING SMOKY CANYON MINE ACTIVITIES

NOISE SOURCE TYPE (SITE LOCATION)	LEQ* (DBA)	MAXIMUM MEASURED (DBA)
Smoky Canyon Access Road during morning "rush hour" commute. Measurements were taken at a distance of 120 feet from edge of road (A-6)	47.4	66.6
Panel C Haul Traffic where it crosses the Smoky Canyon road. Measurements were taken at a distance of 300 feet from edge of haul road (B-2)	60.6	73.0
Panel C Haul Traffic and Overburden Dumping Measurements were taken at a distance of 20 feet from edge of haul road (C-2)	70.4	87.5
In-Pit Loading of Haul Trucks Measurements were taken at a distance of 125 feet from loader (D-2)	74.4	87.9
In-Pit Drilling Measurements were taken at a distance of 130 feet from drill (D-5)	81.7	85.9
Panel C Blasting Measurements were taken at a distance of 3,170 feet from location of blast (BL-1).	Not Applicable	74.4

* Measurements were averaged over a 5-10 minute timeframe.

TABLE 3.2-6 BACKGROUND NOISE MEASUREMENTS COLLECTED SOUTH OF MINING OPERATIONS

NOISE SOURCE TYPE (SITE LOCATION)	LEQ* (DBA)	MAXIMUM (DBA)	MINIMUM (DBA)
Manning Creek Road near Crow Creek Road (E-1)	34.6	54.4	27.9
Crow Creek Road near Deer Creek Road w/15 mph wind (E-2)	55.7	80.8	27.8
Crow Creek Road near Deer Creek Road no wind (E-3)	38.6	55.4	28.3
Crow Creek Road Near Residence (E-4)	35.7	47.5	27.7
Diamond Creek Road Near Stream (BG-1)	41.1	52.3	37.1
Diamond Creek Road Near Summit (BG-2)	38.4	45.1	37.4
Diamond Creek Road Near South Fork Drainage (BG-3)	31.5	51.7	26.8

* Measurements were averaged over a 5-10 minute timeframe

3.3 Water Resources

3.3.1 Surface Water Resources

Simplot's current mining activities are located in several watersheds that drain the east slopes of the north/south trending Webster Range (**Figure 3.3-1**), and ultimately into the Salt River drainage in Wyoming. The northernmost part of the existing Smoky Canyon Mine operations is within the Tygee Creek basin and several of its small tributaries. The southern part of the existing operations is within Sage Creek basin. The Panels F and G include lands in the South Sage Creek, Manning Creek, Deer Creek, Nate Canyon, and Wells Canyon basins. These drainages are in the Crow Creek watershed (5th Level Hydrologic Unit Code (HUC) 1704010507) (**Figure 3.3-1**). In addition, one of the proposed transportation corridors is located alongside Crow Creek. Crow Creek flows into the Salt River (HUC 17040105) approximately five miles downstream of the Study Area boundary (**Figure 3.3-1)**.

A very small (17 acres) part of a proposed West Haul/Access Road drains toward the 34,000-acre Diamond Creek watershed (5th Level HUC 1704020712). All other transportation and mining alternatives lie entirely within the Crow Creek watershed.

Snow melt, rainfall, springs, and diffuse groundwater discharge all contribute to streamflow in the Project Area and its surroundings. In general, most runoff is attributed to snow melt; surface runoff from rainfall is typically low (United States Geological Survey (USGS) et al. 1975). The USFS notes, however, that flood flow events in this area of the Forest seem to represent an unresolved statistically mixed population of events due to various combinations of snow melt, local summer convective thunderstorms, and larger late summer tropical (monsoon) moisture from more southerly latitudes (Jim Laprevote, USFS Hydrologist, personal communication Sept 10, 2004). Maxim (2004c) reports that area streams normally peak in April, May, and June, with declining flows in late summer, fall, and winter. This temporal variability is reflected in the flow data described later in this section.

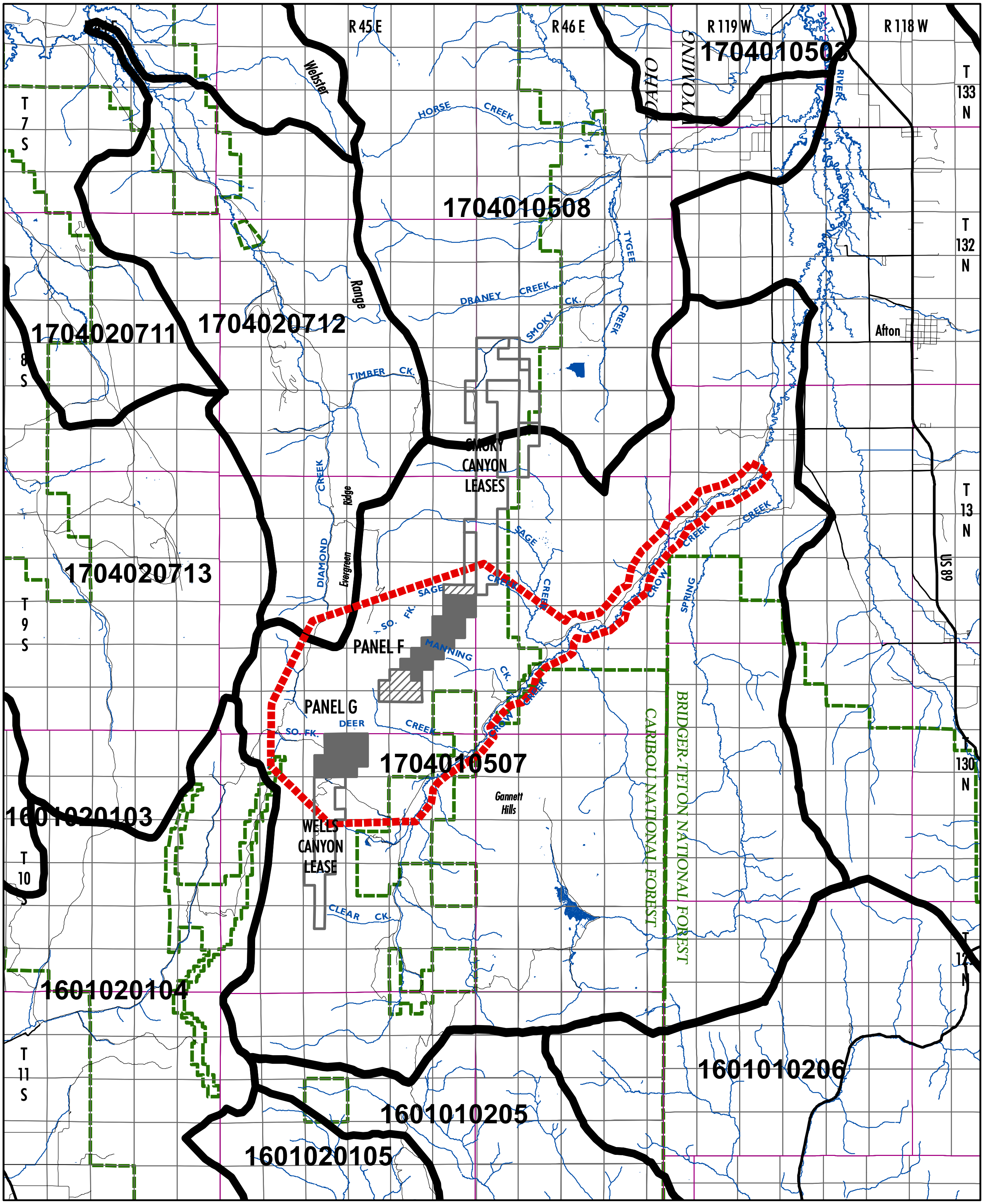
For most of the Project Area streams, where segments cross the Wells formation, all or most of the streamflow is lost to the permeable sandstone/limestone bedrock. This contributes to the spatial variability of reported streamflows in the area.

None of the streams within the Project Area have been designated by the State of Idaho as Outstanding Resource Waters or as Special Resource Waters (Idaho Administrative Code IDAPA 58.01.02). Neither are any of the streams in the Project Area designated under the Wild and Scenic Rivers System, or listed in the Nationwide Rivers Inventory as potentially possessing “outstandingly remarkable values” that may make them eligible for designation in the system (National Park Service 2004). Further, the USFS has determined that none of the streams in the area are eligible for inclusion in the Wild and Scenic Rivers System (USFS 1998). The USFS (2003b) recently rated CNF lands in regard to geomorphic integrity, water quality integrity, and watershed vulnerability. The Project Area has a moderate geomorphic integrity rating, low water quality integrity, and moderate watershed vulnerability.

The RFP for the CNF (USFS 2003a) contains goals, standards, and guidelines specific to managing surface water resources under various types of activities that may occur on the CNF. In regard to mining and road construction, forest-wide guidance that applies directly to surface water resources will be reviewed and evaluated as related to impacts analysis in Chapter 4.

Further, on a watershed basis, the RFP (USFS 2003a) includes guidelines for analyzing proposed projects in regard to non-point pollutant sources, beneficial use impairments, and percent of watershed that would be in a hydrologically disturbed condition at any one time.

In addition to forest-wide guidance, Prescription 2.8.3 applies within defined aquatic influence zones (AIZs), the delineation of which depends upon water source type (perennial, intermittent, wetland, etc.). AIZs in the Project Area are shown on **Figure 3.3-2**. Numerous goals are associated with AIZs in regard to protection of surface water resources; these are not outlined specifically here, but can be found in the RFP (USFS 2003a). Similarly, standards and guidelines associated with AIZs are not repeated here, but they generally focus on avoidance of AIZs. Relevant to this Project are guidelines for culverts and other road drainage features (USFS 2003a).



Note: Base data from Caribou National Forest GIS data sets.

Panel F and G Lease Areas
Lease Modification Areas
Study Area Boundary
National Forest Boundary
Roads
Perennial Stream

1704010507 Idaho 5th Level Hydrologic Unit Code (HUC)

0 Miles 2

Figure 3.3-1
Location Map - Water Resources
Smoky Canyon Mine Panels F and G

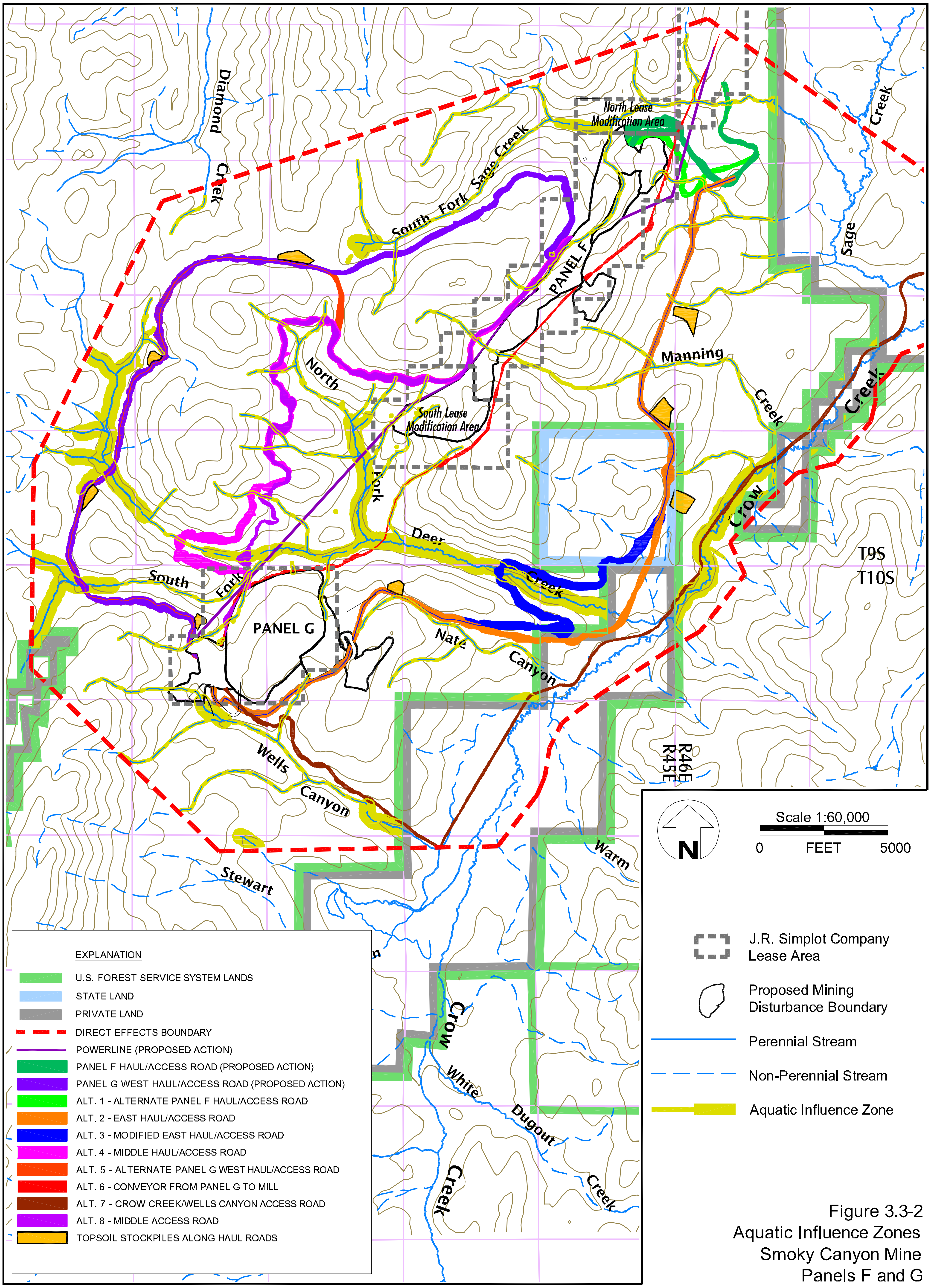


Figure 3.3-2
Aquatic Influence Zones
Smoky Canyon Mine
Panels F and G

General watershed characteristics - including flow patterns - for each of the area streams are described below. Where data are available, stream flow measurements are summarized and discussed in regard to spatial and temporal variability. **Figure 3.3-2** designates perennial and non-perennial reaches as determined by baseline studies (Maxim 2004c). **Figure 3.3-3** shows stream (SW) and spring (SP) monitoring sites that are described in the following narrative. The Sections (**3.3.2**, **3.3.3**, and **3.3.4**) following the watershed and streamflow descriptions contain information on surface water quality, channel morphology/streambed sediment, and surface water uses, respectively.

Salt River

As the Salt River flows through Star Valley, Wyoming, east of the Project Area, it collects flow from Crow Creek and Stump Creek, both of which collect flow from smaller drainages related to Simplot's existing and proposed operations. A USGS stream gauging station (#13027500) has been recording flow data on the lower Salt River since 1954 (USGS 2004b). The station is located above the Palisades Reservoir approximately 30 miles north of the Study Area. The maximum flow documented between 1954 and September 2002 was 5,090 cubic feet per second (cfs), recorded in early June 1986. Typically, snow melt runoff influences flows at the gage site between early April and late July; flows the remainder of the year are relatively uniform, averaging between 500 and 600 cfs (Miller and Mason 2000).

The Salt River watershed drains about 925 square miles. The watershed has been rated as being in good overall condition, with low vulnerability to pollutant loadings and other stressors (USFS 2003a).

Crow Creek

With a drainage area of a little more than 100 square miles, Crow Creek originates on CNF lands to the south of the Project Area. As it flows northeast toward Wyoming, it collects flow from Wells Canyon drainage, Deer Creek, Manning Creek, and Sage Creek in the Project Area, as well as other tributaries entering from the east (**Figure 3.3-1** and **Figure 3.3-2**). Crow Creek would ultimately receive all drainage from the proposed Panels F and G lease areas.

Historic flow monitoring data for the perennial Crow Creek is sparse. The 1981 Smoky Canyon DEIS (USFS 1981) showed a range of flow in Crow Creek just below Sage Creek in the last 6 months of 1979 from 35 to 68 cfs. Maxim (2004c and 2004d) obtained more recent flow data at various sites in Crow Creek to document spatial and temporal variability, at least within the narrow time frame and drought conditions experienced during that period (**Figure 3.3-3)**. According to their records, flow increases downstream from the upstream station SW-CC-50 (0.8 cfs to 1.57 cfs) to SW-CC-800 (25 to 55 cfs), located approximately 8 miles downstream of the Sage Creek confluence. Primary sources of baseflow to Crow Creek are from several major springs in or near the Study Area: Stewart Springs in Stewart Canyon (SP-ST-100 and -200); Books Spring (SP-Books) between the mouth of Deer Creek and Nate Canyon; discharge from lower Deer Creek (between SW-DC-500 and -800); South Fork Sage Creek Springs (SP-SFSC-750); and Hoopes Spring (SP-Hoopes) in lower Sage Creek Valley. Combined baseflow discharge of these sources is about 15 cfs (Maxim 2004c). In addition, Crow Creek gains a measurable amount of flow between SW-CC-50 and SW-CC-300 due to discharge from the Wells formation into the valley alluvium (Maxim 2004c).

In May 2003, flows were measured in Crow Creek at two monitoring sites– one just upstream of the confluence with Sage Creek and one just downstream of that confluence (NewFields 2005). The flow was about 23 cfs at the upper site, and about 42 cfs at the lower site; during that same monitoring event, flow was also measured at 16 cfs near the mouth of Sage Creek.

Seasonality of Crow Creek flows is affected by irrigation withdrawals during the summer months; for example, at SW-CC-100, flows reported during the growing season in August 2003 and August 2004 (1.8 and 2.1 cfs, respectively) are much lower than the 10-11 cfs reported in October 2003, February 2004, and May 2004, outside the growing season (Maxim 2004c and 2004d). Peak snowmelt flows would be substantially greater than this.

Sage Creek

The lowermost reaches of Sage Creek, from where South Fork Sage Creek enters it to where it enters Crow Creek, are included within the Study Area. The perennially flowing Sage Creek drains Sage Valley and collects flow from the eastern slopes of the Webster Range; its watershed area is approximately 25 square miles. The reach through Sage Valley upstream of where Sage Creek exits the Webster Range has been designated as North Fork Sage Creek. Pole Canyon and South Fork Sage Creek are two of the larger subwatersheds within the Sage Creek basin. Pole Canyon flows apparently only rarely reach North Fork Sage Creek via surface flow.

There are few known flow measurements taken in Sage Creek. Tetra Tech EM Inc. (TtEMI), as part of a selenium investigation for IDEQ (Tetra Tech EM Inc. 2004), reported flow in Sage Creek below its confluence with Pole Canyon in May 2002, and May 2003, and at the mouth of Sage Creek in May 2001, May 2002, and May 2003. For the upstream site, flow was about 1 cfs in 2002 and 4 cfs in 2003. Increasing greatly downstream, flows at the mouth of Sage Creek ranged between about 9 and 13 cfs. Simplot also measured base flows at these sites in October of 2002 and 2003 (NewFields 2005). At the mouth of Sage Creek, the two October records - as well as one measurement in February 2004 - showed Sage Creek to have a base flow of between about 10 and 15 cfs. In 2003, TRC Mariah (2004) added a site on Sage Creek below it's confluence with South Fork Sage Creek to its biannual sampling program in the area; those records show flows of 17 and 12 cfs in spring and fall of 2003, respectively.

South Fork Sage Creek

South Fork Sage Creek is one of the main tributaries of Sage Creek, with a watershed area of about 6 square miles. The entire length of an unnamed tributary entering South Fork Sage Creek from the south would be within the footprint of the proposed operations at Panel F.

Unnamed springs contribute flow to the upper reaches of South Fork Sage Creek (USFS 1981; Maxim 2004c). Maxim characterizes South Fork Sage Creek upstream of South Fork Sage Creek Spring (SP-SFSC-750) as intermittent with channel reaches where the stream flows subsurface for distances between perennial pools. The unnamed tributary in Panel F is described as flowing ephemerally, with an alluvial fan at its mouth. South Fork Sage Creek looses flow where it crosses the Wells formation outcrop (BLM and USFS 2002). After exiting the Webster Range, South Fork Sage Creek joins with the mainstem of Sage Creek and drains generally south through Sage Valley before entering Crow Creek.

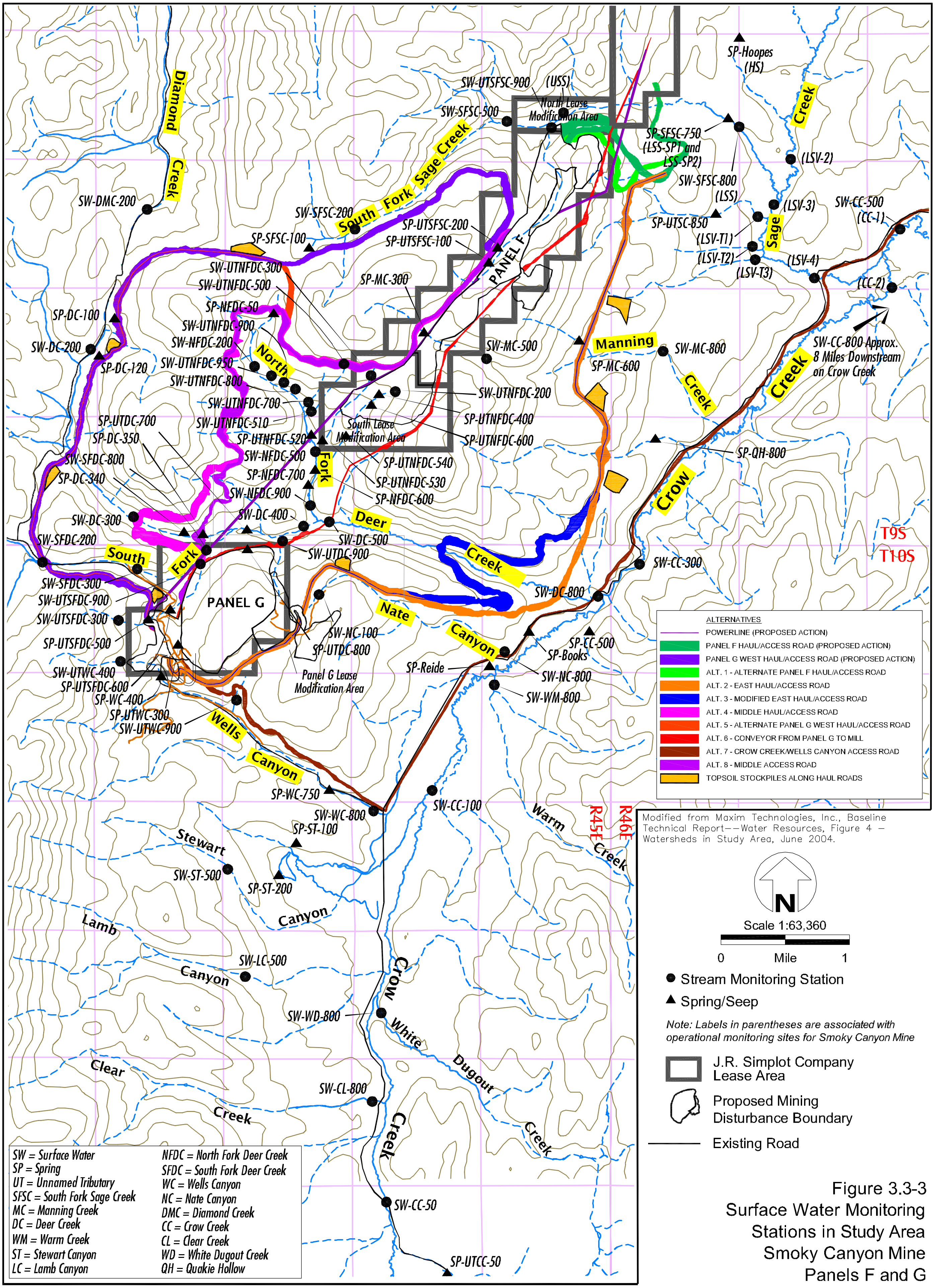


Figure 3.3-3
Surface Water Monitoring Stations in Study Area
Smoky Canyon Mine
Panels F and G

Streamflows in South Fork Sage Creek have been periodically measured since 1992. Most of these measurements were obtained for Simplot by TRC Mariah Associates, Inc. as part of their ongoing surface water monitoring (TRC Mariah 2004). Flow measurements have typically been obtained twice yearly at two stations – one in upper South Fork Sage Creek about one mile upstream from the canyon mouth (USS), and the other about 1.5 miles upstream from its confluence with Sage Creek (LSS). In addition, in both the spring and fall of 1998, flows were measured at nearby sites as part of the ongoing IMA Selenium Subcommittee studies (Montgomery Watson 1999 and 2001). NewFields (2005) measured flows at USS, LSS, and other locations on South Fork Sage Creek a number of times between October 2002 and July 2004. Lastly, streamflow measurements were obtained in the same general vicinities as part of the baseline studies (Maxim 2001) for the Smoky Canyon Mine B & C Panels SEIS (BLM and USFS 2002). **Appendix 3A, Historic Stream Flow Measurement Summary**, includes a summary table of surface water flow measurements; at the upper site, flows ranged from 0 to about 17 cfs, and at the lower site, flows ranged from about 4 to about 40 cfs. Higher reported flows were measured in the spring than in the fall season. The large spring complex near the mouth of the canyon provides much of the flow reporting to the downstream site and generally fluctuates much less seasonally.

More recently, streamflows were measured on South Fork Sage Creek and an unnamed tributary to it as part of the baseline data gathering efforts for the Project (Maxim 2004c and 2004d). Site locations SW-SFSC-200 and SW-SFSC-500 are located upstream of the aforementioned historic South Fork Sage Creek monitoring locations, while SW-SFSC-800 is located at the same approximate location as the downstream historic monitoring site. These recent flow measurements are within the range of historic flow measurements, but generally lower, presumably due to several years of drought in the area. The unnamed tributary is generally dry, except for a short reach in the upper part of the channel where two small springs discharge.

As reported in the TtEMI (2004) study mentioned above, flows were also measured in South Fork Sage Creek below Simplot's current mining activity in May 2001, May 2002, and May 2003, and ranged between 4 and 5 cfs.

Manning Creek

Manning Creek drains an area of about 2.3 square miles. Maxim (2004c) indicates that the reach of Manning Creek that coincides with the F-Panel lease flows ephemerally, with a spring noted to discharge seasonally to the channel within the studied reach. Three streamflow monitoring events in 2003 indicated that this spring discharged in May but only saturated the ground, with no flow in August and September. The creek itself was dry during all seven monitoring visits between May 2002 and August 2004 (Maxim 2004d). About 0.5 miles below the studied reach, USGS mapping indicates that another spring contributes flow to Manning Creek but apparently does not sustain it for any distance downstream.

Deer Creek

Deer Creek drains an area of about 11.5 square miles. Flow in Deer Creek and its north and south forks, as with other streams draining the east side of the Webster Range, varies spatially along its alignment. Flow measurements (Maxim 2004c and 2004d) illustrate this variation, as shown in **Appendix 3A, 2003 and 2004 Streamflow Measurement Data**. Groundwater discharged from distinct springs, or from diffuse sources, can contribute to streamflow. Conversely, in-channel surface flow can be lost to the substrate but continue to flow down-canyon in a subsurface manner, either dispersing to recharge a groundwater system or reappearing as surface flow at some point downstream. Springs contribute flow to the various forks and unnamed tributaries of Deer Creek, as identified by recent baseline studies (Maxim 2004c and 2004d). According to these studies, Deer Creek is perennial below its confluence with North Fork Deer Creek, which itself becomes perennial about midway in its length. From this confluence upstream to the vicinity of SW-DC-300, Deer Creek flow is intermittent with flow occurring primarily during spring runoff. The upper reaches of Deer Creek (above SW-DC-300) and the tributaries in the vicinity of SW-DC-200 have typically exhibited perennial flow. Tributaries between SW-DC-200 and SW-DC-300 are primarily intermittent spring runoff channels. The South Fork of Deer Creek is mostly intermittent with localized reaches of perennial flow upstream of SW-SFDC-200. Similar to the South Fork of Sage Creek, Deer Creek contains isolated perennial pools between reaches of subsurface flow (Maxim 2003a).

As baseline flow data in **Appendix 3A, 2003 and 2004 Streamflow Measurement Data** and Maxim (2004c) shows, streamflow in Deer Creek and its forks not only varies spatially but also temporally. Within the drought conditions reflected in the baseline dataset, baseflow in lower Deer Creek (SW-DC-800) was measured at about 1.2 to 1.9 cfs, while spring season flows increased to almost 10 cfs in May 2003. In May 2004, measured flow at SW-DC-800 was only 5.4 cfs and increased to 6.8 cfs in June 2004 (Maxim 2004d). For either year, it was not documented when - relative to snowmelt runoff peaks - these May and June measurements were made. Flow measurements in upper Deer Creek (SW-DC-200 & -300) ranged from 0 to about 7 cfs. North Fork contributions to the mainstem ranged from about 0.3 to 2.5 cfs, and South Fork contributions were between 0 and 0.9 cfs, with highest flows measured during the spring season.

A comparison between flows contributed to Crow Creek from Deer Creek and flows contributed from South Fork Sage Creek, based upon 2003 data from May, August, and October (Maxim 2004c), indicates a much greater seasonal variability in Deer Creek. Those same data also show that, while Deer Creek drains almost twice the surface area that South Fork Sage Creek does, during base flow conditions it supplies only about one-third as much water to Crow Creek.

Wells Canyon
Wells Canyon is a 3.3 square-mile watershed that feeds into an irrigation ditch near its mouth. Baseline studies (Maxim 2003a, 2004c, and 2004d) of the stream indicate that above SP-WC-750 the stream is non-perennial, and downstream of this point it is perennial. Monitoring in two tributaries to upper Wells Canyon recorded dry conditions during all sampling events (Maxim 2004d).

Nate Canyon
Nate Canyon flows ephemerally, with no flow observed during baseline studies (Maxim 2004c and 2004d).

Diamond Creek
A short reach of a proposed haul road would be located on the west side of the Webster Range, off of Freeman Ridge, and would thus be in the upper Diamond Creek watershed. Diamond Creek is tributary to the Blackfoot River. In the vicinity of the proposed haul road, Diamond Creek flows ephemerally, but becomes perennial within a short distance downstream (Maxim 2004c). Baseline studies measured flows at SW-DMC-200 in the spring, summer, and fall of 2003; the greatest reported flow was about 0.5 cfs, reported in the spring, decreasing to a negligible amount (<0.001 cfs) in the fall. In June 2004, flow was measured at 0.08 cfs (Maxim 2004d).

3.3.2 Surface Water Quality

Regulatory Information

In Idaho, surface water quality is protected by implementing Idaho State Water Quality Standards at IDAPA 58.01.02. Within that code, the State classifies streams according to their designated beneficial uses, and applies numeric and narrative criteria based upon those uses. For undesignated surface waters (including Crow Creek within Idaho, Sage Creek, Deer Creek, Diamond Creek and their perennial or intermittent tributaries), cold water aquatic life and contact recreation beneficial uses are presumed by default according to the Idaho Code, and the relevant criteria for those uses are applied to such waters by the Idaho Department of Environmental Quality. For cold water aquatic life, the lowest of the three relevant metals values for comparison purposes were used by Maxim (2004c): Criteria Maximum Concentration (CMC) for aquatic life; Criteria Continuous Concentration (CCC) for aquatic life; and Criteria Human Consumption (CHC) for organisms. That convention is followed in this document as well. For Idaho, surface water standards for metals are based on the dissolved fraction, except for the chronic aquatic life standards (CCC) for selenium and mercury, which are based on total recoverable analysis. Further, some aquatic life metals standards are hardness dependent; Maxim (2004c) derived those numbers individually for drainages in the Study Area using the average hardness and a water-effect ratio of 1.0. **Appendix 3A, Summary of Surface Water Data**, gives the appropriate standards as derived in the baseline study report (Maxim 2004c and 2004d). Later in this section, available water quality data for surface streams are described in regard to how they meet relevant water quality criteria.

Water that originates within or flows through the Study Area eventually flows to the Salt River and crosses the Idaho border into Wyoming. Wyoming considers the Salt River to be a Class 2 water. Class 2 waters are, according to *Quality Standards for Wyoming Surface Waters*, "Those surface waters, other than those classified as Class 1, which are determined to: (i) Be presently supporting game fish; or (ii) Have the hydrologic and natural water quality potential to support game fish; or (iii) Include nursery areas or food sources for game fish." The Wyoming reach of the Salt River, as a Class 2 water, has therefore been designated as a cold water game fishery, and water quality criteria are set similar to those in Idaho.

The States of Idaho and Wyoming are both required by the Clean Water Act to regularly assess streams to determine whether or not they support their designated beneficial uses. Streams that do not are recommended by the states for 303(d) listing as impaired waters by the EPA. They are then scheduled for total maximum daily load (TMDL) analysis, whereby loading quantities for specific pollutants are set. These recommendations are revised and updated every two years; stream segments may be added, removed, or retained during this revision process. The most recent approved 303(d) list for Idaho is the 1998 list; no streams in the Project Study Area were included on that list. The 2002/2003 Draft Integrated (303(d)/305(b)) Report (IDEQ 2003a) was submitted to EPA in July 2004; meanwhile, IDEQ has begun soliciting data for the 2004 303(d) list (Marti Bridges, IDEQ, personal communication, September 1, 2004). Several Salt River Basin streams are listed in the Draft Integrated Report, including some Project Area streams, as discussed in the following paragraphs, and thus their regulatory status may be changed upon EPA approval. North Fork Deer Creek, South Fork Deer Creek, and upper Deer Creek above its confluence with the South Fork are listed in both Sections 5 and 4c of the Draft 2002/2003 Integrated Report. The Section 5 list equates to the 303(d) list of impaired waters, and the above-named reaches in the Deer Creek watershed are categorized as not supporting aquatic life beneficial uses due to sediments. The same reaches were also found to not support aquatic life beneficial uses due to habitat alterations. These reaches were initially proposed for listing based upon 1998 data collected under IDEQ's Water Body Assessment Guidance monitoring. The impairments were based upon biological indicator data obtained by IDEQ using the Stream Macroinvertebrate Index (SMI) and the Stream Habitat Index (SHI). Upper Diamond Creek also does not meet aquatic life beneficial uses due to sediments, but is included in Section 4a rather than Section 5 of the report because it has an EPA-approved TMDL. The data used to determine impairment are reported on an IDEQ website (IDEQ 2005); that website gives the activities affecting these reaches as beaver, grazing, mining, other, and/or roads.

Sediment impairment is based upon an assessment that a given stream reach does not meet the narrative criteria in the Idaho State Water Quality Standards at IDAPA 58.01.02, which simply says that "sediment shall not exceed….quantities which impair designated beneficial uses", in this case, aquatic life. In addition to being narrative -- rather than numeric -- in nature, the standard encompasses both physical and biological aspects of sediment such as water column sediments (TSS, suspended sediment, turbidity), bed sediments (stream stability, surface sediments, subsurface fines), aquatic life (macroinvertebrates, fisheries), and habitat characteristics (proper functioning condition) (IDEQ 2003a). In determining impairment of a given stream in regard to sediment, an assessor's "substantiated best professional judgment" is relied upon (IDEQ 2002b). Once a stream segment is listed on the 303(d), no further degradation (of the listed pollutant) is allowed until after the TMDL is completed and future target load allocations are developed.

For Diamond Creek, where its sediment impairment was the subject of a TMDL study (IDEQ 2001), load targets were established for two indicators representing sediment: (1) depth of riffle fines of 25 percent less than 6.25 mm and 10 percent less than 0.85 mm, based upon maximum volumes of subsurface sediments on a five-year average; and (2) streambank stability of 80 percent or higher. At times, though not done for Diamond Creek, a TSS concentration limit can be included for clean sediments, and in these cases is often in the range of 50-80 mg/L (Marti Bridges, IDEQ, personal communication, September 1, 2004). If the proposed listing of the Deer Creek segments are approved, and TMDLs need to be established for those reaches (currently scheduled for 2006 (Marti Bridges, IDEQ, personal communication, September 1, 2004)), they may include similar types of targets or could include site-, season-, and flow-specific targets (IDEQ 2003b).

Regarding other stream reaches in the Study Area and their designations in the 2002/2004 Draft, Deer Creek downstream of the impaired reaches, is listed in Section 2 as fully supporting aquatic life beneficial uses. Wells Canyon downstream of the forks, the lowermost 3.2 miles of Sage Creek, and Crow Creek from its confluence with Deer Creek to the Wyoming border were also included in Section 2 because they were found to fully support aquatic life beneficial uses. Other stream reaches within the Idaho portion of the Study Area were either not included because they are considered to be intermittent or ephemeral, or are listed in Section 3 as not yet having been assessed. Crow Creek downstream of the Wyoming border is not listed on the most recent (2002) Wyoming 303(d) list.

Chemical Characteristics of Surface Water

From 1979 to the present, Simplot has been monitoring water quality at sites upstream and downstream of mining activity at the existing Smoky Canyon Mine (TRC Mariah 2004). Where this program overlaps with the Study Area for the Proposed Panel F and G mining, these data records include monthly or bi-annual sampling results from 1992 to the present for South Fork Sage Creek at the two locations where flow measurements were made, both upstream from

Maxim's recent monitoring. These data represent background data as far as the Project is concerned, but data from 1998 forward at the downstream site represent a potentially mining impacted condition due to the existing Smoky Canyon Mine activities in Panel E. The data, along with a few samples taken by others (Montgomery Watson 2001; Maxim 2000a), generally show good water quality, with total dissolved solids typically 100-200 mg/L, with calcium, magnesium, and bicarbonate representing the major ions. More recently, samples were collected on South Fork Sage Creek, North and South Forks Deer Creek, mainstem Deer Creek, Manning Creek, Wells Canyon Creek, Diamond Creek, and some unnamed tributaries to those streams as part of the baseline studies for Panels F and G (Maxim 2004c and 2004d). Site locations are shown on **Figure 3.3-3** and water quality data are given in **Appendix 3A, Summary of Surface Water Data**. A review of these data does not identify any clear indications of spatial or temporal variability of water quality in the stream channels. Data from separate stream channels are quite similar in regard to major constituents, as are data from different locations along a given stream channel and data from different seasons at the same monitoring site. Sampling conducted for water quality from area streams was sporadic, with several stations being sampled once or twice, and some only sampled in a single season or only once in a given year. At least one value, the ORP=-39mv value taken from surface water station SW-SFSC-500, cannot be easily explained, as it generally signifies an oxygen deficit in a carbonate-dominated, shallow, surface stream. As dissolved oxygen for this sample was also given at 6.43 mg/l, this condition is unlikely, so this reading is likely to be erroneous. The lack of identifiable temporal variability may be due to the short-term nature of the monitoring period combined with the sparse frequency of sampling.

Streams in the Project Area and vicinity show calcium and bicarbonate as the predominant ions, with magnesium being the second-most predominant cation. Biannual operational monitoring (NewFields 2005) in May and October of 2002, 2003 and February of 2004 showed similar ionic content for sites in lower Sage Creek, however it appears that sulfate content was higher in lower Sage Creek than in South Fork Sage Creek. In both Maxim's and Simplot's data, lower Crow Creek was noted as having a higher sodium and chloride concentration than other stream sites, perhaps due to the Books Spring contributions. As a whole, nutrient concentrations (nitrate, nitrite, ammonia, and phosphorus) in area streams were near or less than reporting levels (Maxim 2004c and 2004d).

Data obtained by Maxim (2004c and 2004d) from the Project Area streams did not always meet aquatic water quality numeric criteria, and exceedances are shown in highlights in **Appendix 3A.** The noted exceedances were primarily metals (most commonly mercury), and were attributed to natural geologic sources (Maxim 2004c).

Selenium is the COPC with perhaps the greatest level of concern in regard to phosphate mining in southeastern Idaho. Therefore, though none of the surface water baseline samples in the Study Area (Maxim 2004c and 2004d) showed selenium exceedances, data from the nearby area streams, which are affected by the existing Smoky Canyon Mine, are presented here. Outside of, but adjacent to, the Study Area, high selenium values are reported in storm water runoff crossing waste rock dumps and seepage through overburden fills, both associated with Simplot's Smoky Canyon Mine (Simplot Agribusiness 2004; MFG 2003; NewFields 2005). Baseline data collection efforts in the Study Area focused on areas not yet subjected to mining influences, but mining has occurred in the nearby areas draining to lower South Fork Sage Creek, Sage Creek, North Fork Sage Creek, and Pole Creek. A few studies have looked at selenium in these areas during the same general time frame as Maxim was collecting water quality data in the Panels F and G Project Area. Selenium data from these studies is summarized in **Table 3.3-1** and discussed further below.

TABLE 3.3-1 RECENT SELENIUM SAMPLING RESULTS – LOWER SOUTH FORK SAGE CREEK AND SAGE CREEK – REACHES CURRENTLY IMPACTED BY MINING

DATA SOURCE *	LOCATION	DATE	FLOW RATE (CFS)	SELENIUM (MG/L)
TtEMI	Mouth of Sage Creek	May 2001	9	0.003
		June 2001	8	0.002
		Sept 2001	14	0.0051
		May 2002	12.5	0.004
		May 2003	13	0.004
Simplot	Mouth of Sage Creek	May 2002	14.5	0.004
		October 2002	13.2	0.005
		May 2003	16.3	0.004
		October 2003	10.2	0.0054
		February 2004	10.9	0.0061
Simplot	Sage Creek downstream of South Fork Sage Creek	May 2002	13.5	0.005
		October 2002	10.5	0.003
Simplot & TRC Mariah	Sage Creek downstream of South Fork Sage Creek	May 2003	17.3	0.004
		October 2003	12.4	0.006
Simplot	Sage Creek downstream of Hoopes Spring	May 2002	12.5	0.007
		October 2002	5.6	0.007
		May 2003	7.7	0.008
		October 2003	7.6	0.0088
TtEMI	North Fork Sage Creek downstream of Pole Creek	June 2001	1	<0.001
		Sept 2001	0.5	0.001
		May 2002	1	0.001
		May 2003	4	<0.001
Simplot	Sage Creek downstream of North Fork Sage Creek	May 2002	1.9	0.001
		October 2002	0.2	0.001
		May 2003	0.8	0.001
		October 2003	0.6	0.0013
TtEMI	South Fork Sage Creek downstream of Mining	May 2001	4	<0.001
		June 2001	5	0.001
		Sept 2001	4	0.002
		May 2002	4	0.002
		May 2003	4	<0.001

*TtEMI 2002b; TtEMI 2002c; TtEMI 2004; Simplot operational monitoring including from NewFields 2005; TRC Mariah 2004

TtEMI reported data collected in Sage Creek at its mouth, in North Fork Sage Creek below the confluence with Pole Creek, and South Fork Sage Creek (downstream of Smoky Canyon Mine activity) as part of an investigation for IDEQ (TtEMI 2004). During three monitoring events in 2001, they found that a sample taken in September near the mouth of Sage Creek exceeded chronic aquatic life criterion for selenium; other metals did not exceed numeric criteria at the three sites. Monitoring was repeated in May 2002 and 2003, but there were no reports of selenium or other metal exceedances at the Sage Creek sites. However, Hoopes Spring, which was sampled in 2003 did exceed the 0.005 mg/L selenium chronic criterion with a 4-day average of 0.0103 mg/L. An analysis by TtEMI suggested that Hoopes Spring was the source of selenium loading reported at the mouth of Sage Creek.

In addition, operational monitoring (K. Tegtmeyer, NewFields, personal communication July 14, 2004; NewFields 2005) in 2001, in May and October of 2002, 2003, and February of 2004 showed that the selenium criterion was consistently exceeded in Sage Creek downstream of flows from Hoopes Spring. Samples taken in Sage Creek above the confluence with Hoopes Spring did not show selenium exceedances. At two sample sites further downstream (one below the confluence with the South Fork Sage Creek and one near the mouth of Sage Creek), most (but not all) of the selenium concentrations were at or greater than the 0.005 mg/L criterion. However, samples taken by Simplot in Crow Creek in May 2003 downstream of the confluence with Sage Creek did not show selenium exceedances.

In 2003, TRC Mariah (2004) added a site on Sage Creek below the confluence with South Fork Sage Creek to its biannual sampling program. Those data showed similar water quality at this site as reported at their lower Sage Creek site, except that higher selenium concentrations were reported (0.004 mg/L in the spring and 0.006 mg/L in the fall) in Sage Creek than in South Fork Sage Creek. The source of the elevated selenium in lower Sage Creek is presumably Hoopes Spring.

Some of the general conclusions by TtEMI (2004) could be relevant to the other Study Area streams as well as to Sage Creek and the other streams they studied. Looking at previous studies, along with their 3-year study, they conclude that selenium and other metals tend to be greater during years of higher peak snowmelt runoff than during lower flow years. However, a correlation of selenium concentrations with snow water equivalent (SWEQ) was not statistically significant, possibly due to an insufficient data set; other factors including mobilization and uptake processes are also thought to contribute to selenium variability. A study by Presser et al. (2004b) indicates that selenium concentration and load in the nearby Blackfoot River downstream of numerous phosphate mines cycles seasonally with streamflows, with peak selenium concentrations following the hydrograph peak by 2-3 weeks, and most (approximately 70-80 percent) of the selenium load occurring during the 3-month high flow season of April – June when about 40-55 percent of the total annual flow occurs. The seasonality of selenium concentrations and load suggest that there is a regional reservoir of selenium that functions as a longer term supply, rather than simply reflecting a short-duration flush after a dry season (USGS 2004). Given that the majority of the Project Area data and regional selenium data have been collected during recent drought years, these studies could have implications regarding selenium levels produced once a more normal hydrologic regime returns. Data given in **Table 3.3-1** do not appear to follow a pattern of either higher Total Dissolved Solids (TDS) in the spring season as compared with fall, or to generally correlate flow with selenium. However, the data set was not extensive, nor was the timing of sample collection necessarily conducive to observing the patterns described above, so trends regarding selenium, season, and flow cannot be ruled out.

The State of Idaho also has a monitoring program that includes several of the Project Area streams. The Beneficial Use Reconnaissance Program (BURP) focuses more on biological and habitat data rather than chemical data; thus, no selenium or other COPC data are available from this source. The available BURP data are discussed below in **Section 3.3.3**.

Water Column Sediments

This subsection describes available information on sediment-related water quality data; sediment data related to streambeds are described in **Section 3.3.3**. As noted above, the Idaho water quality narrative criteria for sediments encompasses both water column and streambed characteristics. While the terms ‘suspended sediments’ and ‘total suspended solids’ (TSS) are often used interchangeably, there are differences in their definitions and in how they are analyzed. All data discussed herein are thought to refer to TSS. Further, turbidity is often related to sediments in the water column, though there can be other contributing factors.

Turbidity does have a numeric standard under the Idaho water quality standards, which is related to an allowable increase over background (50 Nephelometric Turbidity Units (NTU) increase instantaneous or 25 NTU for more than 10 consecutive days).

Though both TSS and turbidity data exist for streams within the Study Area, neither parameter lends itself to a direct comparison with water quality standards. Further, considering the spatial and temporal variability of natural sediment loads (easily varying over orders of magnitude) and turbidity in streams, the available data set is small and not likely representative. Effects of TSS and turbidity on aquatic life are dependent upon concentration (for TSS), levels (for turbidity), the duration of exposure, and the species considered; bed sediments are important as well.

In regard to suspended solids concentrations in area streams, recent data from Maxim (2004c and 2004d), TtEMi (2004), TRC Mariah (2004) and Simplot indicate TSS levels that are commonly less than detection levels (5 mg/L), and in no cases are reported levels greater than 25 mg/L. Turbidity values ranged from less than 1.0 to 52 NTUs in Maxim's 2002 and 2003 baseline data (2004c); consistently high turbidity readings in 2004 were attributed by Maxim to an inaccurate meter (Maxim 2004d). These data are not sufficient to establish statistically significant regression relationships on a stream-by-stream basis between turbidity and TSS. While, as mentioned above, there is not a numeric water quality criterion for sediment, available information implies that these values would not impair beneficial uses (IDEQ 2003b). Simplot's Storm Water Pollution Prevention Plan (Simplot AgriBusiness 2004) indicates that the monitoring benchmark for TSS in their storm water permit is 100 mg/L. Regarding the 303(d) listings for the upstream reaches of Deer Creek and its forks, the available data are not sufficient to either support or dispute the sediment impairment.

The data collection efforts mentioned above relied upon grab samples as opposed to width/depth integrated samples and did not attempt to specifically catch sediment-laden runoff. In addition, they represent a short time frame, which may not be representative. Depth-integrated sampling for sediment is the generally approved methodology for obtaining representative values for discharge-weighted suspended fluvial sediment measurements from flowing streams. USGS protocols for sampling suspended sediments (USGS 1999b) use width/depth integrated sampling to insure that samples are representative and are "discharge-weighted". This is needful due to the high variability in sediment concentrations that can exist within the water column (USGS 1970, pg 19). For these reasons, grab samples are in general not judged to be representative measures of fluvial sediments in flowing streams. Longer term data (TRC Mariah 2004) for streams in the vicinity of the Smoky Canyon Mine show greater ranges of sediment concentration, though probably still less than the true variability of a given stream.

In the Blackfoot River TMDL (IDEQ 2001), overall sediment yield from the forest land within the subbasin was estimated to be 0.006 tons/acre/year.

3.3.3 Channel Morphology and Streambed Sediment

Maxim generally described morphology and substrate for Project Area streams in their water resources baseline reports (Maxim 2003a, 2004c, 2004e, and 2004k). These descriptions are summarized below. In addition, the State of Idaho's BURP habitat data are discussed. The BURP data were obtained from IDEQ's website (IDEQ 2005) and are primarily from 1998 and 2002 monitoring events.

Crow Creek's morphology from the Wells Canyon confluence to the valley constriction ("Narrows") immediately downstream of the Deer Creek confluence is described as a Rosgen (1996) type E4 channel with a consistently stable meander riffle-pool pattern. Maxim also notes that, while not classified, Crow Creek from the Narrows downstream to the Sage Creek confluence appears similar to the upper E4 reach. In 1998 and 2002, Idaho BURP monitoring listed Crow Creek just downstream from Manning Canyon as a Rosgen type C channel (IDEQ 2005). With a high sinuosity and a low gradient, Crow Creek's floodplain is up to 0.5 miles wide. Some beaver dams are found along Crow Creek but are presumed to be limited by lack of woody vegetation (Maxim 2004e:24). Lateral migration occurs over much of the length of Crow Creek, as is typical of an alluvial valley bottom stream. The existing road alongside the stream does prevent lateral channel migration in some locations, but Crow Creek appears to be vertically stable with riparian areas dominated by herbaceous species. The road encroachment and other impacts from livestock and upstream land use has resulted in segments of Crow Creek being rated as functioning-at-risk, while other reaches were rated as in proper functioning condition (PFC) by CTNF (Maxim 2004e). In 1998, Idaho BURP monitoring listed Crow Creek just downstream from Manning Canyon as being affected by grazing, "other", and recreation but rated 100 percent of the stream bank in the measured reach as stable (IDEQ 2005). In 2002, they added agriculture, mining (exploration), and roads to the affecting activities, and about 4.5 percent of the bank length was rated as unstable.

Baseline studies describe South Fork Sage Creek's channel bed as having shallow alluvium over cobble substrate along much of the studied reach. Although much of the reach apparently is comprised of these permeable materials, conditions are sufficient to support various streamside wetlands with predominantly deep-rooted willows. In spots, the bed is less permeable and forms isolated perennial pools. Studies further described South Fork Sage Creek near its confluence with the unnamed tributary as a Rosgen type G4 and about 1 mile upstream from its mouth as an A4 type (Maxim 2004a). Maxim (2004k) describes the upper channel reach as being in proper functioning condition, but at risk from concentrated sheep grazing and trampling. They report that the lower reach (apparently) is functioning-at-risk due to grazing and noxious weeds, and they note that the 1999 CTNF evaluation indicated that the stream was functioning at risk because of roads and planned mining activities in the drainage.

In 2001, Idaho BURP monitoring listed Sage Creek just downstream from the confluence with South Fork Sage Creek as a Rosgen C stream type, affected by grazing and recreation, with about 20 percent of the stream bank in the measured reach rated unstable (IDEQ 2005).

The channel bed in Deer Creek has a predominantly cobble substrate, though wetland areas and riparian corridors have formed, often associated with beaver activity. Beaver dams were noted to be the primary factor in channel shaping along much of mainstem Deer Creek (Maxim 2004a). However, Deer Creek and its tributaries exhibit a wide variety of channel types, and stability ratings of either stable or degrading. As reported in Maxim (2004e), Deer Creek was rated by Maxim and in the 1999 CTNF PFC analyses, as functioning-at-risk due to noxious weeds, roads, intensive grazing, and/or mining activities. In the headwaters, a degrading meander riffle-pool classification (Rosgen type G6) was identified, while a degrading meander pool-run (type F4) was identified at the confluence with North Fork Deer Creek. In the vicinity of the South Fork Deer Creek confluence and lower Deer Creek, the channel has a meander riffle-pool or riffle run pattern (type C3). A site on lower Deer Creek was typed as Rosgen C in 1998 (IDEQ 2005) with 25 percent of the banks rated as unstable; in 2003 a site on lower Deer Creek about 0.75 miles downstream from the 1998 site was considered a B stream with about 9 percent of the banks in that reach unstable (IDEQ 2005). Upper North Fork Deer Creek is identified as a degrading high-grade riffle (Rosgen type A4), while the lower reach exhibits a degrading riffle pool pattern (type G4). In 1998 and 2003, Idaho BURP monitoring listed North Fork Deer Creek near its mouth as a Rosgen B stream type, with about 30 percent of the stream bank in the measured reach rated unstable in 1998 and about 14 percent unstable in 2003 (IDEQ 2005). South Fork Deer Creek is a stable riffle-pool-run pattern of Rosgen type E6 according to Maxim; its upper reaches were classed by IDEQ (2005) in 1998 as a stable Rosgen type C.

Baseline studies also report that "intensive" livestock use is evident along North Fork Deer Creek and along the intermittent reach of the South Fork Deer Creek, where grazing and trampling have affected stream bank conditions (Maxim 2004e). Further, the South Fork of Deer Creek has been impacted by an adjacent USFS road. The IDEQ (2005) BURP data indicates the various reaches of Deer Creek are affected by beaver, grazing, mining, recreation, "other", and/or roads, depending upon the reach and the year (1998 or 2003).

Maxim (2004c) notes that lower Wells Canyon, near its mouth, is a riffle-run channel of Rosgen type G6. Rosgen type G6 streams are unstable with grade control problems (Rosgen 1996, table 4-1). They are generally considered to be highly degradational (Rosgen 1996, pg 5-186), highly sensitive to disturbance, and have poor recovery potential (Rosgen 1996, table 8-1, pg 8-9). Idaho BURP data (IDEQ 2005) indicates that this same area was a Rosgen type B stream in 1998 and mostly stable (98.5 percent of the banks). An unpaved road alongside the channel has confined the Wells Canyon drainage, filled portions of it, and contributed sediments. Campsites and livestock grazing are also noted as contributing to the stream's instability and at-risk condition. Maxim (2004e) reports their assessment of Wells Canyon Creek as non-functional and degraded by sedimentation and road influences; they note that the 1999 CTNF assessment was functioning-at-risk due to roads, grazing, and recreational activities. Additional Idaho BURP data were apparently collected on Wells Canyon in 2004; however, these data are not yet publicly available. Upper Diamond Creek is a moderately sinuous Rosgen B channel confined within a v-shaped valley (IDEQ 2001). Its overall stability was rated as fair (using the Phankuch methodology) 20 or more years ago, but in 1990, aquatic habitat was apparently in good condition above the forest boundary (IDEQ 2001). In 2002, Idaho BURP monitoring measured 96 percent of the banks in the reach as stable. Diamond Creek was rated as functioning-at-risk in 1999 and is on the EPA approved (1998) 303(d) list of impaired waters, with sediment listed as the pollutant. Diamond Creek is under the governance of a TMDL approved by the EPA in April of 2002. Monitoring of the percent of streambed fines is being conducted by the Forest Service at a location just above the Forest boundary.

Streambed sediment

Streambed sediment can be directly measured as surface or subsurface sediments. The measures are not directly comparable, nor are they directly linked to TSS or suspended sediments as measured in the water column. As mentioned under the regulatory information subsection above, the Diamond Creek TMDL established loads based upon subsurface (depth) fines as determined by core samples taken in bed substrate (IDEQ 2001). Higher percentages of depth fines are related to impacts to salmonid spawning, anadromous habitat, invertebrate habitat, and redd conditions (IDEQ 2003a).

At selected sites in the Study Area, Maxim (2004c) performed pebble counts to characterize in-situ stream bottom grain size distribution (surface sediments). Results of the pebble counts showed that most sites were comprised of predominately gravel-sized sediment, followed by sand and cobbles.

As an alternate means of characterizing substrate, TRC Mariah (2004) has been rating the streambed embeddedness at two South Fork Sage Creek sites on a biannual basis since 1992. Embeddedness is related to, but not directly comparable with, surface fines (IDEQ 2003a). The rating system describes the amount of gravel and larger particles that have their surfaces covered by fine sediment. By its nature, use of the measure of embeddedness indicates that the original streambed substrate is comprised of a matrix of coarse grained particles (gravel and larger); embeddedness ratings cannot be done on beds that are comprised predominately of fines. Values can range from 1 to 5. Implied in a lower embeddedness value is the assumption that fine sediments have been eroded from up-channel or in the watershed and deposited over the surface of “cleaner” substrate that is more suitable for aquatic habitat. A value of 5 would indicate particles that have not been covered over by fines and are therefore of potentially greater habitat value. Between 1992 and 2001, embeddedness values (taken only when flow occurred) ranged between 1 and 4 at the upstream South Fork Sage Creek site and between 3 and 5 at the downstream site, indicating somewhat better conditions downstream (TRC Mariah 2002). Embeddedness is of dubious relevance in intermittent or ephemeral stream reaches, so these data should be treated accordingly.

Subsurface fines data for the area streams are limited to core samples taken at four of the stream sites: South Fork Sage Creek, Deer Creek, South Fork Deer Creek, and Wells Canyon (Maxim 2004c). It is not known whether these samples were taken with the same protocol as would be used to assess impairment-related targets such as were developed for the Diamond Fork TMDL (IDEQ 2001) in regard to core diameter, depth, placement in the riffle, etc. These samples appear to be single unit samples, rather than a set of randomly collected samples within a larger grid, which better characterizes the inherent spatial variability of particle sizes in a small area. The available data are presented in **Table 3.3-2** in a manner that allows them to be compared with the Diamond Fork TMDL allocations. As seen in the table, based upon the single sample analysis at each site, three out of the four streams sampled would not meet the depth fines targets if they were applicable to these reaches.

TABLE 3.3-2 SUBSURFACE FINES DATA FOR AREA STREAMS (FROM MAXIM 2004C)

LOCATION (SITE NUMBER)	PERCENTAGE OF PARTICLES IN SAMPLE LESS THAN		DEPTH FINES – FIVE YEAR AVERAGE ALLOWABLE UNDER DIAMOND CREEK TMDL (FOR COMPARISON PURPOSES ONLY)	
	<6.25 MM	<0.85 MM	<6.25 MM	<0.85 MM
South Fork Sage Creek (SW-SFSC-800)	21	5	25%	10%
Deer Creek (SW-DC-800)	35	18		
South Fork Deer Creek (SW-SFDC-300)	26	11		
Wells Canyon (SW-WC-800)	66	55		

In addition to their physical characteristics, the chemical makeup of streambed sediments can also be important to aquatic and riparian resources. The Area Wide Human Health and Ecological Risk Assessment for the Southeast Idaho Phosphate Mining Resource Area (IDEQ 2002c) summarized conservative benchmarks for freshwater sediments for selected COPCs, as shown in **Table 3.3-3** below. Most of these benchmarks are based on a Threshold Effect

Concentration (TEC). Subsequent to the risk assessment, IDEQ published a risk management plan (IDEQ 2004b), which established removal action levels for sediment (and other media) at phosphate mine-impacted sites under CERCLA consideration; these are also shown in the table. With the exception of selenium, the removal action levels are set at a higher concentration than the benchmark levels used in the 2002 report. In cases where the regional background levels exceeded what would otherwise be the removal action level, the maximum background level was substituted as the action level for a given constituent (IDEQ 2004b).

In August 2003, Maxim (2004c) sampled streambed sediment at 10 Study Area sites to characterize baseline metals concentrations. These data are included in **Appendix 3A**. Concentrations of selenium in sediment ranged from less than 0.4 to 1.3 mg/Kg, which are less than both the 4.0 and 2.6 mg/Kg benchmark and removal action levels in **Table 3.3-3**. In most of the samples analyzed, concentrations of cadmium, chromium, nickel, and zinc were greater than the benchmark levels, and in some cases greater than the removal action levels; only copper and selenium concentrations remained below these levels. The reason for the apparently high concentration for some COPCs in these stream sediments is not clear; there has not yet been mining related disturbances in the watersheds that contribute flow to these sample sites. Further, while the background levels from the IDEQ (2004b) dataset were limited, they were obtained from areas with similar general geology as the watersheds contributing to these sample sites. In addition, the results generally echo streambed sediment samples taken by Montgomery Watson (1999) at the two established monitoring sites above and below mining disturbances in South Fork Sage Creek.

TABLE 3.3-3 SEDIMENT BENCHMARK LEVELS USED BY IDEQ (2002B)

PARAMETER	SEDIMENT BENCHMARK (MG/KG)*	REMOVAL ACTION LEVELS (MG/KG)*
Cadmium	0.99	5.1
Chromium	43.4	100
Copper	31.6	197
Nickel	22.7	44
Selenium	4.0	2.6
Vanadium	none	72
Zinc	123.1	315

* See above paragraphs and IDEQ (2002b) for derivation of these numbers and their source.

3.3.4 Surface Water Uses

Water use in the State of Idaho is managed through the adjudication of water rights, and the adjudication process is managed by the Idaho Department of Water Resources. Water rights information for the Study Area was obtained from their website online computer database (Idaho Department of Water Resources 2004). Water rights for the use of stream flow for various uses are summarized in **Appendix 3A, Summary of Water Rights Points of Diversion** and in Maxim (2004c). The majority of these rights are seasonal, for stockwatering and irrigation uses. In addition, there are surface water rights for stockwatering and irrigation in lower Crow Creek downstream of the reaches described in the Appendix and continuing into Wyoming.

3.3.5 Groundwater Resources

This section describes groundwater resources in the Study Area, including a description of hydrostratigraphy, recharge/discharge, hydraulic characteristics, and water quality, primarily utilizing information from the Water Resources Baseline Technical Reports for the Study Area (Maxim 2004c and 2004d). Other applicable information on groundwater includes memos and reports on the Study Area relating to water balance estimates of the Crow Creek area (JBR 2004b), isotopic data from samples collected in the Study Area (Mayo 2004), groundwater modeling (JBR 2005a), and similar work conducted previously at the Smoky Canyon Mine (MFG 2003 and 2004b, and JBR 2001b). In addition to the physical description of the groundwater resources in the Study Area, the connection between groundwater and surface water is described as well as the beneficial uses of groundwater in the Study Area.

Hydrostratigraphy

Groundwater in the Study Area occurs primarily in sedimentary rock units, although some areas of alluvium and colluvium contain local groundwater flow systems. The general geology, structure, and description of hydrostratigraphic units are described in the Geology, Minerals, and Topography section of this document (**Section 3.1**). The primary regional aquifer in the Study Area is the Wells formation, consisting of over 1,000 feet of sandstone and limestone. The 100-foot thick Grandeur Limestone overlies the Wells formation and is mapped locally as part of the Wells formation. Underlying the Wells formation is the Brazer Limestone, which has similar hydrostratigraphic characteristics (i.e., limestone and interbedded sandstone). Therefore, the Grandeur Limestone, Wells formation, and Brazer Limestone are considered to function as a single hydrostratigraphic unit with respect to groundwater movement.

Immediately overlying the Wells formation is the Meade Peak member of the Phosphoria formation, which generally consists of 75 to 120 feet of shale and mudstone. These rocks have low permeability and do not transmit water, except where faulted and fractured. The Meade Peak member is considered to be a barrier (aquitard) to downward groundwater movement between units above (Rex Chert and Dinwoody) and below (Wells formation) (Ralston 1979, Mayo et al. 1985).

The Rex Chert member of the Phosphoria formation is water bearing in some locations and forms local groundwater flow systems.

The highest bedrock unit stratigraphically in the Study Area that contains groundwater is the Dinwoody formation, which is composed of interbedded siltstone, limestone, and shale. This unit is part of local groundwater flow systems. Presence and movement of groundwater in the Rex Chert member and Dinwoody formation are most predominant where these rocks are faulted and fractured.

The stratigraphy and structure for the Study Area is shown on **Figures 3.1-1** through **3.1-3** and is discussed in **Section 3.1**. The mine panels are located along the east limb of the Webster Syncline and the west limb of the Boulder Creek Anticline. These folds plunge slightly to the north. **Figures 3.3-4** through **3.3-7** focus on hydrostratigraphy and groundwater conditions in the immediate vicinity of Panels F and G and these are discussed later in this section. Locations of all cross-sections are shown on **Figure 3.1-1** in **Section 3.1**.

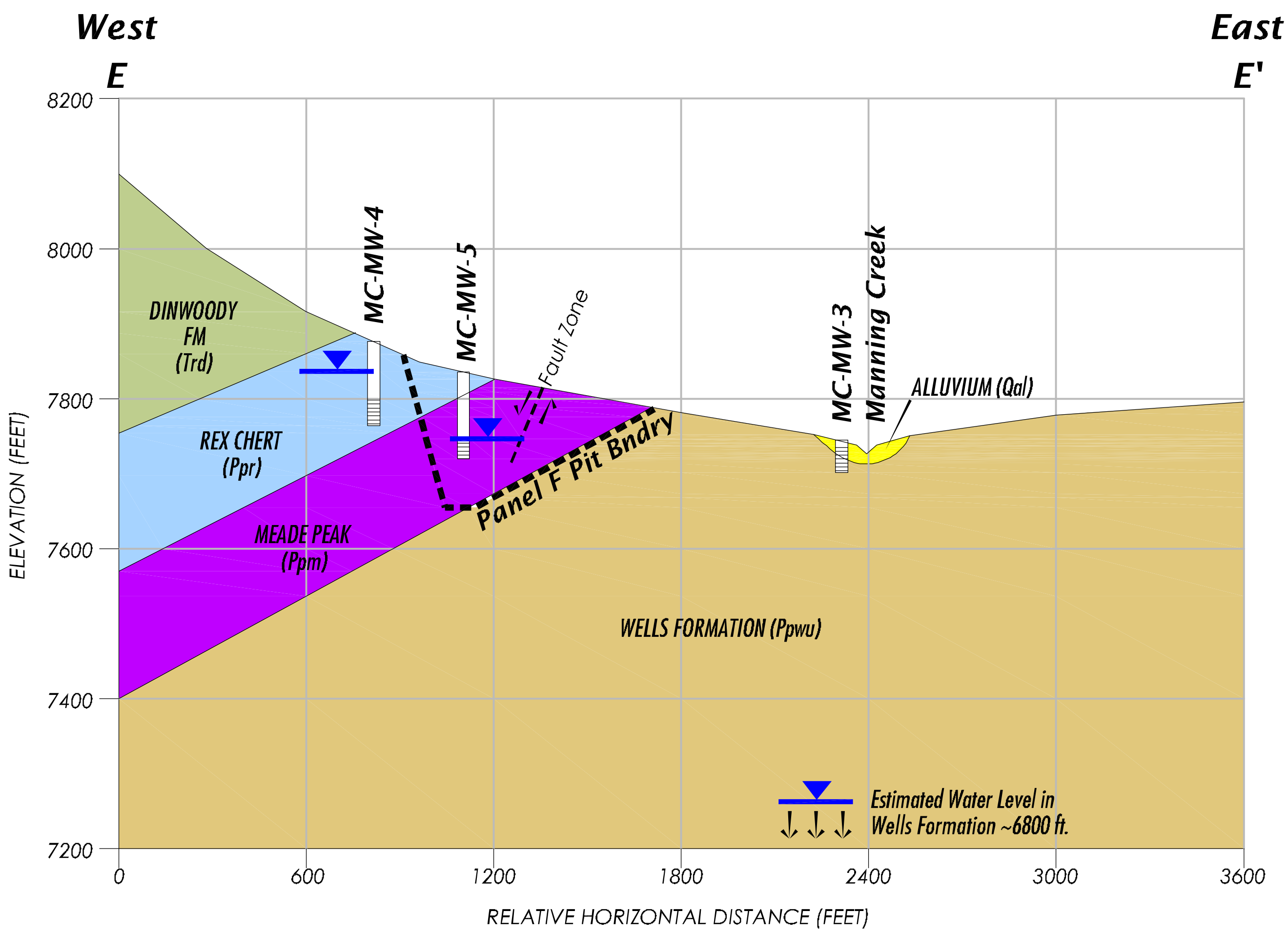
Groundwater Movement

Geologic cross-sections in **Section 3.1** (**Figures 3.1-2** and **3.1-3**) show areas of groundwater recharge and discharge in the Study Area. In general, groundwater recharge occurs to the Wells formation and Brazer Limestone along the high-elevation Freeman Ridge and Snowdrift Mountain on the west side of the Study Area and flows generally eastward downhill toward discharges located in Sage Valley and Crow Creek Valley. Additional recharge occurs along this flow path where outcrop of the Wells formation and Brazer Limestone occur between the eastward edge of the Phosphoria formation and the discharge locations. Evidence for this eastward flow includes the difference in ground surface elevation between the recharge and discharge areas that have been measured for the water table in the Wells formation. The Wells formation aquifer water table elevation was determined to be 6902 feet at the monitoring well DC-MW-5 northwest of the Panel G, 6780 feet at Stewart Ranch Spring, 6590 feet at Books Spring, and 6630 feet at South Fork Sage Creek Spring (**Figure 3.3-8**). In addition, water balance studies conducted in 2003 and 2004 in Crow Creek below its confluence with Lamb Canyon indicate that Crow Creek gains flow due to groundwater discharge from the Wells formation and Brazer Limestone between about Lamb Canyon to just downstream of Deer Creek (Maxim 2004a).

The Webster Range highland is located within the Webster Syncline and contains the Thaynes, Dinwoody, and Woodside formations in the upper elevations, which locally may be highly permeable. Ralston et al. (1977) estimated that the recharge rate of these formations is dependent on locally intense fracturing where snow accumulation occurs. These conditions were thought to result in net recharge rates of 2 to 4 inches in Little Long Valley. This is at a lower elevation than the Webster Range, and minimum recharge rates are expected to be higher in the Webster Range where precipitation amounts are greater. These are recharge areas for what Ralston et al. (1977) called the upper flow system that is contained on top of the Phosphoria formation. Groundwater moves along bedding and fractures within these upper flow system rocks, flowing down dip in the more permeable beds to locations where the beds outcrop in canyons and/or where geologic structure provides secondary permeability.

Ralston conducted a number of site-specific hydrogeology studies in the Smoky Canyon Mine area (Ralston 1979, 1980, 1981, 1983, and 1987). He concluded that there are two major zones of groundwater flow in the Smoky Canyon area, the Triassic beds above the Phosphoria shale and the carbonate rocks below it. He described the same pattern of stream gains and losses in the Triassic beds (Dinwoody and Thaynes formations) and Wells formation, respectively, that has been noted throughout the southeast Idaho area. Gaining perennial flows were noted for the upper reaches of Smoky, Pole, Sage, and South Fork Sage creeks where they flow over the Triassic beds. Flows were noted to be stable where these streams flow across the Phosphoria and then decrease dramatically where they flow over the Wells formation. Winter (1980) described similar patterns of stream channels gaining flow from groundwater discharges in the Dinwoody formation and then losing flow over the Wells formation in Wells Canyon and the Deer Creek drainage.

The Idaho Water Resources Research Institute (1980) studied the general hydrogeology of the region between the Aspen Range to the Smoky Canyon area. They summarized hydraulic conductivity data for the Meade Peak member of the Phosphoria from multiple test locations in the area and concluded that it was an aquitard that “virtually prevented” groundwater flow between the overlying Dinwoody and Thaynes formation aquifers and the underlying Wells formation aquifer. They also characterized the upper aquifers as being “intermediate flow systems” dominating local conditions, while the Wells formation was postulated to be a regional flow system.



See Figure 3.1-1 for cross section location.

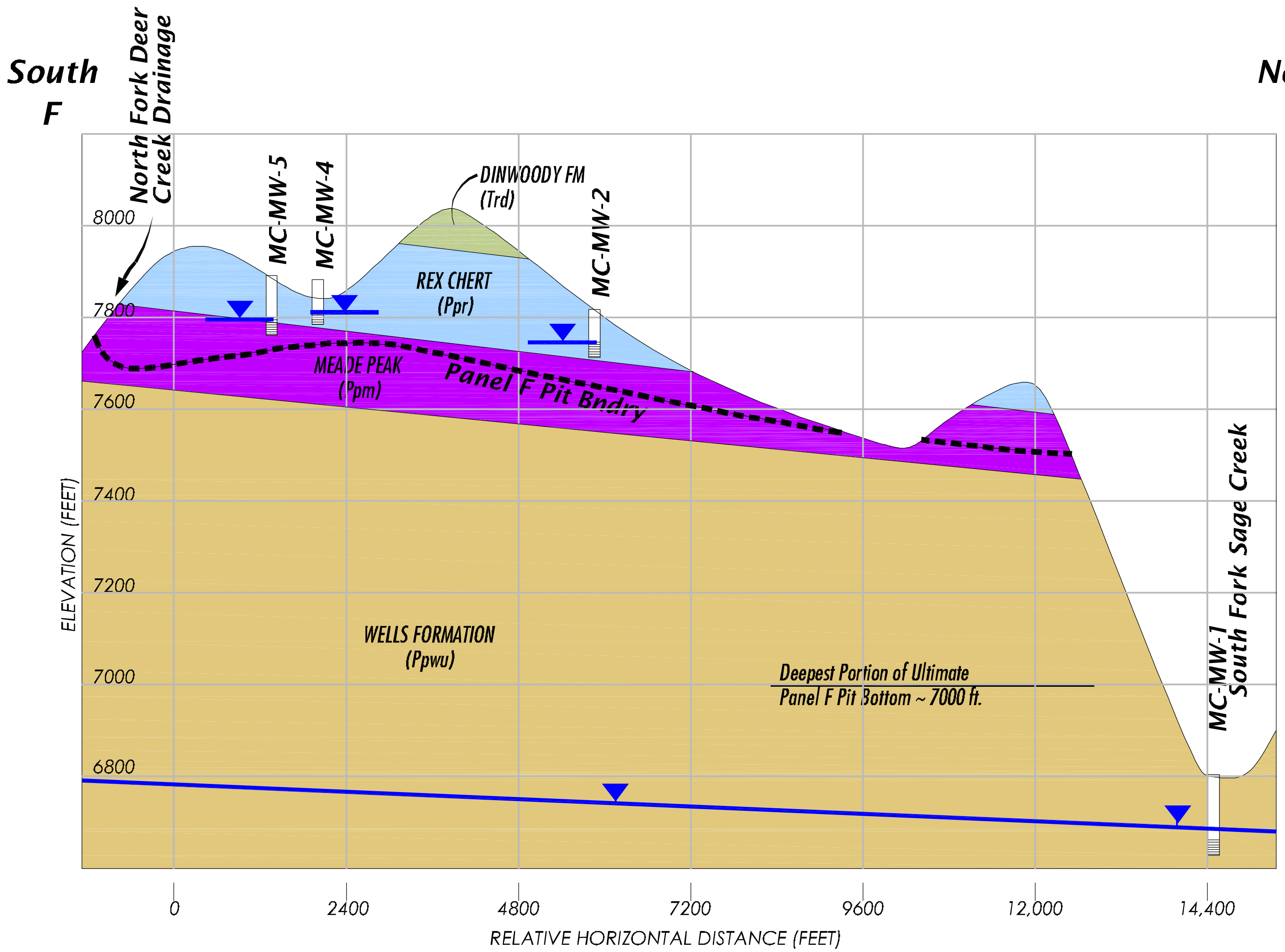
Modified from Maxim Technologies, Inc., Baseline Technical Report—Water Resources, Figure B-4—Panel F East-West Cross Section, March 12, 2004

Scale 1:12,000

0 Feet 1000

Approx. Horizontal Scale

Figure 3.3-4
Panel F East-West Cross Section
Smoky Canyon Mine Panels F and G



See Figure 3.1-1 for cross section location.

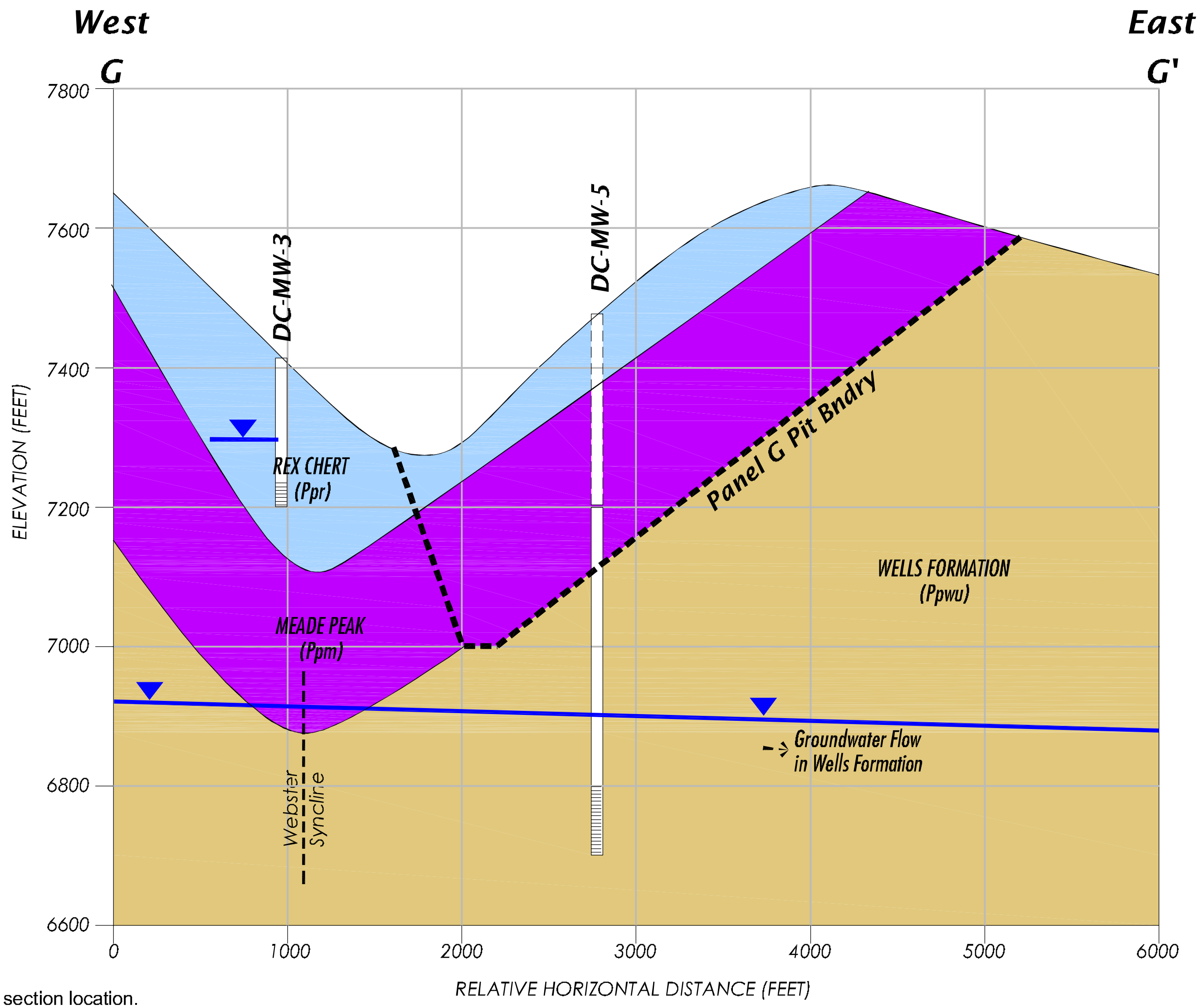
Modified from Maxim Technologies, Inc., Baseline Technical Report–Water Resources, Figure B-5–Panel F North–South Cross Section, March 12, 2004

Scale 1:12,000

0 Feet 1000

Approx. Horizontal Scale

Figure 3.3-5
Panel F North-South Cross Section
Smoky Canyon Mine Panels F and G



See Figure 3.1-1 for cross section location.

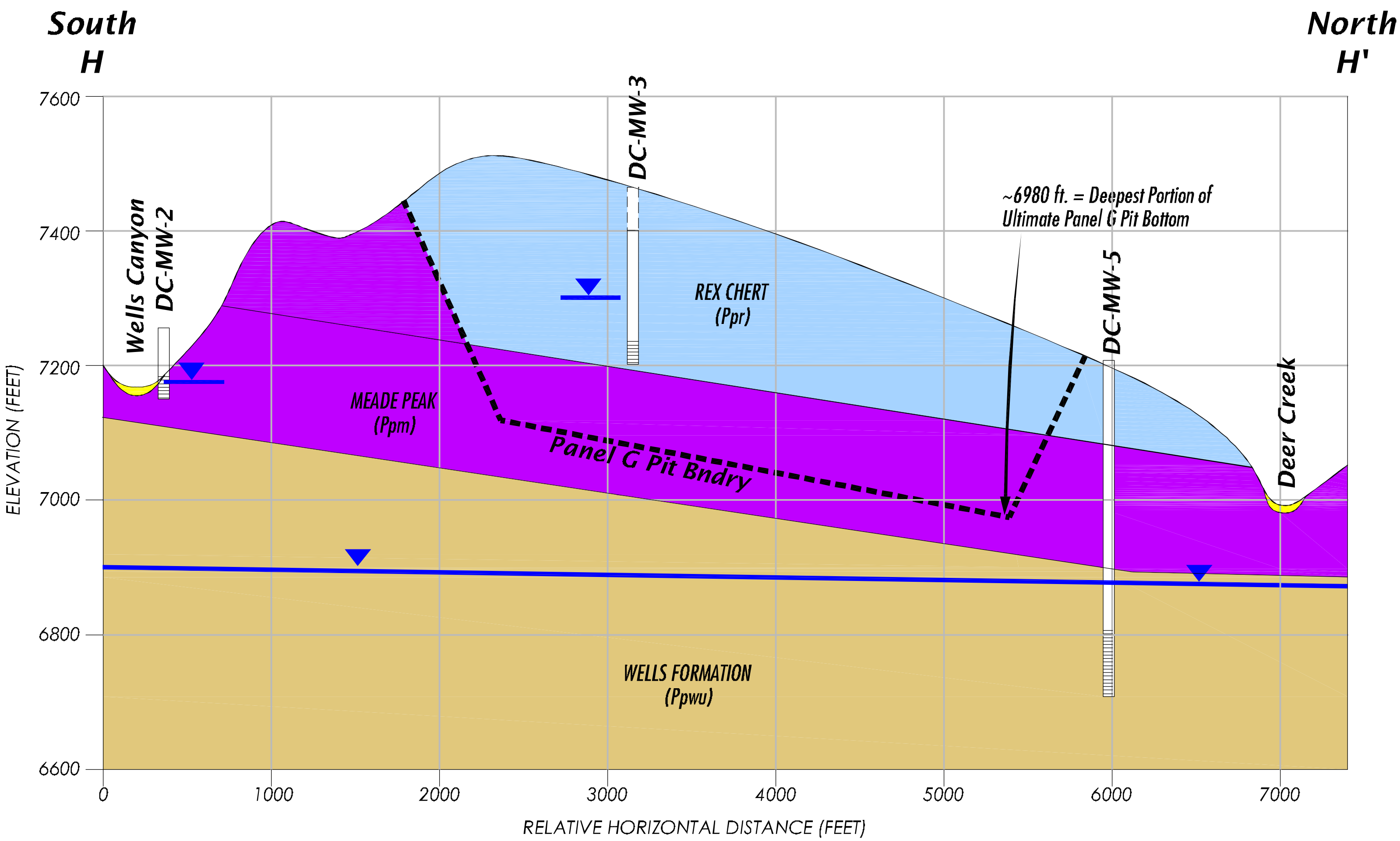
Modified from Maxim Technologies, Inc., Baseline Technical Report–Water Resources, Figure B-6–Panel G East-West Cross Section, March 12, 2004

Scale 1:12,000

0 Feet 1000

Approx. Horizontal Scale

Figure 3.3-6
Panel G East-West Cross Section
Smoky Canyon Mine Panels F and G



See Figure 3.1-1 for cross section location.

Modified from Maxim Technologies, Inc., Baseline Technical Report–Water Resources, Figure B-7–Panel G North–South Cross Section, March 12, 2004

Scale 1:12,000

0 Feet 1000

Approx. Horizontal Scale

Figure 3.3-7
Panel G North-South Cross Section
Smoky Canyon Mine Panels F and G

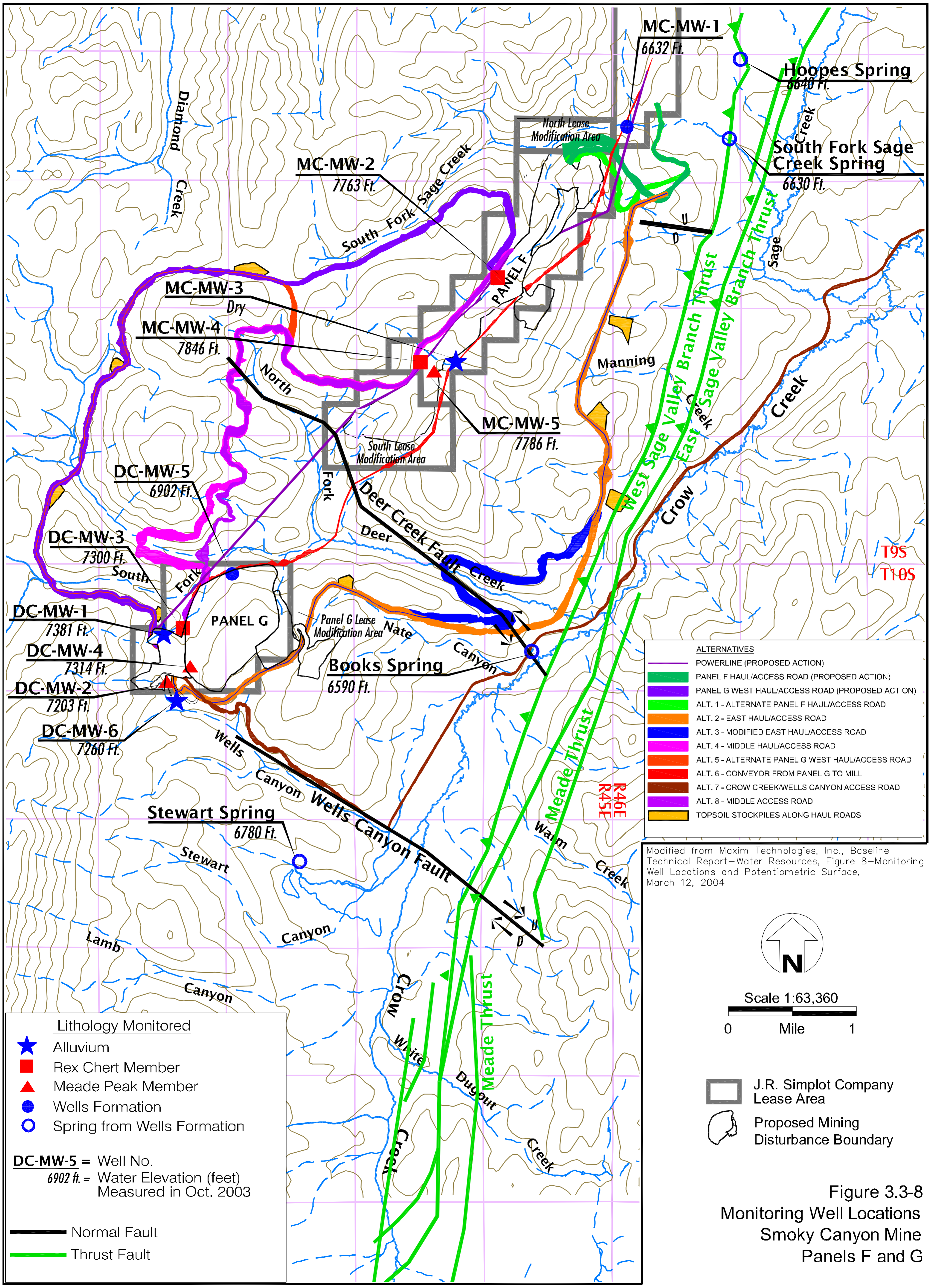


Figure 3.3-8
Monitoring Well Locations
Smoky Canyon Mine
Panels F and G

Mayo et al. (1985) described the regional hydrogeology of the Meade Thrust Plate throughout southeastern Idaho. They determined that groundwater contained in the strata above the base of the Phosphoria formation did not circulate through that aquitard to strata below the Phosphoria, and groundwater below the Phosphoria in the Wells formation and Brazer Limestone did not circulate to rocks above the aquitard. They also determined that groundwater in the Webster Range did not pass through the Meade Thrust Fault zone to the Salt Lake formation and other rocks on the east side of the fault. Isotopic values for groundwater discharges along the Meade Thrust Fault suggested to them that groundwater discharging along the fault could be deeper (older) groundwater from the Brazer Limestone mixed with shallower groundwater in the Wells formation. Groundwater studies done in the Smoky Canyon Mine area within the last few years also indicated that mixed age groundwater was apparently discharging along the Meade Thrust Fault in that area (JBR 2001b).

The separation of the bedrock groundwater above and below the Meade Peak member is an important feature in the Study Area because groundwater in the Dinwoody formation is stratigraphically above the proposed pit backfills and external overburden fills. Therefore, the overburden fills from the proposed mining are downgradient of the Dinwoody aquifer. The Wells formation and Brazer Limestone are stratigraphically below the proposed mining operations and groundwater in these units is downgradient of the proposed mine pits, pit backfills, and external overburden fills. Groundwater in the Wells formation and Brazer Limestone west of the Meade Thrust Fault zone discharges upward to surface streams and springs located along the fault zone or locations west of it.

In the Study Area, the major eastward groundwater flow component in the Wells formation and Brazer Limestone appears to discharge as major springs (e.g., Hoopes Spring, South Fork Sage Creek Springs, and Books Spring) at or near the surface expression of the thrust faults in Sage Valley and in the bottom of Crow Creek Valley (**Figure 3.3-8**). The thrust faults are considered to be barriers to eastward groundwater flow, resulting in the discharge of groundwater at the low elevations along this linear feature. Mayo et al. (1985) indicated that the thrust faults east of and below the Boulder Creek Anticline were barriers to groundwater flow transverse to the plane of the faults, while also providing potential flow pathways parallel to the faults in the shatter or damage zone of the faults. Ralston (1979) concluded that the flow from Hoopes Spring and South Fork Sage Creek Springs occurred from the Wells formation along the West Sage Valley Branch fault where the trace of the fault and adjacent Wells formation outcrop is at an elevation below the water table in the Wells formation, estimated at approximately 6,700 feet (Ralston 1979).

Flow monitoring of streams and springs in the Study Area during 2003 and 2004 baseline studies resulted in an understanding of the approximate amount of groundwater being discharged from the Wells formation and Brazer Limestone to the surface environment (Maxim 2004c). In addition to discrete springs, monitoring of stream flow in Crow Creek and lower Deer Creek indicate the approximate amount of groundwater that is thought to move from the ground into the stream channels within the Study Area (JBR 2005a). **Table 3.3-4** shows the estimates of the discharges from the Wells formation and Brazer Limestone aquifers in the Study Area.

TABLE 3.3-4 GROUNDWATER DISCHARGE FROM WELLS FORMATION AND BRAZER LIMESTONE IN THE STUDY AREA

LOCATION	ANNUAL FLOW (CFS)
Stewart Ranch Springs	6.0
Wells Canyon Spring	0.2
Books Spring	2.9
Lower Deer Creek	0.9
Crow Creek Channel Gain	1.8
South Fork Sage Creek Spring	4.5
Total	16.3

Localized groundwater flow systems occur in the Dinwoody and Phosphoria formations. These rocks receive recharge locally from precipitation in the mountain areas where they outcrop. Smaller springs and seeps in and near the Panel F and G lease areas are likely from local, shallow groundwater systems in the Dinwoody and Phosphoria formations that are structurally and/or stratigraphically controlled. Relatively small flows from these springs discharge where these rocks outcrop due to topography, bedding, or faults/fractures.

A review of drill logs provided by Simplot (2003) for Panel F show that groundwater was encountered in the Rex Chert and Meade Peak members of the Phosphoria formation only in the vicinity of upper Manning Creek where several normal faults have been identified. Other exploration drill holes completed in Panel F to the top of the Wells formation encountered no groundwater. Drill holes in Panel G show that water was encountered in the Rex Chert and Meade Peak members, primarily on the west side of the proposed mine pit. **Figures 3.3-4** through **3.3-7** show locations of groundwater encountered in monitoring wells completed in the vicinity of Panels F and G. Locations of all cross sections are shown on **Figure 3.1-1**.

Figure 3.3-4 is a section across the southern portion of Panel F showing how the mine development would remove the Meade Peak and part of the overlying Rex Chert down dip to the economic stripping ratio. Standing groundwater was encountered in the Rex Chert and in fractured Meade Peak. Both of these groundwater observations are above the regional water table in the Wells Formation, which is more than 800 feet below the bottom of the Panel F pit at this location.

Figure 3.3-5 is a section roughly running along the axis of Panel F and also shows the elevation of the groundwater in the monitoring wells installed within the Meade Peak and Rex Chert. The projection of the deepest portion of the Panel F pit is shown and portrays the fact that the proposed pit bottom throughout Panel F is estimated to be at least 200 feet higher than the regional water table in the Wells formation.

Figure 3.3-6 is a section roughly east-west through Panel G and shows the planned open pit removing the Meade Peak and the Rex Chert that is present on west side of the unnamed hill down dip to the economic stripping ratio. This also shows that a groundwater body exists in the Rex Chert in this location but the regional Wells formation water table is estimated to be approximately 100 feet below the deepest portion of the pit bottom. This is also shown in **Figure 3.3-7**, which is a section roughly parallel to the long dimension of Panel G, which shows groundwater in the Rex Chert and that the bottom of Panel G is estimated to be from 100 to 200 feet above the Wells formation aquifer.

Influence of the Deer Creek and Wells Canyon faults (**Figure 3.3-8**) on groundwater movement in the Study Area is uncertain. A small spring, Wells Canyon Spring, is located about a third of the way up Wells Canyon and may be influenced by the Wells Canyon Fault located in this canyon. Books Spring is located along the Deer Creek Fault and likely discharges from the Wells formation and/or Brazer Limestone. Downstream of where the Deer Creek Fault crosses Deer Creek (**Figure 3.3-8**), the stream gains flow from groundwater from the Wells formation and Brazer Limestone.

Groundwater flow in the Wells formation north of the Deer Creek Fault (under Panel F) flows primarily to the east toward the Meade Thrust Fault and then along the fault toward the north. South of the Wells Canyon Fault, groundwater in the Wells formation and Brazer Limestone appears to discharge at Stewart Spring (**Figure 3.3-8**). Additionally, some groundwater from these formations also appears to discharge into alluvium in the Crow Creek Valley in the general reach between Lambs Canyon and Deer Creek, as evidenced by water balance measurements made in this area in 2003 and 2004 (Maxim 2004c).

Unconsolidated Quaternary colluvium and alluvium deposits occur along the bottoms of South Fork Sage, Deer, and other creeks flowing east from the Webster Range in the Study Area. Alluvial deposits, consisting of well- to poorly-sorted gravel, sand, silt and clay, are narrow and thin in the bottoms of these creeks where they flow through their respective canyons and become thicker at the mouths of the canyons (Cressman 1964). Permeability of the alluvium is high to moderate, depending on the amount of fines in the sediments.

Aquifer Hydraulic Characteristics

During summer 2003, several monitoring wells were constructed in the Project Area to evaluate groundwater conditions (**Figure 3.3-8**). Well completion information is summarized in **Table 3.3-5**. A total of 11 monitoring wells were drilled and completed in the following hydrostratigraphic units: alluvium, Rex Chert, Meade Peak, and Wells formation.

TABLE 3.3-5 MONITORING WELL COMPLETION DATA
SMOKY CANYON MINE - PANELS F & G

WELL NO.	DEPTH TO WATER (FEET)	WATER ELEVATION (FEET)	WELL DEPTH (FEET)	SCREEN INTERVAL (FEET)	MONITORED LITHOLOGY
MC-MW-1	148.1	6632	210	160 - 210	Upper Wells formation
MC-MW-2	60.0	7763	85	55 - 85	Rex Chert Member
MC-MW-3	dry	dry	25	5 - 25	Alluvium
MC-MW-4	45.5	7846	96	66 - 96	Rex Chert Member
MC-MW-5	88.4	7786	121	81 - 121	Meade Peak Member
DC-MW-1	7.5	7381	7.5	2.5 – 7.5	Alluvium
DC-MW-2	62.6	7203	117	87 - 117	Meade Peak & Upper Grandeur Fm.
DC-MW-3	94.9	7300	193	163 - 193	Rex Chert Member
DC-MW-4	105.0	7314	136	106 - 136	Meade Peak Member
DC-MW-5	303.0	6902	494	380 – 483	Upper Wells formation
DC-MW-6	4.3	7260	7.5	2.5 – 7.5	Alluvium

Note: Elevations surveyed October 29, 2003 as feet above mean sea level. Based on NAD 83 datum.

Regional aquifer test data show the following mean, horizontal hydraulic conductivity values for the various hydrostratigraphic units over a wide geographic area: Rex Chert (unfractured) = 2.8 feet/day; Rex Chert (fractured) = 52 feet/day; Meade Peak (unfractured) = 2.4 feet/day; Meade Peak (fractured) = 25 feet/day; and Wells formation = 1.8 feet/day (Whetstone Associates 2003). Hydraulic conductivity of the Wells formation where locally fractured would be expected to be higher.

Aquifer testing conducted in the bedrock monitoring wells indicated hydraulic conductivities that were lower than the ranges of regional values (Maxim 2004c). Tests of three monitoring wells in the Rex Chert yielded hydraulic conductivities ranging from 0.05 to 0.57 feet/day. A test of the Meade Peak Member away from known faulting yielded a hydraulic conductivity of 0.4 to 0.6 feet/day. Where the Meade Peak was faulted in two monitoring wells, the hydraulic conductivity ranged from 0.4 to 2.9 feet/day. The one test of the Wells formation (DC-MW-5) produced a hydraulic conductivity of less than 0.04 feet/day, which is much lower than expected, but this well was difficult to develop, so the measured hydraulic conductivity is suspect. A recent pump test conducted in the Smoky Canyon Industrial Well by NewFields (2004) indicated a hydraulic conductivity for the Wells formation of 3.7 feet/day.

3.3.6 Groundwater Model

To better understand the flow of groundwater in the Wells formation and Brazer Limestone, a numerical groundwater model using the USGS computer code MODFLOW 2000, was developed for the Study Area (JBR 2005a). The boundaries of the modeled area were South Fork Sage Creek on the north, Freeman Ridge/Snowdrift Mountain on the west, Lamb Canyon on the South, and Crow Creek or the Meade Thrust Fault on the east (**Figure 3.3-9**).

An estimate of the groundwater recharge to the Wells formation and Brazer Limestone was made for the model area using empirical data from previous hydrogeology studies (JBR 2005a). The recharge to these units comes from: 1) distributed infiltration of precipitation directly into the outcrop areas of the units within the Study Area, 2) percolation from stream channels where they cross the units and lose flow, and 3) underflow from adjacent portions of these units outside the model area. The estimate of these recharge amounts is shown in **Table 3.3-6**.

TABLE 3.3-6 RECHARGE INTO THE WELLS FORMATION AND BRAZER LIMESTONE IN THE STUDY AREA

TYPE OF RECHARGE	ANNUAL AMOUNT (ACRE-FEET/YEAR)
Distributed Precipitation Infiltration	4,800
Percolation from Stream Losses	1,900
Groundwater Underflow from Adjacent Areas	4,400

Distributed recharge occurs from infiltration of rain and snowmelt over the recharge area of the Wells formation and Brazer Limestone within the model area boundary. It was assumed there would be no such recharge in the area underlain by the Meade Peak member aquitard. Streams that cross the outcrop areas of the Wells formation and Brazer Limestone are known to lose flow through percolation into the units under the stream channels (Ralston 1979, Winter 1980). Estimates of the annual recharge to these formations through stream losses were made using gain/loss survey data measured on the streams in the Smoky Canyon Mine area (JBR 2005a). Groundwater that flows into the model area originates from recharge of precipitation and snowmelt in outcrop areas of the Wells formation to the south and west of the model area. A large, high-elevation recharge area is in the area of Meade Peak immediately south and southwest of the model area boundary.

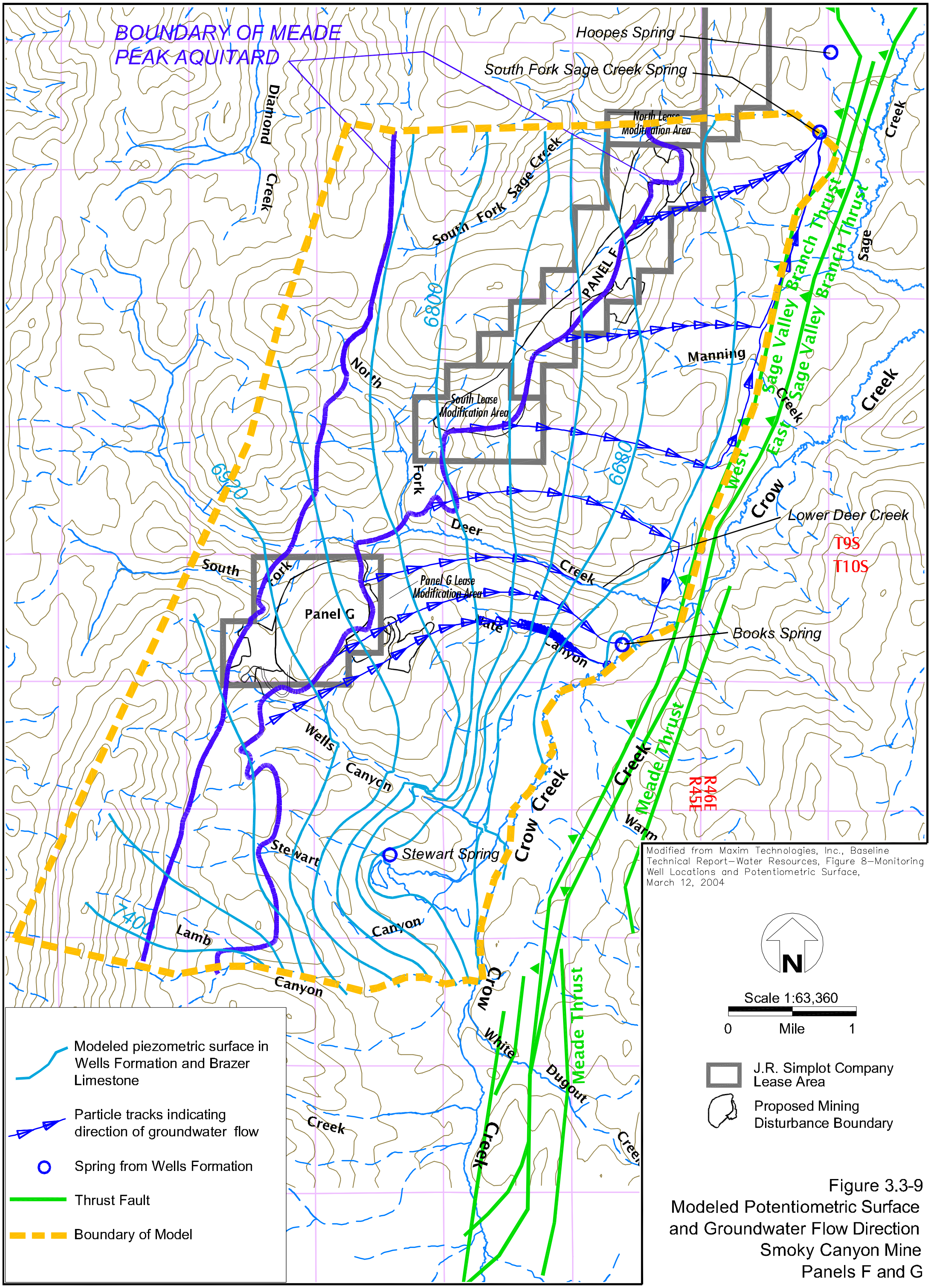


Figure 3.3-9
Modeled Potentiometric Surface and Groundwater Flow Direction
Smoky Canyon Mine
Panels F and G

The groundwater model used a water budget consisting of the measured groundwater discharges listed in **Table 3.3-4** and the groundwater recharge estimates listed in **Table 3.3-6**. The hydraulic conductivity within the model area was adjusted until the model discharges calibrated with the measured flows listed in **Table 3.3-4**, and the elevation of the water table at the discharge points calibrated with the known elevations at these points and the measured water table elevations at monitoring wells DC-MW-5 and MC-MW-1. Based on previous studies in the area, the hydraulic conductivity along the Meade Thrust Fault plane was set at a high level (Mayo et al. 1985). Outside of the thrust fault and the immediate vicinities of Stewart Ranch and Books springs, the majority of the calculated hydraulic conductivities within the model area ranged from about 1.4 to 3.8 feet/day, which is consistent with the recently measured hydraulic conductivity at the Smoky Canyon Mine Industrial Well.

The model was then used to generate the water table contours shown in **Figure 3.3-9**. These show a general pattern of eastward groundwater flow for the Wells formation /Brazer Limestone regional aquifer within the model area. They also show the influence of the large amount of groundwater recharge that occurs in the high-elevation area south and southwest of the model area. Finally, hypothetical particles were placed in the top of the modeled aquifer at specified locations along the east margin of the Meade Peak member and allowed to move downgradient under the influence of groundwater flow. These “particle tracks” are shown in **Figure 3.3-9**.

The particle tracks indicate that groundwater in the Wells formation and Brazer Limestone generally moves toward the east boundary of the model area. They also indicate that the groundwater under Panel F moves toward the trace of the Meade Thrust Fault and then northward along the fault toward South Fork Sage Creek Spring. Groundwater under Panel G appears to flow eastward toward discharge locations along lower Deer Creek or at Books Spring.

3.3.7 Chemical Characteristics of Groundwater

Water samples were collected in 2003 and 2004 from all monitoring wells in the Study Area, with the exception of alluvial well MC-MW-3 (Panel F) because it was dry. Samples were analyzed for the water quality parameters listed in **Appendix 3A, Summary of Groundwater Data**. Some parameters were also measured in the field during sample collection including: temperature, pH, conductivity (SC), dissolved oxygen (DO), oxidation-reduction potential (ORP), and turbidity. Metals were analyzed as both total and dissolved. Tables including complete groundwater quality data are contained in the baseline technical reports (Maxim 2004c and 2004d) and are reproduced in **Appendix 3A, Summary of Groundwater Data**. The groundwater quality standards listed in this same table are obtained from IDAPA 58.01.11.200. For Idaho, groundwater standards for metals are based on the total fraction. Groundwater samples were obtained and analyzed for both total and dissolved metals to identify the potential effect of turbidity on the reported water chemistry. Some groundwater standards (e.g., pH, TDS, chloride, sulfate, aluminum, iron, manganese, silver, and zinc) are “secondary”, which are generally based on aesthetic qualities (IDAPA 58.01.11.200.01.b). If the natural background level of a constituent in groundwater exceeds its standard, the natural background level shall be used as the standard (IDAPA 58.01.11.200.03).

Comparison of the baseline monitoring results from the monitoring wells to applicable standards show that, in general, groundwater in the Study Area meets the groundwater quality standards with some exceptions that exceeded the standards. These exceedances are highlighted in **Appendix 3A, Summary of Groundwater Data** with shading. Many of the exceedances of the metals standards were measured in total metals samples with fewer exceedances noted in dissolved metals samples. The total metal samples are not filtered in the field and represent water quality in the well itself, including any suspended sediment in the well. The dissolved metals samples are filtered in the field to exclude any suspended sediment and represent water quality in the aquifer outside the well casing.

The pH was typically in a range of about 7 to 8.5. Values in the lower range from 5.4 to 6 were measured in the field in four samples from monitoring wells completed in Rex Chert, Meade Peak shale, and alluvium (MC-MW-2, MC-MW-5, and DC-MW-1). Laboratory pH measurements for all four samples were about 7 or above. One well (DC-MW-3) had field and lab pH values over 8 and 10, respectively for the 2003 and 2004 samples. This water was obtained from the Rex Chert west of Panel G.

One groundwater sample (DC-MW-1) had a nitrate value (25 mg/L) over the standard (10 mg/L). This was from a shallow (7.5-foot deep) well developed in alluvium west of Panel G.

The manganese standard (0.05 mg/L) was exceeded in four groundwater samples from the Rex Chert (MC-MW-2, MC-MW-4, and DC-MW-3), two samples from alluvium (DC-MW-1 and DC-MW-6), and three samples from the Meade Peak member (MC-MW-5, DC-MW-2, and DC-MAW-4). The manganese standard is a secondary one intended to reduce discoloration of materials that come in contact with the water.

The dissolved selenium concentration (0.507 mg/L) in the 2003 sample from the Meade Peak member in MC-MW-5 exceeded the selenium standard (0.05 mg/L) by an order of magnitude. The selenium concentration in this well dropped to half the groundwater standard in June 2004 but then increased to 0.325 mg/L in October 2004. Other monitoring well samples collected from the Meade Peak (DC-MW-2 and DC-MW-4) had dissolved selenium values that were below the groundwater standard.

Well DC-MW-5, completed in the upper Wells formation at Panel G, also had selenium concentrations that were anomalous. The dissolved selenium concentration was 0.0143 mg/L in 2003, dropping to 0.0105 mg/L in June 2004 and 0.0079 mg/L in October 2004. These concentrations are below the groundwater standard of 0.05 mg/L, but above the surface water standard of 0.005 mg/L. The significant drop in manganese and iron concentrations between 2003 and 2004 in the samples from this well, combined with the extreme depth (>300 feet) and low pumping rate (1.5 gpm), indicate that this well was not adequately developed to obtain representative groundwater samples, and the selenium concentrations are likely not indicative of baseline conditions.

Concentrations of several metals are elevated for the total fraction (e.g., aluminum, cadmium, chromium, iron, and manganese). Dissolved metal concentrations, however, are lower and show the effect of insufficient development of this well on measured water chemistry.

Graphical plots (Piper and Stiff diagrams) of common ions for the surface water and groundwater samples are included in **Appendix 3A, Figures H-1 – H-9**. The Piper diagrams titled “Median Groundwater Quality” and “Median Spring Water Quality” (**Appendix 3A, Figures H-3 and H-6**) graphically show that ion concentrations are generally similar for all groundwater samples, and the water samples are of the calcium-magnesium bicarbonate type. Stiff diagrams graphically show the concentrations of the major cations and anions in a way that allows comparison of the water chemistries of the different samples. The Stiff diagrams for the median water quality for springs from the Wells formation (**Appendix 3A, Figure H-7**) show the close chemical similarity of these samples, consistent with them all discharging from the same aquifer.

The higher sodium and chloride concentrations in SP-Books (Books Spring) suggest the water in this spring discharge has contacted saline rocks in the Pruess formation, which is known to contain bedded salt deposits in the area. The Pruess formation is present to the east of the Meade Thrust Fault in this area, suggesting the water discharging from this spring has flowed along the fault zone and contacted salt bearing rock.

The major ion values of the water in the two Wells formation monitoring wells (DC-MW-5 and MC-MW-1) on **Figure H-4, Appendix 3A**, are similar to the Wells formation springs shown on **Figure H-7**, again demonstrating a common aquifer for these samples. Note that the concentration scales for **Figure H-4** are different than **Figure H-7**, which is the reason the shapes are different between these two figures even though the chemistries are similar. The stiff diagrams for the other monitoring wells on **Figures H-4 and H-5, Appendix 3A,** demonstrate different water chemistry than the samples from the Wells formation aquifer and show highly variable chemistries when compared to each other.

The stiff diagrams for the Rex Chert monitoring wells (**Figure H-5, Appendix 3A**) typically show low concentrations of all major ions. This pattern is similar to the spring waters shown on **Figure H-9, Appendix 3A,** that discharge on the Rex Chert outcrop (SP-UTNFDC-400, SP-DC-350, SP-UTDC-700, SP-WC-400).

The chemistries shown in **Figures H-5, H-8 and H-9 (Appendix 3A)** for waters sampled from monitoring wells and springs contained in shales (DC-MW-2, SP-SFSC-100, SP-UTSFSC-100, SP-MC-300, SP-UTNFDC-600, SP-NFDC-700, and SP-UTDC-800) all have higher concentrations of calcium and bicarbonate than the samples from the Rex Chert.

Comparisons of water chemistry data for springs in the Study Area to applicable water standards are shown in **Appendix 3A, Summary of Surface Water Data.**

The field pH of the springs was typically in a range of about 7 to 8.5 for the 2002 and 2003 samples. Lower pH values in the range from 6.2 to 6.5 were measured in the field in 2004 regardless of the spring location in the Study Area. Laboratory pHs for all samples in all years were in the range of 7.4 to 8.6. Questions related to field pH measurements in May 2004 resulted in them being declared invalid (Maxim 2004b). There are no obvious geographic or geologic trends in pH between the various springs in the Study Area.

Spring water in the Study Area is generally good quality with total dissolved solids (TDS) values ranging from 22 to 308 mg/L. The lowest TDS values were from SP-UTWC-300 (22 mg/L) and SP-UTSFDC-500 (54 mg/L), which discharge from colluvium west of Panel G. The higher TDS springs included Books Spring (264 mg/L), Hoopes Spring (276 mg/L), which discharge Wells/Brazer groundwater, and two springs located on the south end of Panel F and the north end of Panel G, respectively (SP-UTNFDC-600 = 308 mg/L and SP-UTDC-800 = 285 mg/L), which likely discharge groundwater from the Rex Chert or alluvium/colluvium.

Electrical conductivity is an indirect measurement of the salinity of water and the readings from the springs in the Study Area ranged from 26 to 629 umhos/cm. The lowest conductivity reading was for SP-UTWC-300 (26 umhos/cm). The highest conductivity value for spring water was obtained from SP-CC-500, the small saline spring near the narrows along Crow Creek downstream of Deer Creek (629 umhos/cm). The other high values were from SP-UTNFDC-600 (573 umhos/cm), Books Spring, (498 umhos/cm) SP-UTNFDC-540 (498 umhos/cm) and SP-UTDC-800 (488 umhos/cm).

Springs in the Study Area typically had dissolved cadmium concentrations that were below the surface water standard of 0.001 mg/L (dissolved basis, hardness adjusted). There was one dissolved cadmium concentration (0.0019 mg/L) that exceeded the standard at SP-UTNFDC-540. This spring is located in an area downhill of Meade Peak Shale outcrop.

The mercury surface water standard (0.000012 mg/L total basis) was exceeded in a few springs in the Study Area as shown in **Table 3.3-7**. All of these springs discharge from the Rex Chert or Meade Peak members of the Phosphoria formation. These were all total metals analyses, and the dissolved metals analyses for all these springs were below the surface water standard, indicating the groundwater mercury concentration prior to discharge at these springs was below the standard.

TABLE 3.3-7 SPRINGS EXCEEDING THE MERCURY SURFACE WATER STANDARD

SPRING	DATE	CONCENTRATION (MG/L)
SP-MC-300	8/25/04	0.00013
SP-UTDC-700	8/26/04	0.00027
SP-UTNFDC-400	5/20/03	0.0002
SP-UTSFDC-500	5/22/02	0.0003D, 0.0004T
SP-UTWC-300	5/23/02	0.0003D, 0.0004T
SP-WC-400	8/25/04	0.0001T

The selenium concentrations in a number of springs exceeded the surface water standard of 0.005 mg/L (total basis) (**Table 3.3-8**). All of these springs except SP-UTSC-850 discharge water from the Rex Chert or Meade Peak members of the Phosphoria formation. SP-UTSC-850 is a small spring located approximately along the West Sage Valley Branch thrust fault and could potentially be discharging groundwater from the Wells/Brazer aquifer. The reported selenium values for 5/16/04 are anomalous because later sampling (9/28/04) indicated a total selenium concentration of 0.00073 mg/L.

TABLE 3.3-8 SPRINGS EXCEEDING THE SELENIUM SURFACE WATER STANDARD

SPRING	DATE	CONCENTRATION (MG/L)
SP-DC-350	8/08/02	0.006 D & T
SP-UTDC-700	5/19/03	0.01 D*
SP-UTDC-700	10/28/03	0.0068 T
SP-UTDC-700	5/17/04	0.0073 D, 0.0075 T
SP-UTDC-800	5/19/03	0.015 D*
SP-UTDC-800	5/17/04	0.0065 D, 0.0069 T
SP-UTNFDC-540	10/28/03	0.0054 D & T
SP-UTNFDC-540	5/17/04	0.0105 D, 0.0104 T
SP-UTNFDC-600	10/29/03	0.0122 D*
SP-WC-400	8/08/02	0.006 D & T
SP-UTSC-850	5/18/04	0.008 D, 0.0084 T

*There was no total metals sample for this date or quality assurance requires use of dissolved data.

The only other metal that exceeded surface water standards in the springs water quality monitoring was zinc with a standard of 0.105 mg/L. The standard was exceeded in the samples from SP-UTDC-700 (0.225 mg/L) and SP-UTSFDC-500 (0.21 mg/L). Both these springs are located in the Phosphoria formation outcrop area.

In general the groundwater discharges to the surface at springs in the Study Area indicate good quality groundwater with the exception of certain springs that discharge within the outcrop area of the Phosphoria formation where groundwater flow can contact mineralized rock units. These springs are not hydrologically connected to the regional Wells/Brazer aquifer. Spring discharges from the regional Wells/Brazer aquifer indicate good water quality meeting all surface and groundwater quality standards.

3.3.8 Environmental Isotopes

Analyses were conducted of isotopes (deuterium, oxygen-18, tritium, carbon-14) in selected water samples from the Study Area (Mayo 2004). The stable isotopes (deuterium and oxygen-18) were used to discriminate between different waters and to interpret their origins. All of the springs that appear to discharge from the Wells formation or Brazer Limestone (Hoopes, Wells Canyon, Books, South Fork Sage, Lower Deer Creek, Lower Clear Creek, and Stewart Ranch) all had similar, depleted stable isotopic characteristics indicating they belong to a common aquifer. The more negative values of the stable isotopes for these samples indicate the water precipitated in relatively low temperature conditions, consistent with precipitation occurring at high elevations and as snow, or during colder climatic conditions (old water).

The sample from the deep, Wells formation monitoring well upgradient (west) of Panel G, DC-MW-5, had the most depleted stable isotope ratios, indicating it formed at the coldest temperatures of any of the samples. This is consistent with the fact that only high elevation recharge areas are upgradient of this sample site. On the other hand, the sample from the shallower monitoring well in the mouth of South Fork Sage Creek Canyon, MC-MW-1, had a rather positive stable isotope value, indicating it is in the flow path of recharge from surface water flow in the adjacent South Fork Sage Creek (Mayo 2004).

The stable isotope results for the groundwater samples are consistent with water that was recharged at higher elevations and then flowed eastward to lower elevation discharge locations. The more negative isotope values are also consistent with mixed shallow and deeper origin groundwaters along the Meade Thrust Fault where the deeper waters would be older and have more negative isotopic values.

Stable isotope characteristics for surface water samples obtained in the Study Area during summer 2003 tended to be similar to each other and were more positive in value than the groundwater samples, indicating the water precipitated at warmer temperatures (lower elevations) and possibly was affected by evaporation.

Stable isotope values for Crow Creek samples in the Study Area taken during summer and winter indicated that the winter base flow of the creek upstream from the area of the confluence with Deer Creek was supported by the same aquifer as the other Wells formation/Brazer Limestone springs. This is consistent with water balance studies conducted along Crow Creek during summer 2003 and winter 2004, which indicated that groundwater is discharged into the Crow Creek channel from somewhere below the mouth of Lamb Canyon to just downstream of Deer Creek Canyon (Maxim 2004c).

The radioisotopes (carbon-14 and tritium) were utilized to evaluate mean residence times (age) of the groundwater in the aquifers. Carbon-14 provides information regarding the number of years that have elapsed since the groundwater became isolated from soil-zone gases and near-surface waters. Tritium is a qualitative tool that indicates if groundwater was recharged since about 1954 when man-made tritium was released to the atmosphere through thermonuclear testing. Groundwater ages determined from carbon-14 and tritium were listed as modern, mixed old/modern, or old, depending on whether the samples contained anthropogenic carbon-14 and tritium.

The elevated tritium content of all samples, typically greater than 4 tritium units, indicated that all samples from the Wells formation and Brazer Limestone contained appreciable modern recharge. Most samples also contained carbon-14 concentrations greater than 50 percent modern carbon, indicating anthropogenic (human-induced) carbon associated with atmospheric nuclear weapons testing. Hoopes and Books springs had the lowest carbon-14 contents which, when combined with their lower tritium contents, indicate the flows discharging from these springs are mixtures of old and younger waters with mean residence times of 200 and 300 years, respectively. This is consistent with the mixed-age that was determined for Hoopes Spring water in 2000 (JBR 2001b) and in 1980 (Muller and Mayo 1983).

The modern tritium and radiocarbon ages determined for MC-MW-1 indicated that this well is located in recharge flow paths for modern surface waters in the adjacent South Fork Sage Creek.

Unlike Hoopes Spring and Books Spring, South Fork Sage Creek Spring and Stewart Spring both have appreciable carbon-14 contents indicating they have more modern mean residence times than either Hoopes or Books springs.

The mixed-age mean residence times for samples from Books and Hoopes Spring indicate flows from these sources are likely mixtures of relatively young groundwater in the upper Wells formation and Brazer Limestone aquifer, with relatively old groundwater rising along the Meade Thrust Fault. This is consistent with the theory proposed by previous workers that the trace of the thrust fault acts as a barrier to flow perpendicular to it but also as a zone of preferential flow in the damage zone parallel to the fault trace (Mayo et al. 1985, JBR 2001b).

3.3.9 Groundwater – Surface Water Interconnection

Groundwater in the Dinwoody and Thaynes formations supports springs and seeps located in the map area for these units. Perennial and seasonal seeps, springs and streams in the Study Area are supported by Dinwoody groundwater discharges in the following watersheds: Diamond Creek, Upper Deer Creek (above SW-DC-300), Upper South Fork Deer Creek (above SW-SFDC-200), North Fork Deer Creek (above SW-DC-500), Upper Manning Creek (SP-MC-300), Upper South Fork Sage Creek (SP-SFSC-100), and the upper portion of the unnamed tributary to South Fork Sage Creek that drains the northern portion of Panel F (SP-UTSFSC-100 and –200) (**Figure 3.3-3**).

Groundwater in the Rex Chert apparently does not support any of the major mapped streams in the Study Area, but does provide flow to isolated seeps and springs in the following areas: Upper Wells Canyon (SP-WC-400, SP-UTWC-300), Panel G (SP-UTDC-800, SP-UTDC-700, SP-UTSFDC-500 and -600, Panel F (SP-UTNFDC-400 and –600) (**Figure 3.3-3**).

All of the groundwater supporting the seeps, springs and streams in the Dinwoody and Rex Chert areas is stratigraphically isolated above the Meade Peak member and is not connected to the groundwater in the Wells formation and Brazer Limestone underlying the Meade Peak.

Groundwater contained in the Wells formation and Brazer Limestone supports the following springs and streams located along the eastern slope of the Webster Range: Hoopes Spring (SP-Hoopes), South Fork Sage Creek Spring (SP-SFSC-750), Unnamed spring south of SF Sage Creek (SP-UTSC-850), Lower Deer Creek (above SW-DC-800), Books Spring (SP-Books), Wells Canyon (SP-WC-750), Stewart Ranch (SP-ST-100, -200, and –500), Crow Creek (above SW-CC-500), and Clear Creek (SW-CL-800) (**Figure 3.3-3**). All of the discharges described above that apparently flow from the Wells formation or Brazer Limestone combine for a total flow in the range of 15 to 20 cfs, which provide perennial base flow to Sage Creek, Crow Creek, and certain tributaries to these creeks including Lower South Fork Sage Creek, Lower Deer Creek, and lower Clear Creek.

Groundwater in the Rex Chert member and Dinwoody formation does not recharge the aquifer in the Wells formation to a significant degree. The exception to this is where perennial streams flowing across the Dinwoody are supported by Dinwoody groundwater, and these stream flows are lost to the Wells formation outcrop where the channels cross the outcrop.

Groundwater from the Wells formation and Brazer Limestone does not flow up through the Meade Peak member, so it does not connect with seeps, springs and streams within the outcrop areas of the Rex Chert member or Dinwoody formation.

Based on the above, it is apparent that there are two separate groundwater systems in the Study Area: 1) the Rex Chert and Dinwoody groundwater system located stratigraphically above the Meade Peak member and 2) the Wells formation and Brazer Limestone groundwater system below the Meade Peak.

3.3.10 Beneficial Use of Groundwater

A listing of water rights associated with both surface water and springs (considered a groundwater right) in the Study Area obtained from IDWR (2004) is presented in **Appendix 3A, Summary of Water Rights Points of Diversion**. Also included in the appendix is a map showing locations of water rights (points of diversion) in the Study Area. According to this information, springs closest to Panels F and G that have water rights coincide with:

> SP-UTSFSC-100 and -200 along the west side of Panel F in a tributary to South Fork Sage Creek (No. 4054, USFS, stock water);
>
> SP-MC-300 on the west side of Panel F in upper Manning Creek (No. 4053, USFS, stock water); and,
>
> SP-WC-400 on the southwest side of Panel G in upper Wells Canyon (No. 4056 and 10505, USFS, stock water).

In addition to these springs closest to the Panels F and G, the following spring discharges in the Study Area also have water rights: Books Spring (SP-Books; No. 4069, Nate, irrigation-stock water); Stewart Springs (SP-ST-100 and -200; No. 2020 and 4010, Alleman and Stewart, domestic-irrigation-stock water); South Fork Sage Creek Springs (SP-SFSC-750; No. 10034, Hoopes, stock water); and Hoopes Spring (SP-Hoopes; No. 4081 and 10033, Peterson and Hoopes, domestic-irrigation-stock water). There are also springs with water rights that occur within or very near the proposed haul/access road corridors throughout the Study Area. The majority of these springs have been included in the baseline studies for this EIS and are shown on **Figure 3.3-3**.

There is one listed groundwater right for the Study Area: No. 10024; owner – Reide; domestic use. This matches the "SP-Reide" monitoring site shown on **Figure 3.3-3**, which is a spring that has been developed into a shallow well.

3.4 Soils

Regional Setting

The Project Area is located in the middle Rocky Mountain Physiographic Province of southeastern Idaho. Much of the province is made up of interior basins. Mountains rise steeply from the semiarid sagebrush-covered plains or agricultural valleys. The mountains are generally well covered with vegetation, and the higher elevations support conifer forests on the north and east facing slopes (USDA 1990).

Panels F and G are located in the Webster and Preuss Ranges, and the average annual runoff in these ranges is estimated at 1.07 acre-feet of water per acre of land (USDA 1990). This rate of runoff is more than twice the average runoff of the Blackfoot River watershed, slightly higher than the average for the Salt River, and more than seven times the average annual runoff of the Bear River at Soda Springs, Idaho. Runoff rate statistics indicate that this area is in an important water source area for all three drainages (USDA 1990).

The annual water losses through evaporation exceed the annual water gains from precipitation at lower elevations and in the western portion of the Forest (USDA 1990). Vegetation distribution is controlled mostly by altitude, latitude, direction of prevailing winds, and slope exposure.

Existing soils in the Study Area are largely undisturbed. Past mineral exploration and timber harvesting have disturbed parts of the area. All these areas have been reclaimed and the soil stabilized with vegetation. Forest Routes open to motorized access in the area present an ongoing ground disturbance. Soils in the area can also be affected by grazing and recreational activities (USFS 2003b).

3.4.1 Soil Survey

The Baseline Technical Report for Soil Resources (Maxim 2004f) is a 2nd Order soil inventory conducted from June through August 2003 and is the main reference for determining onsite soil characteristics. Procedures and interpretations were adapted primarily from the *Soil Survey Manual* (USDA 1993), *National Soil Survey Handbook* (USDA 2003b), and *Keys to Soil Taxonomy* (USDA 2003c). Soil resources outside the 2nd Order soil inventory area have been evaluated at the 3rd Order level using the *Soil Survey of the Caribou National Forest, Idaho (*USDA 1990) and the *Soil Survey of Star Valley Area, Wyoming-Idaho* (USDA 1976).

Twenty-two soil map units were identified and mapped, including seven consociations and 15 complexes (Maxim 2004f). Soil profile characteristics obtained in the field were utilized in coordination with laboratory analyses to determine suitable depths of salvage for each soil type. Field procedures and detailed data from the 2nd Order soil inventory are presented in the baseline technical report (Maxim 2004f).

A reconnaissance level field survey was conducted on natural soils within the portions of the proposed and alternative haul road and conveyor corridors, based on the existing 3rd Order *Soil Survey of the Caribou National Forest, Idaho* (USDA 1990). The field survey review included evaluation of exposed soil profiles, depths, coarse fragment content, color, and vegetation-soil relationships, and concluded that soil resources within these proposed disturbance areas have been accurately characterized in the existing survey (Maxim 2004f).

3.4.2 Mapped Soil Unit Characteristics

Soil map units determined in the baseline technical report (Maxim 2004f) for proposed disturbance in Panel F and Panel G are shown on **Figure 3.4-1** and **Figure 3.4-2**, respectively. Soil resources for the proposed haul road, conveyor corridors, and alternatives are shown at a 3rd Order level on **Figure 3.4-3**.

Profile descriptions, laboratory analysis results, and complete soil map unit data for each sample site are presented in the baseline report. **Table 3.4-1** provides a summary of the soil map units, identifying the classification, properties, and characteristics of the soils, and their total composition within the Project Area. Soils in the baseline Study Area are classified to the soil family level in accordance with *Keys to Soil Taxonomy* (USDA 2003c).

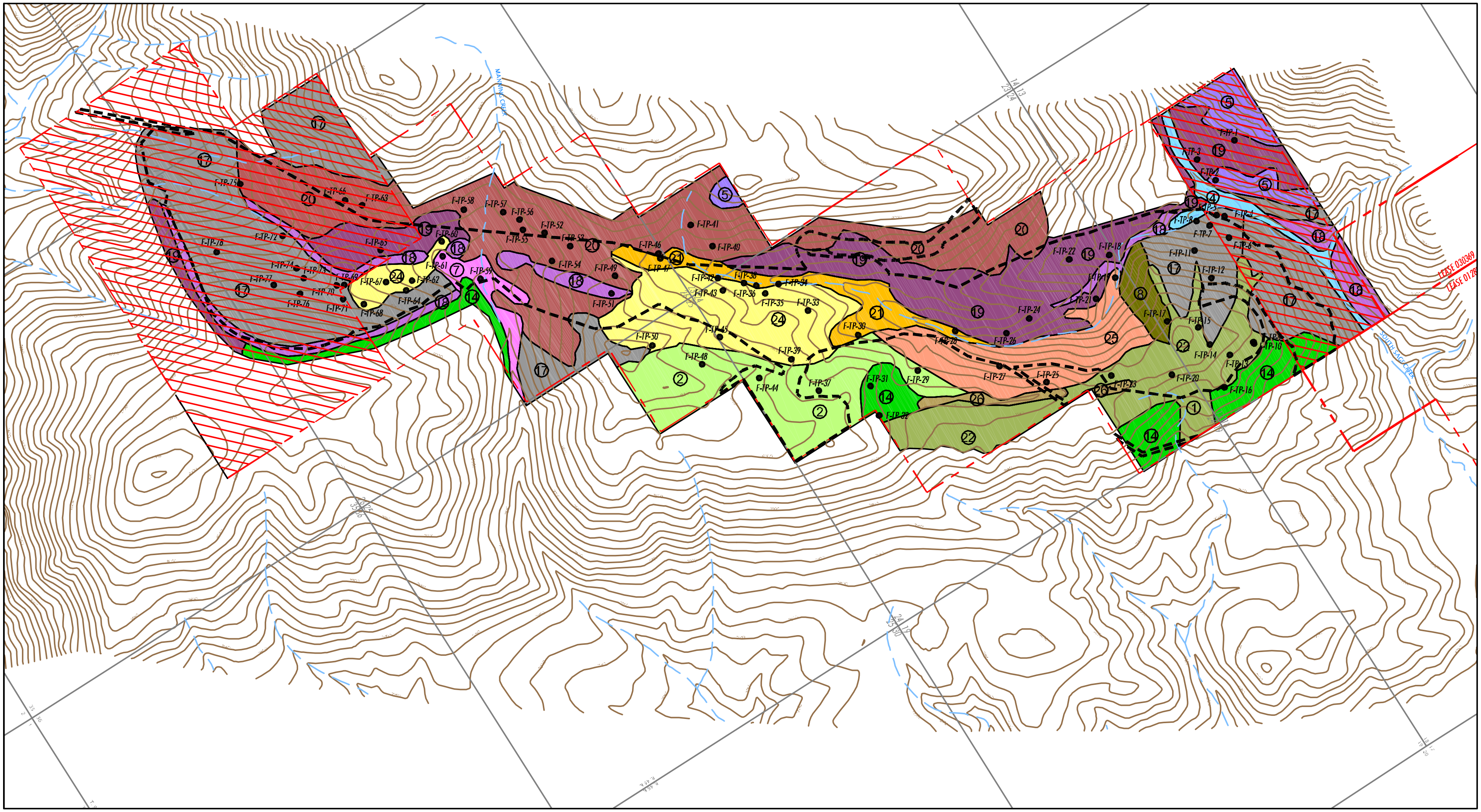
TABLE 3.4-1 SOIL MAP UNIT DESCRIPTIONS

MAP UNIT NUMBER[1]/ NAME	TAXONOMIC CLASSIFICATION	PERCENTAGE OF MAP UNIT	LANDSCAPE POSITION/ SLOPE	PARENT MATERIAL	TEXTURE	APPROXIMATE SOIL DEPTH (INCHES)	ERODIBILITY WIND WATER	PERCENT COARSE FRAGMENTS	WATER HOLDING CAPACITY
1/ Ericson-Rock River Complex	Fine-loamy, mixed, superactive Xeric Haplocryalf	50	Valley bottom/ 15-22%	Alluvium and colluvium	Loam	28	Moderate Moderate	20	Moderate
	Rock River	35			Rock outcrop	0	Low Moderate	+90	Low
2/ Ketchum Loam	Loamy-skeletal, mixed, superactive Xeric Eutrocryept	80	Ridgetop and canyon slopes/ 7–40 %	Limestone	Loam	24	Low Moderate	40	Low-Moderate
3/ Cloud Peak-Ketchum Complex	Loamy-skeletal, mixed, superactive Inceptic Haplocryalf	40	Steep slopes/ 45-55%	Shale and chert	Loam	24	Low Moderate	40	Very High
	Loamy-skeletal, mixed, Superactive Xeric Eutrocryept	40							
4/ Dranyon-Fluvents/Aquolls Complex	Fine-loamy, mixed, superactive Pachic Argicryoll	50	Drainage bottoms and side slopes/ 5-15%	Alluvium	Loam	30	Moderate Moderate	15	Moderate-High
		30							
5/ Blaine-Farlow Complex	Loamy-skeletal, mixed, superactive Xeric Argicryoll	45	Ridgetop and steep side slopes/ 15-50%	Chert, limestone, siltstone	Loam	24	Moderate Moderate	35-60	Moderate-High
	Loamy-skeletal, mixed, superactive Xeric Haplocryoll	40				18			
6/ Ericson-Blaine Complex	Fine-loamy, mixed, superactive Xeric Haplocryalf	50	Hilltops and side slopes/ 15-40%	Old limestone, alluvium and colluvium	Sandy loam	24	Moderate Moderate	40	Moderate-High
	Loamy-skeletal, mixed, superactive Xeric Argicryoll	35	Hilltops and side slopes/ 15-50%					20	
7/ Dranyon-Parkay Complex	Fine-loamy, mixed, superactive Pachic Argicryoll	40	Drainage bottoms and side slopes/ 5-30%	Alluvium and colluvium	Silt loam	30	Moderate High	30	High-Very High
	Loamy-skeletal, mixed, superactive Pachic Argicryoll	40						35	

MAP UNIT NUMBER[1]/ NAME	TAXONOMIC CLASSIFICATION	PERCENTAGE OF MAP UNIT	LANDSCAPE POSITION/ SLOPE	PARENT MATERIAL	TEXTURE	APPROXIMATE SOIL DEPTH (INCHES)	ERODIBILITY WIND WATER	PERCENT COARSE FRAGMENTS	WATER HOLDING CAPACITY
8/ Farlow-Ketchum Complex	Loamy-skeletal, mixed, superactive Xeric Haplocryoll	50	Ridgetop and steep side slopes/ 20-50%	Cherty shale and Rex Chert, Mixed colluvium	Sandy loam	18	Low Moderate	40	Low
	Loamy-skeletal, mixed, superactive Xeric Eutrocryept	35						50	
9/ Swede-Blaine Complex	Fine-loamy, mixed, superactive Xeric Argicryoll	45	Gentle slopes and swales/ 10-15%	Alluvium and colluvium limestone derived	Loam	36	Moderate Moderate	35	Moderate
	Loamy-skeletal, mixed, superactive Xeric Argicryoll	40						20	
10/ Ericson Loam	Fine-loamy, mixed, superactive Xeric Haplocryalf	80	Hilltops and side slopes/ 10-20%	Shale and sandstone	Loam	20	Moderate Moderate	20	High
13/ Blaine-Dranyon Complex	Loamy-skeletal, mixed, superactive Xeric Argicryoll	60	Steep south facing slopes and benches/ 10-20%	Shale and limestone derived colluvium	Silt loam	24	Moderate Moderate	40	Very High
	Fine-loamy, mixed, superactive Pachic Argicryoll	25				30		20	
14/ Blaine-Jughandle Complex	Loamy-skeletal, mixed, superactive Xeric Argicryoll	60	Ridgetops and steep slopes/ 35-45%	Limestone colluvium	Loam	24	Moderate Moderate	40	Moderate
	Coarse-loamy, mixed, superactive Xeric Eutrocryept	25				18		20	
16/ Cloud Peak Loam	Loamy-skeletal, mixed, superactive Inceptic Haplocryalf	70	Swales and gentle sideslopes/10-15%	Limestone residuum and colluvium	Loam	24	Moderate Moderate	40	Moderate
17/ Farlow-Blaine Complex	Loamy-skeletal, mixed, superactive Xeric Haplocryoll	65	Steep canyon sideslopes/ 40-55%	Limestone colluvium	Silt Loam	18	Moderate Moderate	45	Moderate-High
	Loamy-skeletal, mixed, superactive Xeric Argicryoll	20				24		40	
18/ Starman-Rock Outcrop Complex	Loamy-skeletal, mixed, superactive Lithic Cryorthent	40	Ridgetops and steep slopes/ 20-75%	Chert and limestone residuum	Loam	6	Low Moderate	50+	Very Low
	Rock Outcrop	40			Rock Outcrop	0		90+	

MAP UNIT NUMBER[1]/ NAME	TAXONOMIC CLASSIFICATION	PERCENTAGE OF MAP UNIT	LANDSCAPE POSITION/ SLOPE	PARENT MATERIAL	TEXTURE	APPROXIMATE SOIL DEPTH (INCHES)	ERODIBILITY WIND WATER	PERCENT COARSE FRAGMENTS	WATER HOLDING CAPACITY
19/ Judkins-Blaine Complex	Loamy-skeletal, mixed, superactive Xerollic Haplocryalf	45	Mountain sideslopes, north aspect/ 25-50%	Cherty shale and Rex Chert, Mixed colluvium	Gravelly loam	24	Moderate Moderate	50	Moderate
	Loamy-skeletal, mixed, superactive Xeric Argicryoll	40							
20/ Karlan-Dranyon Complex	Fine-loamy, mixed, superactive Pachic Haplocryoll	50	Mountain sideslopes, south and west aspects/ 35-50%	Siltstone and shale	Silt loam	30	Low Moderate	10	Very High
	Fine-loamy, mixed, superactive Pachic Argicryoll	30							
21/ Dranyon-Ericson Complex	Fine-loamy, mixed, superactive Pachic Argicryoll	60	Valley bottom and swale/ 5-10%	Alluvium	Sandy loam	24	Moderate Moderate	25	High-Very High
	Fine-loamy, mixed, superactive Xeric Haplocryalf	20							
22/ Judkins Silt Loams	Loamy-skeletal, mixed, superactive Xerollic Haplocryalf	75	Ridgetop and sideslopes/ 15-30%	Dolomite, limestone, shale	Silt loam	24	Moderate Moderate	70	Moderate
24/ Cloud Peak Silt Loams	Loamy-skeletal, mixed, superactive Inceptic Haplocryalf	75	Sideslopes and ridgecrests/ 20-30%	Shale and chert colluvium and residuum	Silt loam	24	Moderate Moderate	50	Moderate
25/ Jughandle Silt Loams	Coarse-loamy, mixed, superactive Xeric Eutrocryept	75	Steep sideslopes/ 40-50%	Sandstone, limestone	Silt loam	24	Moderate Moderate	15	Moderate
26/ Starley Silt Loams	Loamy-skeletal, mixed, superactive Lithic Haplocryoll	90	Ridge crest/ 10-50%	Limestone, dolomite	Silt loam	6	Low Moderate	50	Very Low

Source: Maxim 2004f
[1] Map units are identified on **Figures 3.4-1** and **3.4-2**.



Modified from Maxim Technologies, Inc., Baseline Technical Report–Soil Resources, Figure 2 – Soil Resource Map–Panel F, June 2004

J.R. Simplot Lease Modification
J.R. Simplot Lease Boundary
Proposed Disturbance Limit
F-TP-1 ● Soil Sample Location

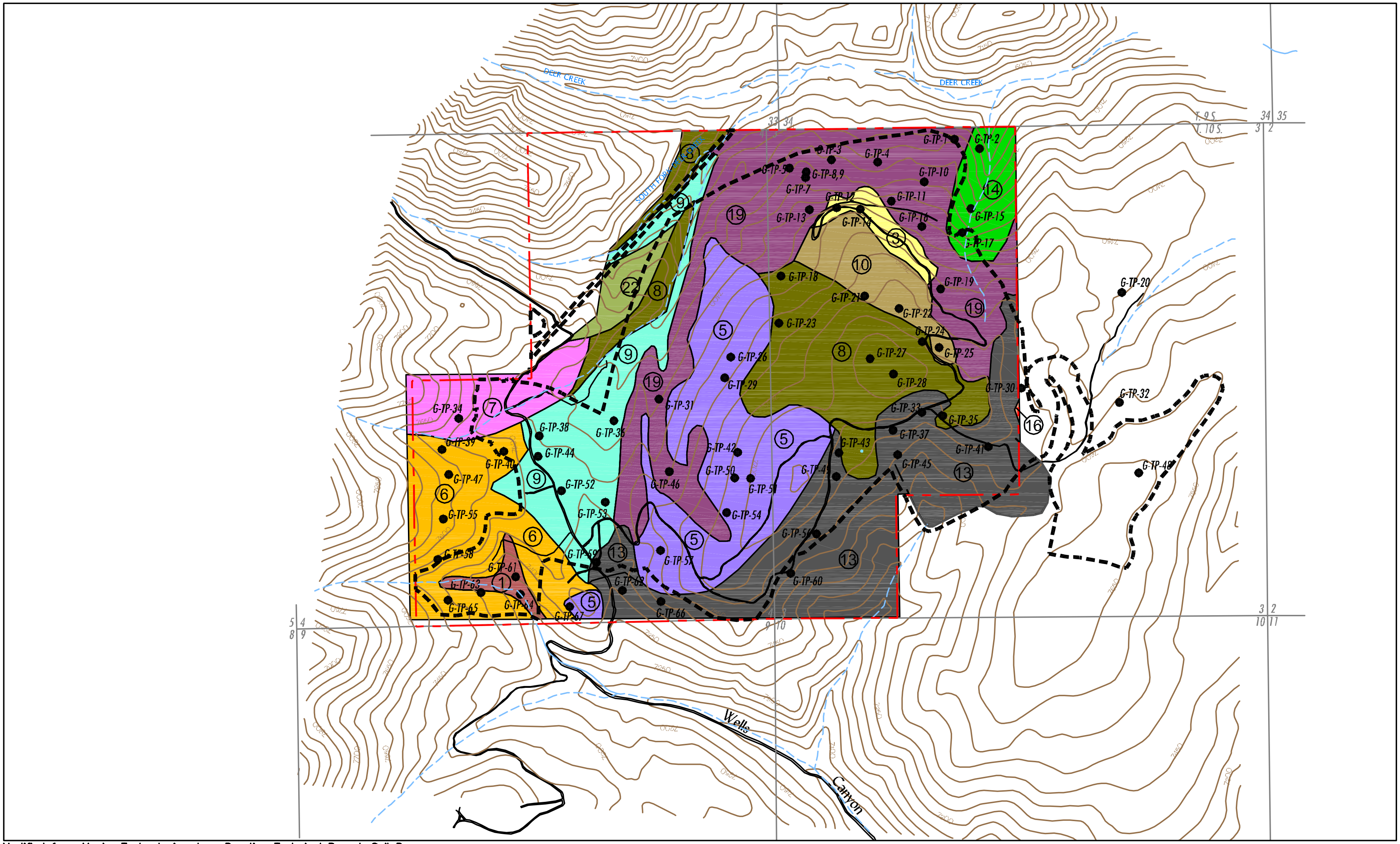
N

Scale 1:24,000
0 Feet 2000

SOIL MAPPING UNITS

2/Ketchum Loam
4/Dranyon-Fluvents/Aquolls
5/Blaine-Farlow Complex
7/Dranyon-Parkay Complex
8/Farlow-Ketchum Complex
14/Blaine-Jughandle Complex
17/Farlow-Blaine Complex
18/Starman-Rock Outcrop Complex
19/Blaine-Judkins Complex
20/Karlan-Dranyon Complex
21/Dranyon-Ericson Complex
22/Judkins Silt Loam
24/Cloud Peak Silt Loam
25/Jughandle Silt Loam
26/Starley Silt Loam

Figure 3.4-1
Soil Mapping Units of Panel F
Smoky Canyon Mine Panels F and G



Modified from Maxim Technologies, Inc., Baseline Technical Report–Soil Resources, Figure 3 – Soil Resource Map–Panel G, June 2004

Scale 1:18,000

0 Feet 1500

J.R. Simplot Lease Boundary

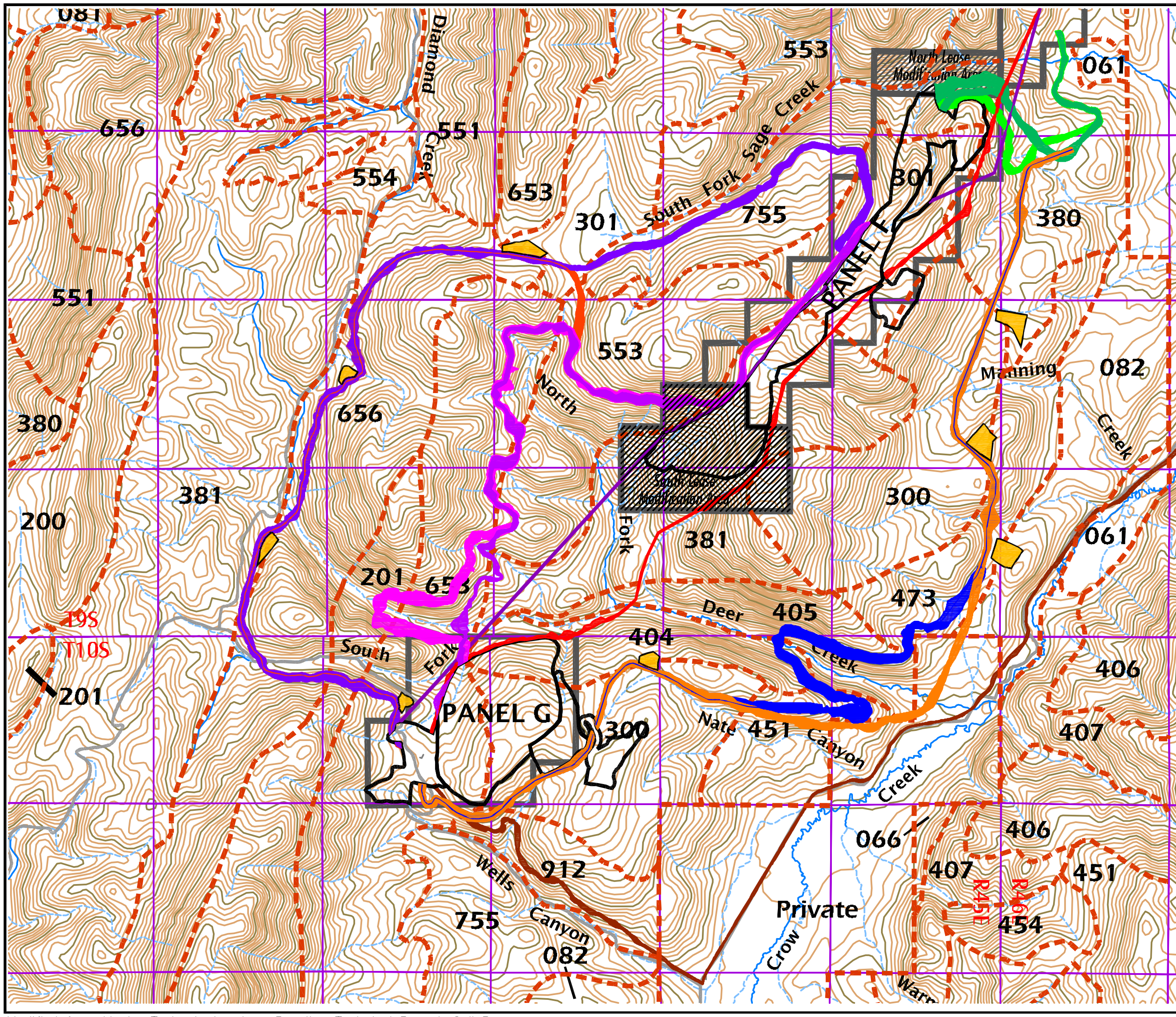
Proposed Disturbance Limit

G-TP-1 ● Soil Sample Location

SOIL MAPPING UNITS

1/Ericson-Rock River Complex
3/Cloud Peak-Ketchum Complex
5/Blaine-Farlow Complex
6/Blaine-Ericson Complex
7/Dranyon-Parkey Complex
8/Farlow-Ketchum Complex
9/Blaine-Swede Complex
10/Erickson Loam
13/Blaine-Dranyon Complex
14/Blaine-Jughandle Complex
16/Cloud Peak
19/Blaine-Judkins Complex
22/Judkins Silt Loam

Figure 3.4-2
Soil Mapping Units of Panel G
Smoky Canyon Mine Panels F and G



LANDTYPE	DESCRIPTION
061	Venable-Argic Cryaquolls-Coski Families complex
066	Red Spur-Povey-Dranyon Families assoc.
081	Red Spur-Harkness Families assoc.
082	Rooset-Beaverdam-Toone Families complex
200	Blaine-Nisual-Swede Families complex
201	Farlow-Judkins-Starley Families assoc.
300	Ericson-Cloud Peak-Ketchum Families complex
301	Blaine-Dranyon Families assoc.
380	Povey-Alpon-Ketchum Families complex
381	Parkay-Judkins-Farlow Families complex
404	Judkins-Farlow-Swede Families complex
405	Starley-Povey-Farlow Families assoc.
406	Blaine-Judkins-Richvale Families complex
407	Devoe-Blaine-Farlow Families complex
451	Beaverdam-Swede-Dranyon Families complex
454	Toponce-Swede-Dranyon Families complex
473	Dranyon-Judkins-Povey Families complex
551	Judkins-Cloud Peak-Farlow Families complex
553	Blaine-Nisula Families-Calcic Cryoborolls complex
554	Ketchum-Swede Families association
653	Judkins-Nisula-Farlow Families complex
656	Cloud Peak-Jughandle-Swede Families complex
755	Ketchum-Nisula-Farlow Families assoc.
912	Calcic Cryoborolls-Starley-Judkins Families complex

Modified from Maxim Technologies, Inc., Baseline Technical Report–Soil Resources, Figure 4 – Soil Resource Map, June 2004

N

Scale 1:63,360

0 Mile 1

J.R. Simplot Company Lease Area

J.R. Simplot Company Lease Modification

Existing Road

405 404 Caribou National Forest Landtype Numbers and Delineations

Note: Background soil data from Caribou National Forest soil data set (USDA, 1990).

Figure 3.4-3
Order 3 General Soils of Transportation Areas
Smoky Canyon Mine Panels F and G

The majority of soils in the Project Area are classified as moderately deep to very deep, well drained to somewhat excessively well drained, loamy-skeletal or fine-loamy, mixed, superactive, Xeric Argicryolls, Haplocryolls and Haplocryalfs. Soil textures are generally loamy with a high percentage of coarse fragments. Slope steepness ranges from five to 75 percent and varies depending on the profile location. Laboratory analytical data indicate that soils pH values range from 5.1 to 8.2 (strongly acid to moderately alkaline), but the majority of soils are neutral to moderately acid. Soil organic matter content ranges from 0.48 to 10.5 percent, with an average of between one and three percent organic matter. Soil depths in the Project Area ranged from rock outcrop areas with no measurable soil to profiles greater than five feet thick.

The map units are mapped as land types and cover a wide range of topography from valley and drainage bottoms to canyon slopes, sideslopes, and ridgetops. Soils found in the Project Area are classified taxonomically as Argicryolls, Cryorthents, Eutrocryepts, Haplocryolls, and Haplocryalfs.

Parent materials for soils within the Project Area include sandstone, shale, siltstone, limestone, chert, colluvium, alluvium and residuum (Maxim 2004f). Soil in drainages and swales developed primarily from alluvial materials, and colluvium is the parent material for development of soil on most slopes.

Depth to water table was determined to be greater than six feet for all map units in the Project Area (Maxim 2004f).

Seven soil consociations and 15 soil complexes were identified as map units within the Project Area. Rock outcrops are not suitable for recovery and use as growth medium. Maxim (2004f) provides further details regarding the specific soil characteristics for each of the individual sample sites. The soil complexes and consociations identified within the Project Area are shown on **Figures 3.4-1** and **3.4-2**.

Soil inclusions that exist to a limited extent within the composition of the soil complexes and consociations identified in the 2nd Order inventory area, but are not a significant portion of the map unit, include the following soil types: Cluff, Mikesell, Moonlight, Nisula, Povey, Redfeather, Starley, Starman, and Thayne. Maxim (2004f) provides further details regarding soil characteristics for these inclusion soil types.

Soil map units described at the 3rd Order level that have been identified in the vicinity of the Study Area are shown on **Figure 3.4-3**. These mapping units are further described in the *Soil Survey of the Caribou National Forest, Idaho* (USDA 1990).

3.4.3 Topsoil/Growth Medium Suitability

Mountainous terrain does not favor optimal soil development. Soils on mountain slopes are susceptible to increased erosion rates that constantly remove the fine particles from the surface and deposit them on the surfaces of soils occupying the alluvial or valley slopes. Mountain soils also tend to have high concentrations of coarse fragments that are transported to the alluvial slopes during landslide events over time. Shallow, stony soils provide a minimal amount of quality topsoil/growth medium material for reclamation. The rate of soil formation is slow in any environmental condition and location, even beneath grassland vegetation. Rates of soil formation from consolidated parent material under grasslands have been calculated at 0.33 tons per acre per year or less (DeBano and Wood 1992).

The estimated average depth of topsoil currently existing in the Project Area is more than 22 inches, as described in the baseline report (Maxim 2004f). Steep slopes are the main limitation that would preclude salvage of topsoil resources in disturbance areas. An estimated 12 acres of soil resources would not be suitable for recovery as growth medium for reclamation due to limiting factors such as rock outcrop, excessive coarse fragments or slope. These areas of unrecoverable soil are scattered throughout the Project Area.

The suitable topsoil/growth medium depths determined for each soil type were based on the amount of salvageable unconsolidated material available in the surface soil or within the subsoil. The percentage of coarse fragments, organic matter, and selenium concentrations were additional, locally important limitations considered in determining topsoil/growth medium suitability. Criteria utilized by Maxim (2004f) to initially determine topsoil/growth medium suitability were developed and outlined by CNF resource specialists and are detailed in **Table 3.4-2**.

TABLE 3.4-2 CRITERIA USED TO DETERMINE TOPSOIL/GROWTH MEDIUM SUITABILITY

PROPERTY	TOPSOIL/GROWTH MEDIUM SUITABILITY				RESTRICTIVE FEATURE[1]
	GOOD	FAIR	POOR	UNSUITABLE	
Texture	textures finer than sands and coarser than sandy clay and silty clay, with less than 35% clay	loamy textures	sand textures and clayey textures with <60% clay	>60% clay content	excessive sands or clays
Organic Matter Content	>3%	<3% but greater than 1%[1]	0.5 to 1.0%[1]	<0.5%[1]	low fertility
Coarse Fragments (0-40 inches)	<15% by volume	15-25% by volume	25-35% by volume	>35%	equipment restrictions and low fertility
Depth to High Water Table	--	--	<1 foot to high water	perennial wetness	equipment restrictions
Soil Reaction – pH[2] (0-40 inches)	6.0 to 8.0	5.0 to 6.0 8.0 to 8.5	4.5 to 5.0 8.5 to 9.0	<4.5 or >9.0	excessive acidity or alkalinity
Slope Steepness	<8% slope	8 to 25% slope	25 to 40% slope	>40% slope	equipment restrictions

Source: Maxim 2004f
Notes:
1. As defined in the Soil Survey Manual (USDA 1993) and National Soil Survey Handbook (USDA 2003a).
2. pH in standard units.
< Less than
> Greater than

Based on field reviews of the soils mapped in the Project Area, the majority of soil family classifications were determined to be potentially suitable for topsoil or growth medium recovery. Samples of each soil horizon were collected and submitted for laboratory analysis to further determine the characteristics and limitations for each soil type. **Table 3.4-3** identifies the topsoil/growth medium suitability parameters and limitations for each soil family that comprise the 2nd Order map units found within the Project Area.

Table 3.4-4 identifies the extent of suitable and marginally suitable soils for topsoil/growth medium salvage found within mapped soil units covered by the 2nd Order soil inventory, including the total volume of useable topsoil/growth medium. The reclamation potential for soils recoverable within the Project Area is based on production and fertility parameters identified in **Table 3.4-2** such as soil texture, organic matter, slope steepness, coarse fragment content, and pH. Soils in the Project Area have pH values of 5.1 to 8.2 that fall within the suitability limit range (Maxim 2004f). Individual soil sample sites may not be representative of the surrounding soil in the major map unit. These minor inclusions represent a small percentage of the map unit and would be incorporated into the majority soil during salvage and reclamation. Excessive coarse fragment content and steep slopes are the two limitations that have the most potential to negatively influence fertility and production of reclaimed areas within the Project Area. Mixing of soil map units during salvage operations would dilute excessive coarse fragment content and selenium concentration in some soils, resulting in maximum recovery volumes.

Prime Farmland

Prime farmland is classified as available land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops (USDA 1993). Due to high elevations, there are no prime farmlands located within Caribou County. The growing season in areas of high elevation in this portion of southeastern Idaho often is less than 60 days and frost may occur anytime during the year at elevations above 6,500 feet (USDA 1990), which renders the soil unsuitable for classification as prime farmland.

TABLE 3.4-3 TOPSOIL/GROWTH MEDIUM SUITABILITY PARAMETERS FOR SOILS IN THE PROJECT AREA

SOIL FAMILY	PHYSICAL CONSIDERATIONS			ANALYTICAL CONSIDERATIONS[3]				TOPSOIL/ GROWTH MEDIUM SUITABILITY LIMITATION(S) [5]
	SOIL TEXTURE[1]	COARSE FRAGMENT CONTENT PERCENT [2]	SLOPE PERCENT	ORGANIC MATTER PERCENT[4]	REACTION (PH) [4]	TOTAL SELENIUM[4] (SE)	EXTRACTABLE SELENIUM[4] (SE) (MG/KG)	
Blaine	Silty clay loam/ Clay loam	35-60	10-70	2.59-10.2	5.9-6.0	Not Detected (ND)	0.09-0.15	Extractable Se greater than 0.10 mg/Kg[6] Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope
Cloud Peak	Sandy loam/ Silt loam/ Loam	40-50	15-60	0.48-3.5	5.0-7.6	ND	ND to 0.13	Extractable Se greater than 0.10 mg/Kg[7] Low organic matter content below 39 inches. Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope
Ericson	Loam/ Silt loam/ Clay loam	20-25	2-60	0.52-3.38	5.4-6.6	ND	ND to 0.26	Extractable Se greater than 0.10 mg/Kg[6] Equipment restrictions in areas with >40% slope
Farlow	Silt loam	35-60	0-70	1.22-6.71	5.5-7.1	ND	ND to 0.10	Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope
Judkins	Loam	50-70	2-65	0.88-10.5	6.3-7.3	ND to 6 mg/Kg	ND to 0.14	Extractable Se greater than 0.10 mg/Kg[6] Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope.
Jughandle	Silt loam/ Loam/ Sandy loam	15-20	30-50	0.47-6.09	5.1-6.6	ND	ND to 0.07	Low organic matter content below 17 inches. Equipment restrictions in areas with >40% slope
Jughandle (variant)	Silty clay loam	15-20	30-50	1.67-4.07	5.8-6.0	ND	0.11-0.12	Extractable Se greater than 0.10 mg/Kg[6] Equipment restrictions in areas with >40% slope.

SOIL FAMILY	PHYSICAL CONSIDERATIONS			ANALYTICAL CONSIDERATIONS[3]				TOPSOIL/ GROWTH MEDIUM SUITABILITY LIMITATION(S) [5]
	SOIL TEXTURE[1]	COARSE FRAGMENT CONTENT PERCENT [2]	SLOPE PERCENT	ORGANIC MATTER PERCENT[4]	REACTION (PH) [4]	TOTAL SELENIUM[4] (SE)	EXTRACTABLE SELENIUM[4] (SE) (MG/KG)	
Karlan	Loam/ Silt loam/ Silty clay loam	10-15	10-60	0.71-4.93	5.6-8.2	ND to 24 mg/Kg	0.03-0.14[7]	Total Se greater than 13 mg/Kg[6] and extractable Se greater than 0.10 mg/Kg[7] Equipment restrictions in areas with >40% slope.
Ketchum	Sandy loam/ Silt loam/ Loam/ Silty clay loam	40-50	10-70	0.33-5.26	5.3-7.4	ND to 8 mg/Kg	ND to 0.06	Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope
Moonlight	Loam	Not Applicable (NA)	15-35	0.69-3.88	5.7-6.0	ND	ND to 0.07	NA
Parkay	Silt loam	35	10-70	1.31-5.26	6.4-7.1	ND	0.07-0.10	Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope
Povey	Loam	NA	0-60	2.45-4.9	6.9-7.4	ND	ND to 0.08	Equipment restrictions in areas with >40% slope
Starley	Silt loam	50	10-70	NA	6.3-7.2	Not Analyzed	Not Analyzed	Equipment restrictions in areas with >40% slope. Equipment restrictions and low fertility in areas with high coarse fragment content.
Starman	Silt loam/ Loam	+50	15-70	0.88-7.02	5.8-6.0	ND	0.04	Equipment restrictions and low fertility in areas with high coarse fragment content. Equipment restrictions in areas with >40% slope
Swede	Silt loam/ Silty clay loam	20	5-65	0.78-8.48	5.5-6.3	ND	0.07-0.14	Extractable Se greater than 0.10 mg/Kg[7] Equipment restrictions in areas with >40% slope.

Source: Maxim 2004f

1. Majority soil texture(s) (by percent weight) occurring throughout the depth of the profile.
2. Range of estimated percent volume of coarse material through the top 40 inches of the profile. Coarse fragment content is dominated by gravels in most soils.
3. Production potential.
4. Range of values through soil profile. The pH values represent the top 40 inches of the soil profile.
5. Based, in part, on Guidelines for the Salvage of Topsoil and Shale used to Reclaim and Provide a Seed Bed for Phosphate Mine Reclamation (USDA 2003c), in addition to suitability parameters identified in **Table 3.4-2**.
6. At one sample site.
7. At more than one sample site.

ND = Not detected.

TABLE 3.4-4 SUITABLE AND MARGINALLY SUITABLE RECLAMATION SOILS IN THE PANEL F AND G PROJECT AREA

MAP UNIT[1]	SOIL FAMILY	SUITABLE TOPSOIL/GROWTH MEDIUM		MARGINALLY SUITABLE TOPSOIL/GROWTH MEDIUM		ACRES WITHIN PANELS F & G (INCLUDES PROPOSED LEASE MODIFICATIONS)	TOPSOIL/GROWTH MEDIUM VOLUME (BCY)
		SOIL DEPTH (INCHES)[2]	CONSTRAINTS	SOIL DEPTH (INCHES)[2] AND HORIZON DEPTHS	CONSTRAINTS		
1/ Ericson-Rock River Complex	Ericson	15	--	11 (15-26)	Selenium[4]	5.86*	12,309
	Rock River	0	Rock outcrop	0	Rock outcrop		
2/ Ketchum Loam	Ketchum	22	Slope[3]	44 (22-66+)	Excessive coarse fragment content	1.0	8,906
3/ Cloud Peak-Ketchum Complex	Cloud Peak	5	Excessive coarse fragment content or Slope[3]	58 (5-55+)	Excessive coarse fragment content or selenium[4]	8.87	75,129
	Ketchum						
4/ Dranyan-Fluvents/Aquolls Complex	Dranyon[5]	30	--	0	--	1.68	6,776
	Fluvents/ Aquolls						
5/ Blaine-Farlow Complex	Blaine	0	Excessive coarse fragment content or Slope[3]	21 (0-21+)	Excessive coarse fragment content or Slope[3]	85.56	241,564
	Farlow						
6/ Ericson-Blaine Complex	Ericson	0	Selenium[4]	24 (0-24)	Excessive coarse fragment content, selenium[4] or slope[3]	45.21	145,878
	Blaine	0	Excessive coarse fragment content				
7/ Dranyon-Parkay Complex	Dranyon[5]	16	--	13 (16-29)	Selenium[4]	17.42	67,731
	Parkay						
8/ Farlow-Ketchum Complex	Farlow	0	Excessive coarse fragment content or Slope[3]	18 (0-18)	Excessive coarse fragment content	84.3	204,006
	Ketchum						
9/ Swede-Blaine Complex	Swede	36	Excessive coarse fragment content	0	Excessive coarse fragment content	45.5	220,220
	Blaine						
10/ Erickson	Ericson	20	--	0	--	23.39	63,019
13/ Blaine-Dranyon Complex	Blaine	0	Excessive coarse fragment content	24 (0-24)	Excessive coarse fragment content	60.06	193,794
	Dranyon[5]						
14/ Blaine-Jughandle Complex	Blaine	0	Slope[3]	17 (0-17)	Excessive coarse fragment content and low organic matter below 17 inches	7.18	16,449
	Jughandle						

MAP UNIT[1]	SOIL FAMILY	SUITABLE TOPSOIL/GROWTH MEDIUM		MARGINALLY SUITABLE TOPSOIL/GROWTH MEDIUM		ACRES WITHIN PANELS F & G (INCLUDES PROPOSED LEASE MODIFICATIONS)	TOPSOIL/GROWTH MEDIUM VOLUME (BCY)
		SOIL DEPTH (INCHES)[2]	CONSTRAINTS	SOIL DEPTH (INCHES)[2] AND HORIZON DEPTHS	CONSTRAINTS		
16/ Cloud Peak	Cloud Peak	0	Excessive coarse fragment content	24 (0-24)	Excessive coarse fragment content	0.16	516
17/ Farlow-Blaine Complex	Farlow Blaine	0	Slope[3]	24 (0-24)	Excessive coarse fragment content	151.71	489,518
18/ Starman-Rock Outcrop Complex	Starman	0	Excessive coarse fragment content and Slope[3]	6 (0-6)	Excessive coarse fragment content	24.21*	23,435
	Rock outcrop	0	Rock outcrop	0	Rock outcrop		
19/ Judkins-Blaine Complex	Judkins Blaine	7	Excessive coarse fragment content or Slope[3]	17 (7-24+)	Excessive coarse fragment content or Selenium[4]	197.48	637,202
20/ Karlan-Dranyan Complex	Karlan Dranyon[5]	0	Selenium[4]	28 (0-28)	Selenium[4]	62.89	250,955
21/ Dranyon-Ericson Complex	Dranyon[5] Ericson	28	--	0	--	26.3	98,863
22/ Judkins Silt Loams	Judkins	22 (7-29)	Excessive coarse fragment content	7 (0-7)	Excessive coarse fragment content and Selenium[4]	42.37	164,740
24/ Cloud Peak Silt Loams	Cloud Peak	0	Excessive coarse fragment content	24	Excessive coarse fragment content	65.95	212,799
25/ Jughandle Silt Loam	Jughandle	0	Slope[3]	17 (0-17)	Low organic matter below 17 inches and Slope[3]	35.66	81,695
26/ Starley	Starley	0	Excessive coarse fragment content	6 (0-6)	Excessive coarse fragment content	0.68	549
TOTAL						992.83	3,216,053

Source: Maxim 2004f

1. Map units are identified on **Figures 3.4-1** and **3.4-2**.
2. Soil depth is the average recoverable depth, generally to the bottom of the B horizon or to a depth where more than 35% of the profile contains coarse fragments greater than 3 inches in size. Materials below this depth may be suitable at some individual sites.
3. Equipment restrictions exist in areas with >40% slope.
4. Total Selenium >13 mg/Kg or Extractable Se >0.10 mg/Kg
5. Laboratory analyses for selenium, organic matter, and coarse fragment content were not conducted for Dranyon soils.

* Rock outcrop comprises between 35-40% of these map units, therefore acreage has been reduced for the cubic yard calculations.

3.4.4 Erosion Potential

The overall hazard of erosion for soils has previously been determined by soil surveys conducted within the watershed area (USDA 1990; USDA 1976). Soil erosion, combined with other impacts from forest disturbances, such as soil compaction, can reduce forest sustainability and soil productivity (Elliot et al. 1996). In general, upland areas are more susceptible to erosion than lowland sites, and areas with higher coarse fragment content and lower slope angle have lower potential for water erosion hazard.

Elliot et al. (1996) determined that soil erosion in an undisturbed forest is extremely low, generally under 0.5 tons per acre per year (tons/acre/yr). Disturbances can dramatically increase soil erosion to levels exceeding 50 tons/acre/yr (Elliot et al 1996). These disturbances may include natural events such as wildfires and mass movements, as well as human induced disturbances such as road construction and timber harvesting (Elliot et al 1996).

Soil loss tolerance (T-factor) is defined as the maximum rate of annual soil erosion at which the quality of a soil as a medium for plant growth can be maintained (USDA 2003b). The T-factor is represented by integer values ranging from 1 to 5 tons per acre per year (USDA 1993). The factor of 1 ton per acre per year is for shallow or otherwise fragile soils, and 5 tons per acre per year is for deep soils that are least subject to damage by erosion (USDA 1993). A T-factor rating is assigned to soils without respect to land use or cover and represents the soil loss from wind and water erosion (USDA 2003b). Select published data on rates of soil formation and plant productivity responses to erosion indicate that tolerable soil losses vary widely for croplands (DeBano and Wood 1992). Data for rangelands are essentially nonexistent, although values of 4.5 tons per acre per year have been estimated for shallow soils on rangeland sites (DeBano and Wood 1992).

The soil suitability assessment identifies limitations and suggests that certain areas disturbed by the Project would experience increased erosion potential by water due to the steep slopes in the Project Area. **Table 3.4-5** identifies the erosion potential and hydrologic characteristics of soils in the Project Area. These soil erodibility characteristics are described in the *Soil Survey Manual* (USDA 1993) and summarized below.

Wind Erodibility Group (WEG)

The WEG for each soil was determined based on soil texture using the *National Soil Survey Handbook* (USDA 2003b) and soil information presented in Maxim (2004f). WEGs are based on the compositional properties of the surface horizon that are considered to affect susceptibility to wind erosion. These properties include texture, presence of carbonate, and the degree of decomposition of organic soils. The wind erodibility index of each WEG is the theoretical, long-term amount of soil lost per year through wind erosion (USDA 1993). Significant proportions of clay content, organic matter, and coarse fragment content decrease the wind erosion potential. Silt loam is the soil texture that is most susceptible to wind erosion. Wind erosion potential has been rated as moderate for the majority of soils within the Project Area, with the exception of the Karlan, Ketchum, Starley, and Starman soils, which have low wind erodibility ratings. There are no soil types in the Project Area categorized as highly susceptible to wind erosion (Maxim 2004f).

Course Fragment Content

Typical soils within the Project Area have been determined to have a surface coarse fragment content from three to 20 percent. The Farlow, Judkins, Ketchum, Povey, Starley, and Starman soil types characteristically have 20 to 43 percent surface coarse fragments, with some profile layers containing as much as 70 percent coarse fragments. The majority of soils contain a range of 1.6 to 10.5 percent organic matter in the top few inches of the soil profile, with an average of approximately 4.4 percent.

K-Factor

The K-factor is a relative index of the susceptibility of bare, cultivated soil to particle detachment and transport by rainfall (USDA 1993). A high K-factor value indicates greater susceptibility of the soil to erosion by water and provides a quantification of the hazard. The K-factor may be computed from the composition of the soil texture and structure, and may be influenced by organic matter and surface coarse fragment content. The fine sand and silt fractions of soil are most susceptible to erosion, while organic matter and coarse fragments reduce susceptibility to erosion (Maxim 2004f). Water erosion hazard for soils within the Project Area has been determined to be moderate for all map units except the Cluff, Harkness, and Parkay soils with high water erodibility, and the Povey and Moonlight soils with low water erodibility. Soils with greater than 25 percent coarse fragments by volume would have dramatically reduced susceptibility to water erosion (Maxim 2004f). When adjusted for the generally excessive coarse fragment content of the native soils, the Blaine, Cloud Peak, Farlow, Judkins, Ketchum, Starley and Starman soil types would be classified as having a low hazard for water erosion, rather than a moderate hazard as shown in **Table 3.4-5**. The overall erosion hazard rating is based on the combination of the WEG and K-factor values and has been adjusted for coarse fragment content.

Available Water Capacity (AWC)

AWC is the volume of water that should be available to plants if the soil, inclusive of coarse fragments, were at field capacity (USDA 1993; 2003b). It is commonly estimated as the amount of water held between field capacity and wilting point, with corrections for salinity, fragments, and rooting depth. This is an important soil property in developing water budgets, predicting droughtiness, designing and operating irrigation systems, designing drainage systems, protecting water resources, and predicting yields (USDA 2003b). Depending on their abundance and porosity, rock and pararock fragments reduce AWC. Soils high in organic matter have higher AWC than soils low in organic matter if the other properties are the same.

Drainage Class

Drainage class identifies the natural drainage condition of the soil. It refers to the frequency and duration of wet periods (USDA 2003b). Soils in the Project Area are generally well drained to somewhat excessively drained, which indicates that water is removed from the soil readily and sometimes rapidly. None of the soils in the Project Area have been classified as poorly drained. Therefore, drainage is not a factor that would inhibit growth of roots for significant periods during most growing seasons.

Soil Permeability

Soil permeability is the quality of the soil that enables water or air to move through it. Historically, soil surveys have used permeability coefficient or permeability as a term for saturated hydraulic conductivity (USDA 2003b). The soil properties that affect permeability are distribution of pore sizes and pore shapes. Texture, structure, pore size, and density are properties used to estimate permeability since the pore geometry of a soil is not readily observable or measurable (USDA 2003b).

TABLE 3.4-5 EROSION POTENTIAL AND HYDROLOGIC CHARACTERISTICS OF SOILS IN THE PROJECT AREA

SOIL FAMILY	SLOPE (PERCENT)	DRAINAGE	PERMEABILITY	AVAILABLE WATER HOLDING CAPACITY	WATER ERODIBILITY[1] (K-FACTOR)	WIND ERODIBILITY[2] (WEG)	SURFACE COARSE FRAGMENTS[3]	OVERALL EROSION HAZARD [4]
Blaine	10-70	Well drained	Moderate to moderately slow	Moderate	Moderate (0.26)	Moderately erodible (5)	18	Low to moderate
Cloud Peak	15-60	Very well drained	Moderate to moderately slow	Moderate	Moderate (0.39)	Moderately erodible (5)	16	Low to moderate
Cluff	40-55	Well drained	Moderately slow	High	High (0.47)	Moderately erodible (5)	15	Moderate to high
Dranyon	0-70	Well drained	Moderate to moderately slow	Very high	Moderate (0.29)	Moderately erodible (5)	9	Moderate
Ericson	2-60	Well drained	Moderately slow	High	Moderate (0.33)	Moderately erodible (5)	10	Moderate
Farlow	0-70	Somewhat excessively drained	Moderately rapid	High	Moderate (0.27)	Moderately erodible (5)	23	Low to moderate
Harkness	10-50	Well drained	Slow	High	High (0.48)	Moderately erodible (5)	0	Moderate to high
Judkins	2-65	Well drained	Moderately slow	Moderate	Moderate (0.36)	Moderately erodible (5)	23	Low to moderate
Jughandle	30-50	Somewhat excessively drained	Moderate to moderately rapid	Moderate	Moderate (0.28)	Moderately erodible (3)	3	Moderate
Karlan	10-60	Well drained	Moderate to moderately rapid	Very high	Moderate (0.35)	Low erodibility (6)	7	Low to moderate
Ketchum	10-70	Somewhat excessively drained	Moderately rapid	Low	Moderate (0.33)	Low erodibility (8)	29	Low
Nisula	10-70	Well drained	Moderately slow to slow	High	Moderate (0.37)	Moderately erodible (5)	18	Moderate
Parkay	10-70	Well drained	Moderate to moderately slow	High	High (0.44)	Moderately erodible (5)	17	Moderate to high

SOIL FAMILY	SLOPE (PERCENT)	DRAINAGE	PERMEABILITY	AVAILABLE WATER HOLDING CAPACITY	WATER ERODIBILITY[1] (K-FACTOR)	WIND ERODIBILITY[2] (WEG)	SURFACE COARSE FRAGMENTS[3]	OVERALL EROSION HAZARD [4]
Povey	0-60	Well drained	Moderately rapid to moderately slow	High	Low (0.20)	Moderately erodible (5)	43	Low to moderate
Redfeather	40-70	Somewhat excessively drained	Moderate	Very low	Moderate (0.37)	Moderately erodible (5)	0	Moderate
Starley	10-70	Somewhat excessively drained	Moderate to moderately rapid	Very low	Moderate (0.34)	Low erodibility (8)	30	Low
Starman	15-70	Somewhat excessively drained	Moderate to moderately rapid	Very low	Moderate (0.31)	Low erodibility (8)	30	Low
Swede	5-65	Well drained	Moderate to moderately slow	Moderate	Moderate (0.28)	Moderately erodible (5)	11	Moderate
Thayne	2-40	Well drained	Moderate to moderately slow	High	Moderate (0.34)	Moderately erodible (5)	0	Moderate

Source: Maxim 2004f, USDA 1993.
[1] Relative index of susceptibility to water erosion (0.25=low, 0.25 to 0.40=moderate, >0.40=high).
[2] Wind Erodibility Group (WEG) rating (1-2 = highly erodible, 3-5 = moderately erodible, 6-8 = low erodibility).
[3] Values based on field estimates (Maxim 2004f).
[4] Hazard rating for a disturbed, unvegetated soil. Erodibility rating has been adjusted for coarse fragment content of native soils.
Maxim (2004f) notes that soils with more than 25% coarse fragments by volume would have reduced susceptibility to water erosion.

3.4.5 Roads and Development

Areas of potential disturbance (mainly proposed haul/access road corridors) outside the 2nd Order soil inventory area have been described at the 3rd Order level (USDA 1990), and these soil land types are shown on **Figure 3.4-3**. **Table 3.4-6** identifies the suitability ratings of these soils for roads and development. Land types that are not within potential disturbance corridors are not further described in the table, although they are identified in **Figure 3.4-3**. Ratings are given for trafficability on unsurfaced roads, cut and fill erosion hazard, cut and fill revegetation limitations, cut slope stability hazard, and suitability for topsoil (USDA 1990).

Ratings for trafficability on unsurfaced roads assume use of native materials for the road running surface (USDA 1990). Ratings are based on characteristics such as soil texture, drainage, and coarse fragments. Soils containing large percentages of coarse fragments are not rated as suitable for unsurfaced roads. A rating of good indicates that the roadbed would be stable and require only occasional maintenance. A rating of fair indicates that the roadbed would yield limited volumes of sediment and require seasonal repair to maintain trafficability. A rating of poor indicates that roadbeds would yield high volumes of sediment and require frequent maintenance. Soils within the Study Area have been rated as poor to good for trafficability on unsurfaced roads.

Cut and fill erosion hazard ratings are for the period prior to revegetation and assume cut and fill slopes of 1h:1v (USDA 1990). The ratings are based on properties which affect soil movement caused by overland flow, including slope, coarse fragments, and surface erosion hazard. A rating of low indicates that resistance to erosion is sufficient to permit prolonged exposure of bare soil. A rating of moderate indicates that resistance to erosion is sufficient to permit temporary exposure of bare soil, necessitating standard revegetation practices. A rating of high indicates that unprotected cuts and fills would yield high volumes of sediments, requiring special protective measures. Within the Study Area, soils have a low to high rating for cut and fill erosion hazard, with the majority of soils in the moderate range.

Cut and fill revegetation limitation ratings assume uniform slopes with 1h:1v slope and seeding completed during the first growing season following construction (USDA 1990). The ratings are based on properties affecting the establishment of grasses, including mass stability, drainage, coarse fragments, soil texture, depth to bedrock, and slope. Soils that are shallow, rocky, unstable, or are located on steep slopes have severe limitations for establishing vegetation. A rating of slight indicates an acceptable revegetation response rate; moderate indicates a limited response, and severe indicates that a slow revegetation response can be expected. Soils within the Study Area have been rated as slight to severe for cut and fill revegetation suitability.

Cutslope stability hazard ratings assume construction on uniform slopes with cuts greater than five feet high, a 1h:1v final slope, and revegetation following construction (USDA 1990). These ratings are based on soil properties affecting stability of mechanically disturbed slopes including mass stability, texture, drainage, and slope. Wet soils with uniform particle size on steep, naturally unstable slopes have the highest hazard. A rating of low indicates that no appreciable hazard of mass failure on cut and fill slopes exists. A rating of moderate indicates that seasonal repair of roads would be needed because of potential mass failures, and a rating of high indicates that cut and fills may yield excessively high volumes of material from mass failures, necessitating constant repairs. Within the Study Area, soils have a low to high rating for cut slope stability hazard, with the majority of soils in the moderate range.

TABLE 3.4-6 ROADS AND DEVELOPMENT SUITABILITY

LAND TYPE[1] & SOIL FAMILIES	UNSURFACED ROAD TRAFFICABILITY	CUT & FILL EROSION HAZARD	CUT & FILL REVEGETATION LIMITATION	CUT SLOPE STABILITY HAZARD	TOPSOIL SUITABILITY
061 Venable-Argic Cryaquolls-Coski	Poor to Good	Low to Moderate	Slight to Moderate	Low	Poor to Good
082 Rooset-Beaverdam-Toone	Poor to Fair	Moderate to High	Moderate	Low to Moderate	Fair to Good
201 Farlow-Judkins-Starley	Poor	Moderate to High	Moderate to Severe	Low	Poor
300 Ericson-Cloud Peak-Ketchum	Poor to Good	Low to Moderate	Slight to Moderate	Low to Moderate	Poor
301 Blaine-Dranyon	Good	Moderate	Moderate	Low	Fair to Good
380 Povey-Alpon-Ketchum	Fair to Good	Low to Moderate	Slight to Severe	Low to Moderate	Poor to Good
381 Parkay-Judkins-Farlow	Fair to Good	Low to Moderate	Slight to Severe	Low	Poor to Good
404 Judkins-Farlow-Swede	Fair to Good	Moderate to High	Moderate to Severe	Low to Moderate	Poor
405 Starley-Povey-Farlow	Fair to Good	Moderate to High	Moderate to Severe	Moderate	Poor
451 Beaverdam-Swede-Dranyon	Poor to Fair	Low to Moderate	Slight	Moderate to High	Fair to Good
473 Dranyon-Judkins-Povey	Poor to Fair	Moderate to High	Moderate to Severe	Low to Moderate	Poor to Fair
553 Blaine-Nisula-Calcic Cryoborolls	Poor to Good	Moderate to High	Moderate to Severe	Low to Moderate	Poor
653 Judkins-Nisula-Farlow	Poor to Fair	Moderate to High	Moderate to Severe	Low to Moderate	Poor
656 Cloud Peak-Jughandle-Swede	Fair	Low to Moderate	Moderate to Severe	Low to Moderate	Poor
755 Ketchum-Nisula-Farlow	Poor to Good	Moderate to High	Moderate to Severe	Low to Moderate	Poor
912 Calcic Cryoborolls-Starley-Judkins	Fair to Good	Moderate to High	Severe	Low to Moderate	Poor

Source: USDA 1990
[1]Map units described in this table are identified on **Figure 3.4-3**

Ratings for suitability for topsoil assume stripping of surface layers for storage and later use as a growth medium for revegetation (USDA 1990). Growth medium recovered from road surfaces typically remains adjacent to the road for use during reclamation. The suitability ratings are based on properties which affect reclamation of the borrow area as well as ease of excavation, loading and spreading. These properties include depth to bedrock, soil texture, coarse fragments, layer thickness, slope, and depth to a high water table. A rating of poor indicates that the material is an improbable source of growth for revegetation; a rating of fair indicates the material is a probable source with some limitations, and a rating of good indicates that the material is a probable source of growth medium. Within the Study Area, soils have a low to high rating for topsoil suitability, with the majority of soils in the poor range. It should be noted that the topsoil suitability criteria for roads and development are based on suitability criteria identified in the 3rd Order Soil Survey (USDA 1990). Topsoil suitability ratings identified in **Table 3.4-6** do not include laboratory analyses from the 2nd Order analysis (Maxim 2004f) and are not determined using criteria identified in **Table 3.4-2**.

3.4.6 Selenium and Trace Elements in Soils

Selenium

As documented elsewhere in this EIS, selenium has been identified as a concern in southeastern Idaho where phosphate mining activities have caused surface disturbance with mine overburden. Because selenium in growth medium and water resulting from certain phosphate overburden can bio-accumulate in plants, animals consuming a constant diet of contaminated plants can be exposed to elevated levels of selenium. These selenium levels have the potential to exceed concentrations considered hazardous to livestock. Both deficient and toxic levels of selenium cause similar effects, including reproductive depression, anemia, weight loss, and immune disfunction (Koller and Exon 1986 as cited in Skorupa 1998). Similar toxic effects could occur in terrestrial wildlife, although the pathology is not as well understood.

The range of naturally occurring selenium concentrations in soils of the western United States is <0.1 to 4.3 mg/Kg, and the mean concentration is 0.23 mg/Kg (Shacklette and Boerngen 1984). Selenium is considered a metalloid, possessing both metallic and non-metallic properties, and can exist in an amorphous state or in any of three crystalline forms (Haws and Möller 1997). It exists in four oxidation states including selenate (Se^{+6}), selenite (Se^{+4}), elemental selenium (Se^0), and selenide (Se^{-2}). Elemental selenium is present in minute amounts, and selenides are typically associated with sulfides and are largely insoluble (Haws and Möller 1997).

Selenium enters the soil profile through the weathering of selenium-rich rocks. Water and wind erosion and sedimentation processes distribute these particles and deposit them into topsoil. Selenium moves through the soil until adsorbed on metal hydroxides, or organic particles.

Selenite and selenate are produced by chemical oxidation and soil microorganisms from less soluble forms of selenium. These forms are highly soluble in alkaline soils, thus facilitating uptake of selenium by certain plants. Selenate is generally the more toxic form in soils, since selenite is adsorbed to hydrous metal oxides and is generally unavailable for plant uptake (Mayland et al. 1991). The major form of selenium found in well-aerated alkaline soils is selenate, whereas selenite predominates in acid and neutral soils (Mayland et al. 1991).

Selenium mobility in soils is favored by alkaline pH, high selenium concentrations, oxidizing conditions, and high concentrations of other strongly adsorbed anions. Selenates are significantly more stable and soluble than selenites, especially in alkaline environments (Haws and Möller 1997). Adsorption of selenite is influenced positively by low pH, organic carbon, hydrous oxides, calcium carbonate, and cation exchange capacity, and negatively influenced by high salt, alkalinity, and high pH. Sorption of both selenite and selenate decreases with increasing pH (Munkers 2000). Studies conducted by Mayland et al. (1991) indicate that sorption of selenite by soil shows some analogies to the sorption of phosphate, whereas the sorption of selenate is closer to that of sulfate. Some soil anions, such as phosphate, increase plant selenium uptake because increased soil-solution anion concentrations compete with selenium anions for adsorption sites on soil particles. Other anions, such as sulfate, actually inhibit uptake by affecting plant metabolism. The antagonistic effect of selenium and sulfate can reduce selenium availability. For example, Mayland et al. (1991) shows that the addition of lime to soils containing sulfur often mobilizes selenium by precipitating the sulfate ion. This results in greater selenium uptake by vegetation. Mayland et al. (1991) cited Ylaranta (1983) who found selenate was reduced by added organic matter (peat) and subsequently rendered immobile by adsorption onto clay. Munkers (2000) reviewed literature showing that selenium-reducing bacteria can reduce soluble, oxidized forms to insoluble forms.

Skorupa (1998) indicates that the presence of selenium in geologic formations does not mean it is present in toxic amounts in the soils derived from these strata. Herring (1990) states that an important consideration of selenium behavior in soils is of assimilation and availability. The most important observation is that neither assimilation or availability of the element necessarily correspond to its soil concentration. An example cited in Herring (1990) indicated that in the case of acidic soils that contain an abundance of iron, iron selenite compounds or complexes form, and these are sufficiently insoluble to reduce the bioavailability of the selenium. Thus, acid soils favor the more reduced, complexed forms of selenium, such as ferric selenite, which are not readily available to plants. Oxidation by chemical and bacterial processes in alkaline soils favors the existence of selenate compounds of complexes, and these are soluble and readily assimilable by plants (Herring 1990).

Selenium has been identified as a parameter affecting soil management. USFS developed guidelines for phosphate mine reclamation have been developed for topsoil/growth medium salvage relative to this element (USDA 2003a). This document provides guidance and does not impose legally binding requirements or imply policy. The guideline states that soil with less than 13 milligrams per kilogram (mg/Kg) total selenium or less than 0.10 mg/Kg extractable selenium are known to be suitable for reclamation. Implementation of these guidelines for soil salvage and use as growth medium could reduce the amount of selenium available for uptake by plants. Soils, weathered in place on the landscape appear to have been depleted of most of their bioavailable selenium (USDA 2003a). Salvage soil materials with total selenium values up to 13 mg/Kg are considered suitable for use as a planting medium when used in combination with other preventative BMPs designed for the long-term protection of reclamation plantings (USDA 2003a). Under the guidelines, soils with selenium values above 13 mg/Kg may also be acceptable for reclamation with additional testwork. The guideline of 13 mg/Kg was established because soils with concentrations above 13 mg/Kg were not available for testing.

Concentrations of selenium in topsoil/growth medium samples collected within the Project Area are below detection limits in most soil samples. Only one sample site from the Project Area exhibited elevated total selenium levels, and this occurred in Panel G at depths greater than 54 inches.

Naturally occurring selenium concentrations in soil vary greatly depending on the profile location. When soils are salvaged for proposed mining operations, soil from different areas can become mixed, reducing selenium concentrations in the soil mixture. The total concentration of selenium in soils does not directly determine the concentration of available selenium in the plants growing on those soils (Lakin 1972 as cited in Bauer 1997; Fisher 1991). **Table 3.4-7** shows the maximum selenium and trace element concentrations for sampled soils within the Project Area. Laboratory analyses indicate the total selenium concentrations were generally less than analytical detection limits at all sample locations (Maxim 2004f), with the following exceptions:

- The Judkins soil type at sample site G-TP-5 contained 3 mg/Kg of selenium in the top seven inches of the profile and 6 mg/Kg in the 7 to 27-inch interval depth of the profile.
- Karlan soil at sample site G-TP-33 showed total selenium levels of 24 mg/Kg in soils greater than 54 inches deep, with 7-12 mg/Kg total selenium levels throughout the upper layers of the profile.
- Two profile layers of the Ketchum soil at sample site F-TP-48 showed total selenium values of 6 to 8 mg/Kg. These profile layers were separated by 20 inches of soil with non-detectable selenium levels.

The above values for total selenium are not elevated and are considered suitable for topsoil/growth medium recovery and use in reclamation (USDA 2003a), with the exception of the Karlan soil occurring deeper than 54 inches at site G-TP-33, which by itself would not be suitable for reclamation due to elevated selenium content.

TABLE 3.4-7 MAXIMUM SELENIUM AND TRACE ELEMENT CONCENTRATIONS FOR SAMPLED SOILS WITHIN THE PROJECT AREA

	ANALYTICAL RESULTS – EXTRACTABLE (MG/KG)[1]				ANALYTICAL RESULTS – TOTAL (MG/KG)[1]			
SOIL TYPE	CADMIUM	NICKEL	SELENIUM	ZINC	CADMIUM	NICKEL	SELENIUM	ZINC
Blaine	1.1	1	0.15	7.7	2	36	ND	156
Cloud Peak	2.9	0.8	0.13	9.4	8	33	ND	280
Ericson	1.1	36	0.26	5	2	49	ND	207
Farlow	0.5	1.4	0.10	3.3	ND	40	ND	209
Judkins	30	217	0.14	67.2	12	244	6	944
Jughandle	3.5	1.4	0.07	6.4	16	56	ND	348
Jughandle (variant)	0.1	0.9	0.12	1.2	ND	13	ND	52
Karlan	9.8	41.7	0.14	70.5	24	125	24	520
Ketchum	0.7	0.6	0.06	3.5	1	33	8	121
Moonlight	16	6.9	0.07	65.3	59	71	ND	906
Parkay	0.6	1.8	0.10	--	ND	32	ND	245
Povey	5.3	5.5	0.08	47.7	13	86	ND	512
Starman	0.4	0.3	0.04	2.3	ND	22	ND	75
Swede	0.2	0.6	0.14	2.4	ND	15	ND	61

Source: Maxim 2004f
[1] Maximum value reported at any sample site, in any single soil horizon.
ND = Not Detected (Indicates nonspecific value below detection limit).
- - = Not noted or analysis not requested.

Extractable selenium concentrations were generally less than 0.1 mg/Kg, indicating that the hazard for excessive selenium uptake in vegetation in undisturbed soil is low, with the following exceptions:

- Judkins soil type at sample site F-TP-9 contained 0.14 mg/Kg of extractable selenium in the top seven inches of the profile. The remainder of the profile (7-29 inches) showed extractable selenium of less than 0.10 mg/Kg.
- The Farlow soil at sample site F-TP-10 had extractable selenium content of 0.10 mg/Kg in profile layers below 28 inches (28-40 inches).
- At sample site F-TP-22, the Blaine soil had extractable selenium levels of 0.12 to 0.15 mg/Kg in the soil profile layers below six inches (6-19 inches).
- The Ericson soil had extractable selenium of 0.12 mg/Kg in the soil layer between 15-21 inches and 0.26 mg/Kg in soil below 21 inches (21-26 inches) at sample site F-TP-27.
- The Karlan soil at sample site G-TP-33 showed extractable selenium levels ranging from 0.10 to 0.13 mg/Kg in three of the six soil profile layers. This site also had total selenium of 24 mg/Kg below 54 inches. At sample site F-TP-58, Karlan soil showed extractable selenium levels ranging from 0.11 to 0.14 mg/Kg throughout the soil profile (0-44 inches).
- Cloud Peak soil at sample site F-TP-45 showed extractable selenium of 0.12 mg/Kg in the 16-23 inch layer. The remainder of the profile (23-55 inches) showed extractable selenium of less than 0.10 mg/Kg. At sample site F-TP-67, the Cloud Peak soil had extractable selenium of 0.13 mg/Kg in soils greater than 20 inches deep.
- At sample site F-TP-46, the Swede soil had one layer (20-33 inches) that showed extractable Se of 0.13 mg/Kg. The remaining portions of the profile (0-20 and 33-45 inches) showed extractable selenium of less than 0.10 mg/Kg. At sample site F-TP-55, the Swede soil showed extractable selenium levels ranging from 0.11 to 0.14 mg/Kg throughout the soil profile (0-28 inches).
- The Parkay soil at site F-TP-59 showed extractable selenium at 0.1 mg/Kg below 16 inches deep.
- Jughandle soil variant at sample site F-TP-63 showed extractable selenium levels ranging from 0.11 to 0.12 mg/Kg throughout the soil profile (0-28 inches).

It should be noted that individual soil sample sites may not be representative of the surrounding soil in the major map unit. The Swede soil sample taken at site F-TP-46 indicated elevated extractable selenium, but this does not represent the majority of soil types within the Judkins-Blaine Complex that have selenium levels below the 0.10 mg/Kg guideline. In comparison, three samples were taken within the Karlan-Dranyon Complex (Map Unit #20), including samples of the Karlan soil, the Swede inclusion and the Jughandle (variant) inclusion. All three of these sample sites showed elevated extractable selenium levels throughout the entire soil profile. This map unit is composed of approximately 50 percent Karlan soil, 30 percent Dranyan soil, and the remaining 20 percent is represented by inclusions.

Cadmium

All soils and rocks have some cadmium in them. It is generally found at low concentrations in the environment and typical background concentration of cadmium in western United States soils is less than 1.5 mg/Kg (EPA 2003a). The Soil Screening Level (SSL) for cadmium in plants is 32 mg/Kg (dry weight in soil) and the soil invertebrate SSL for cadmium is 140 mg/Kg (EPA 2003a). The cadmium SSL for avian wildlife is 1.0 mg/Kg and the SSL for mammalian wildlife is 0.38 mg/Kg (EPA 2003a). With the exception of the mammalian value, these concentrations are higher than the 50th percentile of reported background soil concentrations in eastern and western U.S. soils (0.23 and 0.40 mg/Kg dry weight, respectively). Cadmium is adsorbed in soil to a much lesser extent than most other metals (EPA 2003a). The most important soil properties influencing adsorption are pH and organic content. Adsorption increases with pH and organic content, therefore, leaching is more apt to occur under acid conditions in sandy soil (EPA 2003a). Plant uptake of cadmium decreases as soil pH increases. In soil, cadmium is expected to convert to more insoluble forms, such as cadmium carbonate in aerobic environments and cadmium sulfide in anaerobic ones (EPA 2003a).

Nickel

The normal range of nickel concentration in soil is between 4 and 80 mg/Kg. Shacklette and Boerngen (1984) calculated the mean concentration of nickel in western United States soils to be 15 mg/Kg. Nickel attaches to soil particles that contain iron or manganese, which are often present in soil and sediments (ATSDR 2003). It is usually attached so strongly onto the soil and rock particles that it is not readily taken up by plants and animals, although under acidic conditions nickel is more mobile in soil. Nickel does not appear to collect in fish, plants, or animals used for food (ATSDR 2003). The International Agency for Research on Cancer (IARC) has determined that nickel metal may possibly be carcinogenic to humans, and that some nickel compounds are carcinogenic to humans (ATSDR 2003).

Zinc

Zinc (Zn) is the 23rd most abundant element in the earth's crust and is an essential element for proper growth and development of humans, animals, and plants (USGS 2004c). It is the second most common trace metal, after iron, naturally found in the human body (USGS 2004c). Zinc is bioaccumulated by all organisms, even in areas of low zinc concentrations, and both deficient and excessive amounts cause adverse effects in all species (Skorupa 1998). It is highly reactive and is present as both soluble and insoluble compounds. Typical background concentrations of zinc in western United States soils are less than 150 mg/Kg and Shacklette and Boerngen (1984) calculated the mean concentration to be 55 mg/Kg. Skorupa (1998) identified the level of concern for zinc in sediment to be 150-410 mg/Kg; however, sulfides in sediment may reduce zinc toxicity. Zinc toxicity in water is affected by water hardness, pH, temperature, dissolved oxygen, and alkalinity. In most of the West, water hardness of more than 200 mg/L is common, and zinc would be less toxic under those conditions (Skorupa 1998). Skorupa (1998) also notes that most of the zinc introduced into the aquatic environment is eventually deposited in sediments.

3.5 Vegetation

3.5.1 Introduction

The CNF, its uses, and resources are managed with the guidance of the RFP (USFS 2003a). The Desired Future Conditions (DFC) and objectives for forest and non-forest vegetation are achieved by using the forest-wide standards and guidelines and the standards and guidelines for the Biological Elements section as set forth in the Management Prescriptions of the RFP. Maxim conducted a baseline assessment of vegetation resources within the Study Area during 2003. These studies provided baseline data on vegetation resources that might be influenced by any of the action alternatives. A baseline technical report was prepared and provides details on Maxim's methodologies, results, and conclusions (see Maxim 2004e). The following is largely summarized from this report. Additional pertinent information is also included and cited appropriately.

3.5.2 Cover Type Descriptions

The Study Area ranges in elevation from about 6,500 feet in the lower end of the South Fork Sage Creek, Manning Creek, and Deer Creek drainages, to about 8,500 feet along Freeman Ridge west of Panels F and G. Vegetation within the Study Area is common to this portion of the CNF with both forested and non-forested cover types. Maxim (2004e) assessed, described, and mapped ten vegetation cover types in the Study Area (**Figure 3.5-1**). **Table 3.5-1** shows the acres and relative occurrence of each type.

TABLE 3.5-1 VEGETATION COVER TYPES, ACRES, RELATIVE OCCURRENCE, AND PRINCIPAL PLANT SPECIES IN THE STUDY AREA

COVER TYPE (ACRES/OCCURRENCE1)	PRINCIPAL PLANT SPECIES	
	SCIENTIFIC NAME	COMMON NAME
Aspen (6,702 / 32.8%)	*Populus tremuloides*	Quaking aspen
Mountain Big Sagebrush (5,479 / 26.8%)	*Artemisia tridentata* ssp. *Vaseyana* *Purshia tridentata* *Symphoricarpos oreophilus*	Mountain big sagebrush Antelope bitterbrush Mountain snowberry
Subalpine Fir (3,056/14.9%)	*Abies lasiocarpa* *Pinus contorta* *Populus tremuloides*	Subalpine fir Lodgepole pine Quaking aspen
Aspen/Conifer (1,593 / 7.8%)	*Populus tremuloides* *Pseudotsuga menziesii* *Pinus contorta*	Quaking aspen Douglas-fir Lodgepole pine
Riparian Shrub/Wet Meadow (1,546 / 7.5%)	*Carex nebrascensis* *Deschampsia caespitosa* *Salix boothii* *Salix drummondii* *Lonicera utahensis*	Nebraska sedge Tufted hairgrass Booth's willow Drummond's willow Utah honeysuckle
Mountain Snowberry/Sagebrush (932 / 4.5%)	*Symphoricarpos oreophilus* *Artemisia tridentata* ssp. *Vaseyana* *Prunus virginiana* *Amelanchier alnifolia* *Rosa* spp. *Ceanothus velutinus*	Mountain snowberry Mountain big sage Chokecherry Serviceberry Rose Snowbrush
Douglas-Fir (456 / 2.2%)	*Pinus contorta* *Abies lasiocarpa* *Pseudotsuga menziesii*	Lodgepole pine Subalpine fir Douglas-fir
Forb/Graminoid (341 / 1.7%)	*Delphinium bicolor* *Geranium viscosissimum* *Veratrum californicum*	Little larkspur Sticky geranium California false hellebore
Mountain Big/Silver Sagebrush (187 / 0.9%)	*Artemisia tridentata* ssp. *vaseyana* *Artemisia cana*	Mountain big sage Silver sage
Mountain Mahogany (180 / 0.9%)	*Cercocarpus ledifolius*	Mountain mahogany

[1] Occurrence expressed as % of total Study Area (20,462 acres)

Aspen

Aspen (*Populus tremuloides)* is the most abundant (32.8 percent) cover type in the Study Area. Aspen stands are primarily located on east- and southeast-facing slopes. This cover type is an early-seral (i.e., pioneer) stage on nearly every moist Douglas-fir (*Pseudotsuga menziesii*) site, and many mixed conifer and subalpine fir/Engelmann spruce (*Abies lasiocarpa*/*Picea engelmannii*) sites on the CNF (USFS 2003a). Aspen communities within the Project Area are typically closed canopy stands of aspen with a few conifers, usually Douglas–fir. The understory consists mainly of mountain snowberry (*Symphoricarpos oreophilus*), sweet cicely (*Osmorhiza chilensis*), sticky geranium (*Geranium viscosissimum)*, meadowrue (*Thalictrum occidentalis*), and silvery lupine (*Lupinus argenteus var. parviflorus*). Intermediate and older aspen stands are located at higher elevations, while younger stands are common at the lower elevations, usually in drainages. Below the elevation range of conifers, aspen stands may indicate a late-seral (i.e., climax) condition.

Mountain Big Sagebrush

Mountain big sagebrush is the second most abundant (26.8 percent) cover type in the Study Area, found at lower elevations and on dry south-facing slopes. Mountain big sagebrush (*Artemisia tridentata* ssp*. vaseyana*) is the dominant plant species, with mountain snowberry and antelope bitterbrush (*Purshia tridentata)* found occasionally. Forb and grass species found in this cover type include arrowleaf balsamroot (*Balsamorhiza sagittata*), silky lupine (*Lupinus sericeus*), bluebunch wheatgrass (*Agropyron spicatum*), Kentucky bluegrass *(Poa pratensis*), and western needlegrass (*Stipa occidentalis*).

Mountain Big/Silver Sagebrush

The mountain big/silver sagebrush cover type is co-dominated by both species and is found on more mesic (moderately moist habitat) sites at lower elevations. This cover type accounts for 0.9 percent of the Study Area. Associated forbs include death camas (Zigadenus paniculatus) and monument plant (Frasera speciosa).

Douglas-Fir

The Douglas-fir cover type, 2.2 percent of the Study Area, is found on the east-facing slopes from Deer Creek north to Sage Creek. Two habitat types are associated with Douglas-fir.

- The Douglas-fir/mountain sweet-cicely (*Osmorhiza chilensis*) habitat type is a predominant habitat type in southern Idaho and northern Utah (Steele et al. 1983) and occupies slopes with relatively moist soils. Douglas-fir is the dominant overstory species, with 45-65 percent canopy cover. Aspen and lodgepole pine are often interspersed. The understory usually contains high shrub cover, including mountain snowberry, chokecherry (*Prunus virginiana*), and serviceberry (*Amelanchier alnifolia*). Herbaceous species include mountain sweet-cicely, sticky geranium (*Geranium viscosissimum*), wild strawberry (*Fragaria vesca*), pinegrass, and elk sedge (*Carex geyeri*).
- The Douglas-fir/pinegrass (*Calamagrostis rubescens*) habitat type occurs on drier and cooler sites, usually on gentler slopes (5-25 percent). Overstory species consist of Douglas-fir, lodgepole pine, and occasionally subalpine fir. Small pockets of large Douglas-fir, some over 30 inches in diameter, were observed in the Study Area. The Douglas-fir/pinegrass habitat understory consists of sparse shrub cover, including Utah honeysuckle (*Lonicera utahensis*), Oregon grape (*Berberis repens*), and wild rose (*Rosa* spp.). Herbaceous species include pinegrass, elk sedge, wild strawberry, and heart-leaf arnica (*Arnica cordifolia*).

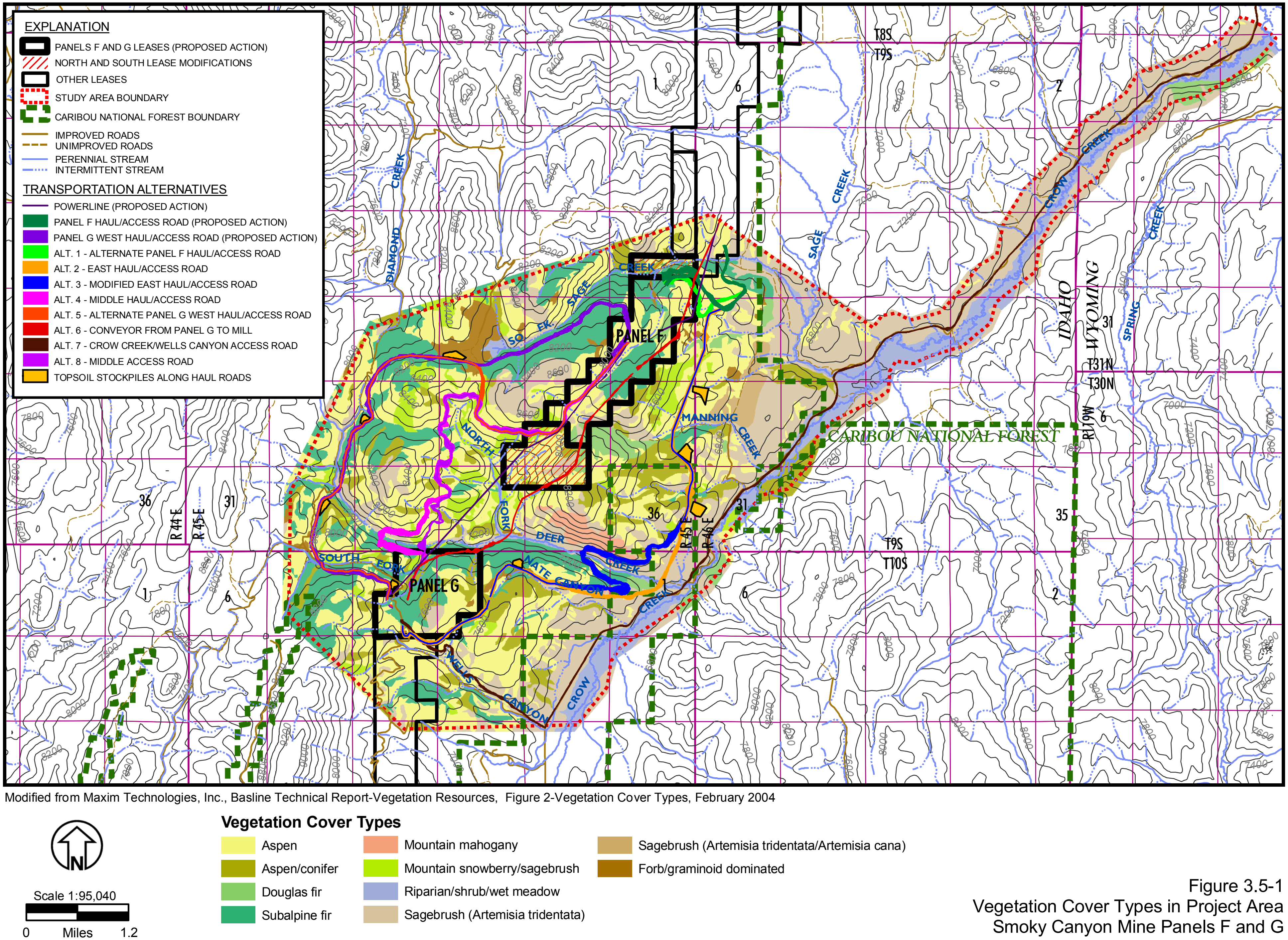


Figure 3.5-1
Vegetation Cover Types in Project Area
Smoky Canyon Mine Panels F and G

Subalpine Fir

The Subalpine fir cover type occurs on 14.9 percent of the Study Area and is found on north-facing, cool slopes at relatively low elevations, and on all aspects at high elevations. The north-facing slopes of Deer Creek, Manning Creek, and Sage Creek drainages are inhabited by large stands of subalpine fir, dominated by an overstory of lodgepole pine. Aspen is often interspersed on east- and south-facing slopes in subalpine fir habitats. Three habitat types are associated with subalpine fir:

- The subalpine fir/pinegrass habitat type occupies cooler sites than the Douglas-fir/mountain sweet-cicely. The subalpine fir/pine grass habitat type understory is dominated with pinegrass and elk sedge, often exceeding 60 percent cover. Other associates include heart-leaf arnica, Oregon grape (edible), and mountain snowberry.
- The subalpine fir/mountain sweet-cicely habitat type occupies cooler sites than the Douglas-fir/pinegrass habitat type and is dominated by aspen and a small number of Douglas-fir. Understory shrubs include mountain snowberry, serviceberry, and wild rose. Herbaceous species include mountain sweet-cicely, sticky geranium, wild strawberry, pinegrass, and Kentucky bluegrass (*Poa pratensis*).
- The subalpine fir/grouse whortleberry (*Vaccinium scoparium*) habitat type occupies the coldest sites in the Study Area. The overstory is dominated by lodgepole pine with sapling and pole-sized subalpine fir. The shrub understory is dominated by grouse whortleberry mixed with globe huckleberry (*Vaccinium globulare*), russet buffaloberry (*Shepherdia canadensis*), Utah honey suckle, and mountain lover (*Pachistima myrsinites*). Herbaceous species are sparse in this habitat type but include heart-leaf arnica, pinegrass, pipsissewa (*Chimaphila umbellata*), one-sided wintergreen (*Pyrola secunda*), and various species of hawkweed (*Hieracium* spp.).

Aspen/Conifer

The mixed aspen/conifer cover type comprises 7.8 percent of the Study Area and is interspersed among pure aspen and conifer stands. Trees in the aspen/conifer type are intermediate to mature in age, and many stands are potentially seral, succeeding from aspen to conifer. Dominant canopy species are quaking aspen, Douglas-fir, subalpine fir, and lodgepole pine. The understory consists mainly of mountain snowberry, meadowrue, sticky geranium, and pinegrass.

Riparian Shrub/Wet Meadow

The riparian shrub/wet meadow cover type makes up 7.5 percent of the Study Area and includes two separate vegetation communities: wet/sedge meadows and riparian shrub. These communities are associated with the high moisture levels found in the broad floodplain of Crow Creek and areas along Deer Creek. Wet/sedge meadows are dominated by Nebraska sedge (*Carex nebrascensis*) and tufted hairgrass (*Deschampsia caespitosa)*. The riparian shrub community is dominated by Booth's willow (*Salix boothii)*, Drummond's willow (*Salix drumondii)*, and Utah honeysuckle. **Section 3.6** provides a more detailed description and identification of delineated wetlands.

Riparian areas in the Study Area were evaluated for Proper Functioning Condition (PFC) in accordance with the procedures described in BLM (1993). Riparian areas associated with Crow Creek, Deer Creek, Wells Canyon drainage, South Fork Sage Creek, and Manning Creek were evaluated and compared to the CNF rating of functional capacity determined by CNF personnel in January 1999. The evaluations and comparisons of the riparian areas are as follows:

Crow Creek

Maxim (2004e) evaluated Crow Creek from the confluence of the Wells Canyon drainage to approximately five miles downstream to the confluence of Sage Creek. Crow Creek is a low-gradient stream with a broad floodplain up to 0.5 mile wide. Approximately 25-30 percent of the stream in the Study Area has been affected by grazing and the clearing of natural vegetation. Riparian areas have unstable banks that show signs of accelerated erosion; some areas have been stabilized with riprap. Approximately 50 percent of the riparian area evaluated had vegetation densities in sufficient amounts to resist erosion along the banks of Crow Creek. The functional capacity is reduced by the scarcity of large woody debris in and adjacent to Crow Creek, and recruitment of tree and shrub species that generate woody debris is nearly non-existent. Crow Creek was rated as functioning-at-risk due to loss of woody vegetation, accelerated bank erosion on some reaches, placement of riprap, constriction of the stream channel by the Crow Creek Road, proposed expansion alternative of the road within the floodplain, and increased sediment loading from Crow Creek Road.

Deer Creek and Tributaries

Deer Creek and its tributaries drain the steep, mountainous terrain near the headwaters of Crow Creek. A floodplain has developed where the valleys in this drainage area become wider. Wetland and riparian vegetation covers most of these floodplains. Willows, with small patches of sedge meadows interspersed within, are found along the perennial and intermittent reaches of Deer Creek. Willows, native grasses, and sedges have been reduced in density and replaced by silver sagebrush, Kentucky bluegrass, and other invasive species including nemophila (*Nemophila breviflora*), bilobed speedwell (*Veronica biloba*), Canada thistle (*Cirsium arvense*), and Dyer's woad (*Isatis tinctoria*), a noxious weed. The perennial reach of upper South Fork Deer Creek is constrained by a Forest road located along the creek. The road is adding sediment to the creek from surface water runoff. Deer Creek was found to be functioning-at-risk (Maxim 2004e).

Wells Canyon Drainage

The Wells Canyon drainage was evaluated from its source at the upper most spring down to the confluence with Crow Creek. This relatively high gradient drainage, which is mostly intermittent and confined by steep banks in a canyon, has a narrow strip of riparian vegetation that is primarily willows and sedges. The riparian vegetation in the upper drainage is not effective in withstanding high stream flows. There is little or no channel migration during high flows because of the presence of the Forest road in the canyon bottom and confining canyon slopes. Several camping sites and the road have been constructed adjacent to the drainage, reducing the riparian area. The unpaved Forest road constrains the intermittent channel over most of the length. The road has added sediment to the stream, and in some areas the stream flows over the road. The Wells Canyon drainage was rated as non-functional due to high sediment loads caused by the road (Maxim 2004e). CNF had previously rated the drainage as functioning-at-risk (Maxim 2004e).

South Fork Sage Creek

South Fork Sage Creek was evaluated from the east boundary of the Study Area to its origin at a spring in Sage Meadows. Riparian vegetation consists of dense stands of willows interspersed with sedge meadows on some of the broader stream terraces. Invasive plant species have increased in density on disturbed soils. Invasive species found included tarweed (*Madia glomerata*), California false-hellebore (*Veratrum californicum)*, nemophila, and bilobed speedwell. South Fork Sage Creek was rated as properly functioning.(Maxim 2004e). The CNF evaluated the creek as functioning-at-risk.

Manning Creek

Manning Creek, an intermittent stream, is a tributary to Crow Creek with a short upper reach of perennial flow due to a spring discharge. The entire channel receives seasonal flow from snowmelt and precipitation. Manning Creek was determined to be functioning-at-risk due (Maxim 2004e).

Mountain Snowberry/Sagebrush

The mountain snowberry/sagebrush cover type is found primarily at higher elevations, where soil moisture is higher than in low-elevation sagebrush stands. The mountain snowberry/sagebrush cover type occurs on 4.5 percent of the Study Area and is dominated by mountain snowberry and big sagebrush. In certain areas, big sagebrush is absent and young aspen trees are found, indicating that these areas may succeed to forest cover in the absence of disturbance. Other associated shrub species include chokecherry, serviceberry, rose, and snowbrush (*Ceanothus velutinus*, USFS 2003b). Associated grasses and forbs include buckwheat (*Eriogonum* spp.), arrowleaf balsamroot, mules ear (*Wyethia amplexicaulis*), and oniongrass (*Melica bulbosa*).

Forb/Graminoid

The forb/graminoid cover type is present throughout the Study Area, accounting for 1.7 percent of the vegetation. This cover type, dominated by forbs with some grasses and sedges, is found on steep, "shaley" slopes most frequently, but can also be found in more mesic conditions and appear as montane meadows. The common associates include: little larkspur (*Delphinium bicolor*), paintbrush (*Castilleja pilosa var. longispicata*), western wallflower (*Erysimum asperum*), hawksbeard (*Crepis* spp.), lupine (*Lupinus* spp.), mutton grass (*Poa fendleriana*), buckwheat, mules ear, arrowleaf balsamroot, horse-mint (*Agastache urticifolia*), sticky geranium, and California false hellebore.

Mountain Mahogany

The Mountain mahogany cover type occurs on 0.9 percent of the Study Area on south-facing slopes above Deer Creek with dry, rocky, shallow, limestone soils. Curlleaf mountain mahogany (*Cercocarpus ledifolius*) dominates, forming an open canopy. Other associates include: bluebunch wheatgrass, mountain snowberry, serviceberry, arrowleaf balsamroot, and Oregon grape.

3.5.3 Special Status Plant Species

The US Fish and Wildlife Service (USFWS) does not identify any Threatened, Endangered, Proposed, or Candidate (TEPC) species that are known or expected to occur on the CNF (Species List #1-4-05-SP-0354). In addition to TEPC species, the Regional Forester identifies Sensitive (S) species as those for which population viability is a concern, as evidenced by significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species' existing distribution. Sensitive species receive special management emphasis from the USFS to ensure their viability and to preclude trends toward endangerment that could result in the need for federal listing (FSM 2672.1). Sensitive species potentially occurring in the Study Area are listed in **Table 3.5-2**. Background information on each species follows the table. Additional information can be found in the RFP EIS (USFS 2003b:Appendix D) and the vegetation baseline report (Maxim 2004e).

TABLE 3.5-2 SENSITIVE SPECIES KNOWN OR SUSPECTED TO OCCUR ON THE CNF

COMMON NAME	SPECIFIC NAME	USFS STATUS
Starveling Milkvetch	*Astragalus jejunus* var. *jejunus*	Sensitive
Payson's Bladderpod	*Lesquerella paysonii*	Sensitive
Cache Penstemon	*Penstemon compactus*	Sensitive

Starveling Milkvetch

In Idaho, starveling milkvetch occurs on knolls, ridges, and other exposures of raw, loose, sparsely vegetated, light-colored shale. It appears to be restricted to bright outcrops of calcareous shale, having a fine to stone-size texture. Starveling milkvetch is found on all aspects, usually on gentle to moderately steep slopes. Idaho populations are found in the southeastern corner of the State, in the southern Preuss Range, Sheep Creek Hills, and Bear Lake Plateau, all in Bear Lake County, all at least 15 miles from the Project Area. While no individuals of this species were observed, suitable habitat for this species may be present on road cuts along the South Fork of Deer Creek or on ridge tops along the west side of the Crow Creek Valley. Approximately 1,340 acres of potential habitat for starveling milkvetch occur in the Study Area; however, this species appears to be restricted to more exposed shale sites than those observed in the Project Area (Maxim 2004e).

Payson's Bladderpod

Payson's bladderpod occurs most often above 8,000 feet elevation, on ridge tops or south-facing slopes of limestone with gravelly soils and sparse vegetation. The species is endemic to west-central Wyoming and adjacent Idaho, with disjunct populations in southwestern Montana (USFS 2003b:D-186). While Payson's bladderpod was not observed during field investigations, the range of the species includes areas near the Project Area (Maxim 2004e). The nearest occurrence is the nearby Salt River Range in Wyoming, approximately 15 miles southeast of the Project Area.

Cache Penstemon

Cache penstemon is considered endemic to the Bear River Range, located at least 15 miles west-southwest of the Project Area. This species occurs in open, rocky limestone areas in the subalpine zone at 8,800 – 9,300 feet elevation. Idaho populations are reported to occur on carbonate substrates (USFS 2003b:D-188). While this species was not observed during field investigations, some habitat exists in the Project Area (Maxim 2004e).

3.5.4 Noxious Weeds

Noxious weed species, as defined in Executive Order 13112 (64 CFR 6183, Invasive Species, February 1999), are those plants of foreign origin, not widely prevalent in the United States, that can injure crops, ecosystems, interests of agriculture, or fish and wildlife resources. They generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, and a carrier or host to insect pests or disease. The State of Idaho is responsible for listing noxious weeds in the State. The State's most current list, created in 2001, lists 36 species of noxious weeds. Six of these species were recorded in the Study Area.

In 1996, the CNF adopted Integrated Pest Management (IPM) guidelines to treat uncontrolled noxious weeds. IPM emphasizes the best management strategies for weed control and uses the best control techniques available for the targeted species. In February 2001, the CTNF completed a forest strategy for noxious weeds developed from direction found in the following documents: National Administration's *Pulling Together – National Strategy of Invasive Plant Management*, Forest Service's *Stemming the Invasive Tide – A Forest Service Strategy for Noxious and Nonnative Invasive Plant Management*, and *Idaho's Strategic Plan for Managing Noxious Weeds*. The RFP (USFS 2003a:3-21) outlines the goal of minimizing the establishment and spread of noxious weeds through the application of Forest direction, IPM, and BMP's. The RFP also established standards and guidelines to be used for controlling and eliminating noxious weeds and other invasive plant species (USFS 2003a:3-22). The Smoky Canyon Mine's weed control program follows guidelines established by the USFS. The mine is inspected on a monthly basis, and Simplot is notified by the USFS of any problems noted, including weed infestations. Simplot responds to these reports by treating weed-infested areas with USFS-approved chemicals.

As reported from CTNF survey results in 2001, noxious weeds infest over 85,000 acres throughout the CTNF. Based on GIS data provided by the CNF, a number of noxious weed infestations occur within the Study Area. **Figure 3.5-2** shows infestations of black henbane (*Hyoscyamus niger*), Canada thistle, Dyer's woad, field bindweed (*Convolvulus arvensis*), musk thistle (*Carduus nutans*), and yellow toadflax (*Linaria vulgaris*). The vegetation baseline studies found three noxious weed species during surveys in 2003 (Maxim 2004e). Black henbane was observed along Crow Creek Road and scattered along the lower portions of Deer Creek and the Manning Creek Road. Canada thistle was found along the riparian corridors of Crow, Deer, and Manning Creeks. Dyer's woad was observed along sections of lower Deer Creek, Crow Creek Road, and along the Manning Creek Road.

3.5.5 Suitable Timber for Harvest

Management prescriptions in the RFP are a set of practices applied to a specific area to attain multiple-use and to provide a basis for consistently displaying management direction on land administered by the CNF. Management Prescription 5.2 (USFS 2003a:4-71, Forest Vegetation Management) pertains to scheduled wood-fiber production, timber growth, and yield while maintaining or restoring forested ecosystem processes and functions to more closely resemble historical ranges of variability with consideration for long-term forest resilience. All forms of timber harvest are permitted, including salvage, to achieve stated goals and objectives. Livestock grazing may be allowed on transitory forage produced following timber harvest where and when that use would not conflict with regeneration and restoration efforts. Motorized use is prevalent for timber management activities and recreation. Land in this prescription is included in the suitable timber base and contributes to the Allowable Sale Quantity.

Tentatively Suitable Forest land is land which is producing or is capable of producing crops of industrial wood and: 1) has not been withdrawn by Congress, the Secretary, or Chief; 2) existing technology and knowledge is available to ensure timber production without irreversible damage to soil, productivity, or watershed conditions; and 3) existing technology and knowledge provides reasonable assurance that adequate restocking can be attained within five years after final harvesting (USFS 2003a). The Panel F and G lease areas, including the lease modification areas of Panel F, encompass a total of 2,040 acres. The lease areas contain 1,610 acres of tentatively suitable timber. However, only the portion of Panel F that lies within

Prescription 5.2 is included in the Allowable Sale Quantity. This portion of Panel F contains 641 acres of tentatively suitable timber (108 acres aspen, 170 acres aspen/conifer, and 363 acres conifer), which is included in the Allowable Sale Quantity (Maxim 2004g).

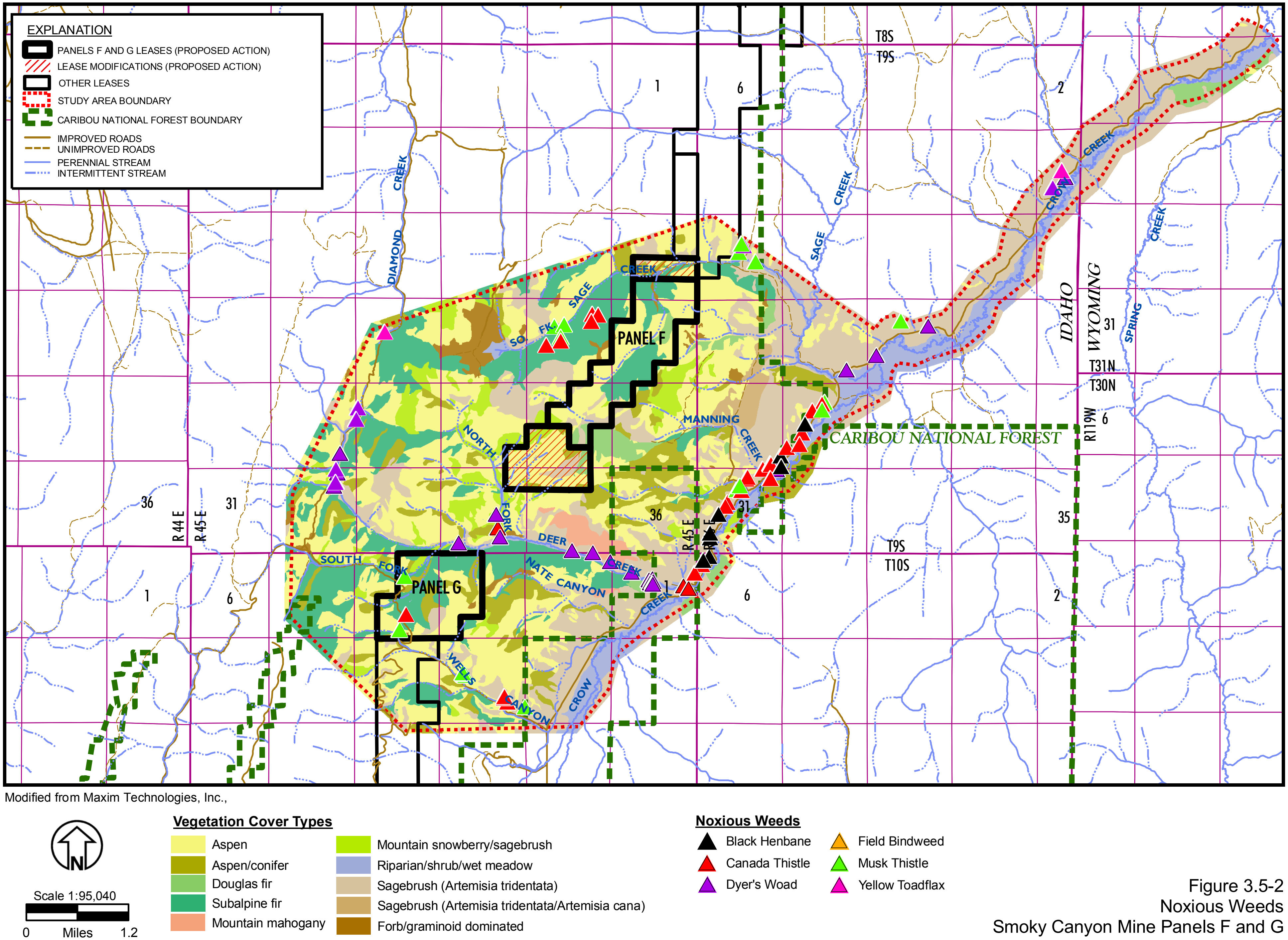
Management Prescription 5.2 is replaced by Prescription 8.2.2 (Phosphate Mine Areas) following approval of a Mine and Reclamation Plan. Prescription 8.2.2 allows for the exploration and development of existing mine leases.

3.5.6 Selenium Issues with Vegetation

The uptake of selenium and other trace elements by plants is correlated to the availability of those trace elements in the soil. Several studies have investigated selenium uptake in plants on reclaimed phosphate mining areas in southeast Idaho. NewFields (2005) measured the COPC (including selenium) content of terrestrial vegetation across Smoky Canyon Mine Panels A, D, and E, both within and adjacent to mined areas that have been reclaimed. Reclamation in Panels A, D, and the early parts of Panel E did not include selenium control measures (capping) common to current mining practices. Much of the Panel E overburden fills have been capped with chert and topsoil. Mean selenium accumulation in terrestrial vegetation (including browse and forage species) growing on reclaimed overburden fills was 4.42 mg/Kg dry weight (dw), whereas mean selenium accumulation in terrestrial vegetation growing in native soils adjacent to the reclaimed areas was 0.3 mg/Kg dw. JBR (2001c) sampled reclamation vegetation across the same Smoky Canyon Mine Panels collecting forb and grass samples from six different reclamation sites. They found vegetation rooted in unsorted overburden had the highest selenium values, whereas vegetation rooted in topsoil spread over a chert cap had selenium uptake that was comparable to background levels. Mean dry weight concentration of selenium in all vegetation sampled from the reclaimed areas by JBR was 12.11 mg/Kg dw, relative to background levels of 0.25 mg/Kg dw. Alfalfa sampled on five of the treatment areas showed the highest selenium levels (15.3 - 98.0 mg/Kg dw), with the exception of one sainfoin sample. These values exceed the threshold selenium value for grazing animal forage, established at 5 mg/Kg dw (National Research Council 1980).

At Wooley Valley Mine, approximately 20 miles west of Smoky Canyon Mine, Mackowiak et al. (2004) found that the mean vegetation selenium content from an overburden fill site was 38 mg/Kg dw. Mean selenium values for legume, grass, and tree species growing on the historical Wooley Valley Mine reclamation site were all greater than 5 mg/Kg dw, whereas forb and shrub species growing on the site had lower selenium values. A study where alfalfa was grown in pots showed similar selenium uptake levels as grass species, supporting Stark and Redente's (1990) theory that alfalfa's ability to uptake trace elements from oil-shale deposits was due to its deeper root penetration. Mackowiak et al. (2004) suggested that substituting native shrub and forb species for alfalfa may lessen the risk of selenium toxicosis in livestock and wildlife. Alfalfa and sainfoin are no longer used in reclamation seed mixes for phosphate mines in southeast Idaho on USFS system lands.

When seleniferous overburden material lies beneath topsoil and a layer of low-selenium chert, selenium uptake would largely depend on the ability of roots to penetrate these upper layers and make contact with the overburden. Nobel (1991) compared the root characteristics of various groups of vegetation and found that winter annuals and perennial grasses generally had maximum root depths of less than three feet. Native trees and shrubs, if reestablished through either reclamation or natural colonization, would have greater root penetration. Of the



Modified from Maxim Technologies, Inc.,

Figure 3.5-2
Noxious Weeds
Smoky Canyon Mine Panels F and G

common tree species found in the Project Area, reports could be found for subalpine fir, lodgepole pine, Douglas-fir, and quaking aspen (Stone and Kalisz 1991). Douglas-fir maximum root depths were reported from five studies (12.1, >10.5, 4.9, 9.8, and approximately 32.8 feet). Subalpine fir maximum root depths were reported from two studies (4.9 and >13 feet). Lodgepole pine maximum root depths were reported from three studies (>3.3, >6.6, and >10.8 feet), and quaking aspen maximum rooting depths were reported from six studies (4.9, 7.5, >9.8, 4.9, >9.8, and >5.9 feet). In a survey of reported maximum rooting depths of 253 herbaceous and woody plants, Canadell et al. (1996) found that the mean maximum root depths of herbaceous plants, shrubs, and trees were 8.5, 16.7, and 23.0 feet, respectively.

Within the last several years, Simplot has begun using a cap design that includes four feet of chert and one to two feet of topsoil for all seleniferous overburden reclamation activities at the existing Smoky Canyon Mine. Sampling reclamation vegetation growing on these capped areas has demonstrated a lack of selenium accumulation in the vegetation compared to areas where reclamation vegetation is growing directly on top of seleniferous overburden (JBR 2001c, NewFields 2005).

3.6 Wetlands

Wetland resources in the Project Area and along proposed haul/access road and conveyor corridors were surveyed by Maxim Technologies, Inc. (Maxim) in 2003 and 2004. The Maxim surveys identified potentially jurisdictional wetlands and Waters of the U.S. within areas that may be affected by the Proposed Action and alternatives (**Figure 3.6-1**). The results of these surveys are presented in several reports addressing various phases of the Proposed Action and alternatives (Maxim 2003b; 2004h; 2004i). Data from these reports are summarized below.

Waters of the U.S. include channels that show evidence of conveying flowing water on at least an average annual basis and have the presence of a defined bed and banks. Maxim's reports identify Waters of the U.S. by the acronym WUS, or as "non-wetland waters." The acronym WOUS is also used to identify Waters of the U.S. Concerning RFP Standards and Guidelines for wetlands and aquatic resources (USFS 2003a:3-16), direction is provided in Prescription 2.8.3 (USFS 2003a:4-45 to 4-53). This prescription applies to the Aquatic Influence Zone (AIZ) associated with lakes, reservoirs, ponds, streams, and wetlands. Default AIZ widths for wetlands include: 1) for wetlands > 1 acre, the AIZ would consist of an area 150 feet slope distance from the maximum pool elevation of the wetland, and 2) for wetlands < 1 acre, the AIZ would consist of an area 50 feet slope distance from the edges of the wetland. Within the Study Area, there are approximately 1,225 acres of AIZs that are associated with perennial and intermittent streams (fish-bearing and non-fish-bearing) and identified wetlands.

Maxim further identified channels as ephemeral, intermittent, and perennial. Ephemeral channels flow only during periods of snow melt or intense precipitation events. Intermittent channels support surface flow for only a portion of the year. Flow in these channels occurs as a result of snow melt, precipitation events, and in part as a result of seasonal groundwater discharge. Perennial channels flow year round, with flow supported by continuous groundwater discharge.

Some channels may be ephemeral or intermittent in their upper reaches and perennial in some (usually lower) reaches. Channels were examined for evidence of an average annual flow. In particular, channels were examined for evidence of an ordinary high water mark (OHWM). Channels exhibiting evidence of an OHWM and that share a connection to interstate waters or waters used in interstate commerce are generally identified as Waters of the U.S.

Potential wetland areas were evaluated using the methodology specified in the USACE's Wetland Delineation Manual ("Manual") for conducting routine onsite wetland delineations (USACE 1987). The vegetation, soils, and hydrology were examined at potential wetland sites. As described in the Manual, potentially jurisdictional wetlands must meet specific vegetation, soils, and hydrology criteria. Waters of the U.S., including wetlands, that may be used in interstate commerce are identified as jurisdictional waters under the Clean Water Act (CWA).

Dredge and fill activities within jurisdictional areas are regulated by the USCOE. If wetlands are present adjacent to a Waters of the U.S., USCOE jurisdiction extends beyond the ordinary high water mark of the waters to the limit of the adjacent wetlands. Wetlands located along Crow Creek were identified based on National Wetland Inventory (NWI) maps. Maxim did not field-verify the majority of these NWI-mapped wetlands along Crow Creek due to access restrictions. The boundaries of these wetlands as taken from the NWI maps may not be completely accurate.

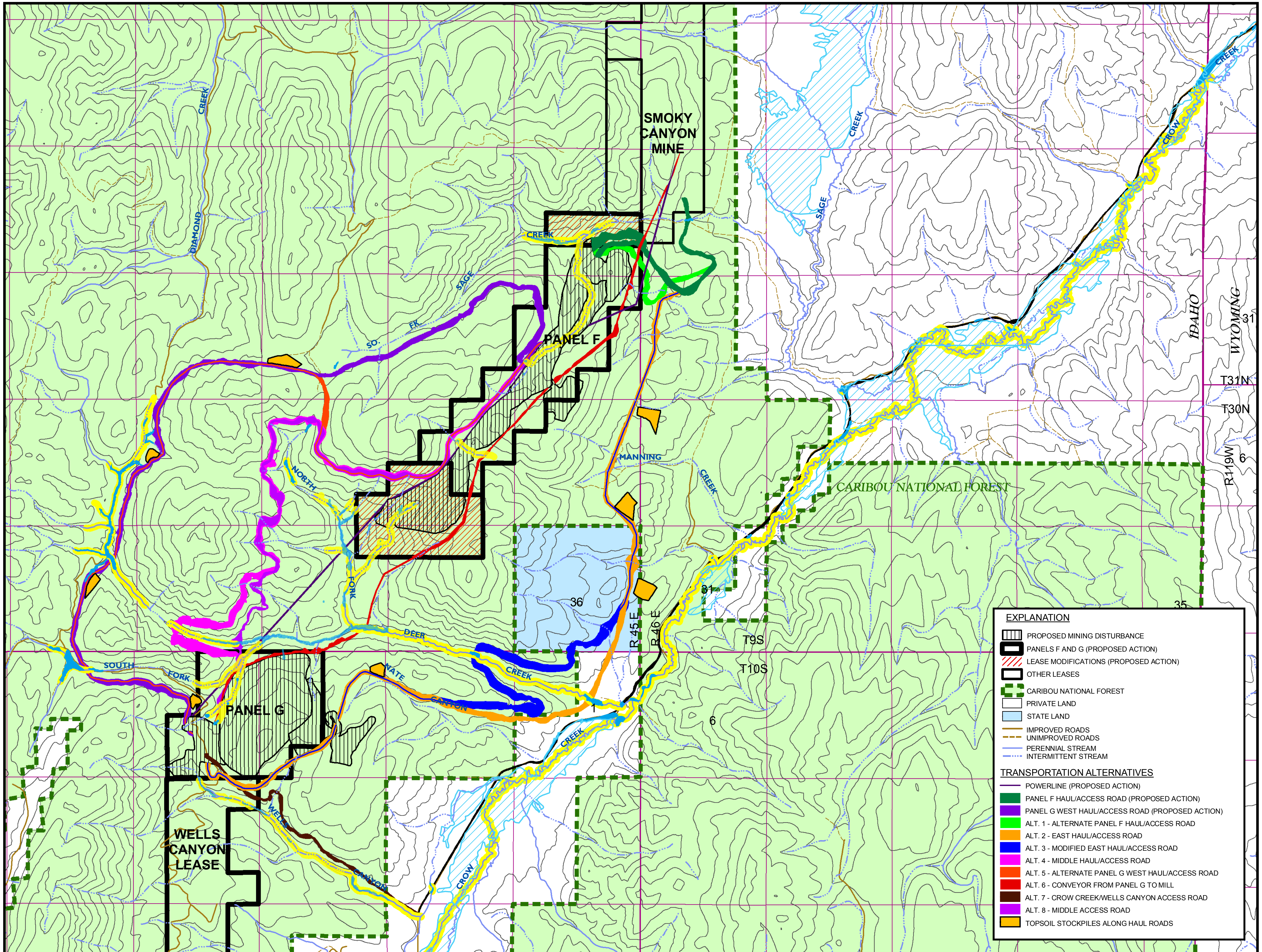
3.6.1 SWANCC Decision

The USACE regulates dredge and fill activities in Waters of the U.S. (including wetlands) under Section 404 of the Clean Water Act. Waters of the U.S. include navigable waters and their tributaries, including adjacent wetlands; interstate waters and their tributaries, including adjacent wetlands; and all other Waters of the U.S. "such as isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters that are not a part of a tributary system to interstate waters or navigable Waters of the U.S., the degradation or destruction of which could affect interstate commerce" (Federal Register 1982). On January 9, 2001, the U.S. Supreme Court ruled in the Solid Waste Agency of Northern Cook County (SWANCC) case that the USACE cannot invoke migratory bird use as the sole basis under which the USACE may assume jurisdiction over certain isolated Waters of the U.S., including isolated wetlands (Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers, No. 99-1178). Prior to this Supreme Court ruling, the USACE considered migratory bird use of isolated wetlands to be a tie to interstate or foreign commerce. As a result of the SWANCC decision, the rationale for USACE's jurisdictional determinations has changed. The USACE may now require the presence of a defined channel/bed and bank connection to known interstate waters or to waters with a clear tie to interstate commerce before taking jurisdiction. Several isolated, non-jurisdictional wetlands were identified within the Project Area.

3.6.2 Wetland Functions and Values

Wetland functions and values were assessed and rated using the methods developed for the Montana Department of Transportation (MDT) (Berglund 1999). Wetland functions include wildlife and fish habitat (including habitat for listed and/or sensitive species and for general wildlife and fish habitat), flood attenuation, long- and short-term water storage, sediment and nutrient retention and removal, sediment and shoreline stabilization, production export and food chain support, and groundwater recharge and discharge. Wetland values include uniqueness and recreational and educational potential. Parameters which include both function and value include habitat for federally listed, proposed and candidate plants and animals and habitat for animals and plants receiving special status from state agencies.

Note: Base data from Caribou National Forest GIS data sets.
Topography from U.S.G.S. 30-meter Digital Elevation Model.
Contour interval 40 feet.



NWI Mapped Wetlands
2002-2004 Maxim Mapped Wetlands
Waters of the U.S.

N
Scale 1:48,000
0 Feet 4,000

Figure 3.6-1
Wetlands
Smoky Canyon Mine Panels F and G

Wetlands are assessed and assigned a functions and values rating for each of twelve functions and values categories. Functions and values points are then summed and expressed as a function of the possible total. Functions that do not apply are not included in the point total. This percentage is then used to rank the functions and values of the wetland in one of four categories, with Category I the highest ranking and Category IV the lowest. Category I wetlands include rare, unique and/or pristine wetland systems; Category IV wetlands represent severely degraded systems. The wetlands functions and values rating, multiplied by the area of the wetland, also provides a measure of "Wetlands Functional Units." Functions and values for each delineated wetland are available in Maxim 2003b, 2004h, and 2004i.

3.6.3 Wetland Types

The Maxim delineations also classified wetlands found in the area by Hydrogeomorphic (HGM) type (Brinson 1993) and classified wetlands according to the USFWS's Wetland Classification System (Cowardin et al. 1979). The HGM classification categorizes wetlands based on the abiotic features that maintain wetland ecosystem function, such as hydrologic and geomorphic controls (Maxim 2003b). The USFWS Cowardin system categorizes wetlands based on vegetative cover and the role vegetation plays in the structure and function of wetlands. Common Cowardin wetland types in the Project Area include palustrine emergent (PEM) wetlands, which include wetted areas with emergent vegetation and wet meadows; and palustrine scrub-shrub (PSS) wetlands, which include willow stands.

3.6.4 Findings on Extent and Jurisdictional Status of Wetlands

The findings discussed below represent Maxim's evaluation of the extent and jurisdictional status of wetlands and Waters of the U.S. found in the Study Area. As displayed in **Figure 3.6-1**, numerous wetlands were identified throughout the area. No delineation becomes official until it has been verified by the USACE. The USACE conducted a field verification of the Panel F and Panel G delineation, including the areas of the proposed North and South Lease Modifications. With the exception of a single wetland area in the Panel F South Lease Modification Area, the Corps concurred with Maxim's 2003 findings (USACE 2003). The USACE also conducted a field verification for a delineation on potential haul roads and Crow Creek Road (Maxim 2004h) and concurred with the findings, but the USACE has not yet verified the findings in the Maxim (2004i) delineation, an addendum report to Maxim (2004h). Accordingly, the figures for jurisdictional extent of wetlands and Waters of the U.S. found in these portions of the survey area may change. Further, because mining in Panel G may not begin for a number of years, the USACE has determined a verification of the extent of wetlands and Waters of the U.S. in the Panel G area would occur at a later date.

Panel F Lease Area

Maxim (2003b) identified two ephemeral stream reaches within the Panel F lease area (**Figure 3.6-1**). One of these reaches is on Manning Creek, in the southern portion of the proposed lease area. The second is an unnamed ephemeral tributary to the South Fork of Sage Creek located in the northern and central portions of the Panel F lease area. This ephemeral tributary drains the majority of the proposed Panel F lease area north of the Manning Creek watershed. While channel definition in the lower end of this unnamed tributary to the South Fork of Sage Creek is lost, Maxim indicated a groundwater connection exists between this tributary and the South Fork of Sage Creek. Accordingly, Maxim identified both of these channels as potentially jurisdictional features. The delineation also identified three small wetland areas within the Panel

F lease area (**Figure 3.6-1**). One of these wetlands is located at the head of Manning Creek, and the second is adjacent to the unnamed tributary to the South Fork of Sage Creek. Both of these wetlands are considered to share a connection with interstate waters (Manning Creek is directly tributary to Crow Creek, while the unnamed channel is tributary to the South Fork then the main fork of Sage Creek). These sites were identified as potentially jurisdictional wetlands. A third small wetland area is isolated and was identified as a non-jurisdictional site. The two potentially jurisdictional wetlands include a total area of approximately 0.05 acre and a combined Functional Unit score (the functions and values rating multiplied by the acreage of the wetland) of 0.133. Both of these wetlands are developed springs, and are identified as PEM wetlands. The isolated and non-jurisdictional wetland is approximately 0.07 acre in size and was given a Functional Unit score of 0.330. This site is identified as a fen (an area of peat that is fed by groundwater) and as a PEM wetland.

Panel F, North Lease Modification Area

An intermittent reach of the South Fork of Sage Creek passes through the Panel F North Lease Modification Area. Maxim (2003b) identified this intermittent reach of the South Fork of Sage Creek as a potentially jurisdictional channel (**Figure 3.6-1**). Maxim (2003b) also identified a portion of the ephemeral unnamed tributary to the South Fork of Sage Creek as being within the Panel F North Lease Modification Area and a potentially jurisdictional Waters of the U.S. Three wetland areas were identified within or partially within the Panel F North Lease Modification Area. Two of these sites are located on and adjacent to the South Fork of Sage Creek, and both were identified as potentially jurisdictional features. A small isolated wetland area was identified as non-jurisdictional. The two jurisdictional wetlands include a total area of approximately 3 acres and were given a Functional Unit score of approximately 27.6. The isolated and non-jurisdictional wetland is 0.01 acre in size and was given a Functional Unit score of 0.130. All three of these wetlands were identified as riverine/slope/PEM wetlands.

Panel F, South Lease Modification Area

Maxim (2003b) identified two unnamed tributaries to the North Fork of Deer Creek as being within the Panel F South Modification Lease Area. These two tributaries drain southwest from the lease modification area. Both are ephemeral within the lease modification area. Based on evidence of a groundwater connection to the perennial North Fork of Deer Creek, both these channels were identified as potentially jurisdictional Waters of the U.S. (**Figure 3.6-1**). A total of 14 wetland areas within the Panel F South Lease Modification Area were also identified. The Maxim delineation and subsequent USACE verification identified all but one of these wetlands as jurisdictional features. The majority of wetlands present within the Panel F South Modification Lease Area were identified as riverine features on ephemeral channels. Twelve of these wetlands were identified as Palustrine Scrub-Shrub PSS wetland features; one was identified as a fen/PEM wetland. The thirteen jurisdictional wetlands include a total area of approximately 0.84 acre and a combined Functional Unit score of 3.57. The single isolated and non-jurisdictional wetland is approximately 0.02 acre in size and was given a Functional Unit score of 0.090. This site was identified as a fen, and as a PEM wetland.

Panel G Lease Area

Maxim (2003b) identified two ephemeral drainages within the Panel G lease area. These drainages are the South Fork of Deer Creek and an unnamed tributary to this named drainage. The unnamed tributary includes two forks in its upper reaches. Maxim (2003b) identified both of these drainages, including both forks of the unnamed drainage, as potentially jurisdictional Waters of the U.S. (**Figure 3.6-1**).

Maxim (2003b) also identified six wetland areas within the Panel G lease area (**Figure 3.6-1**). Five of these six wetlands were identified as riverine features/PSS wetlands adjacent to the South Fork of Deer Creek or its unnamed tributary. These five features were identified as potentially jurisdictional. The sixth wetland was identified as an isolated, non-jurisdictional feature, located south of the South Fork of Deer Creek. The five jurisdictional wetlands, all identified as riverine systems on ephemeral streams, include approximately 0.4 acre and a combined Functional Unit score of 1.513 for the area of potentially jurisdictional wetlands. The single isolated wetland is approximately 0.3 acre in size and received a Functional Unit score of 1.715. This wetland was identified as a fen/PEM wetland.

3.6.5 Haul/Access Roads and Conveyor Corridors

A delineation of wetlands and Waters of the U.S. that occur within potential haul/access road corridors was also conducted (Maxim 2004h and 2004i). Wetlands and Waters of the U.S. in the area of a potential utility corridor between Panels F and G were identified in the original Deer and Manning Creek Lease Area delineation (Maxim 2003b). A potential conveyor and power line corridor between Panels F and G were located within this Potential Utility Corridor Area. A summary of the findings for the corridors is summarized below.

Panel F Haul/Access Road and Alternate Corridor

This corridor crosses a defined, ephemeral reach of the South Fork of Sage Creek (**Figure 3.6-1**). The Alternate corridor for the haul/access road crosses the defined, but non-perennial reach of the South Fork Sage Creek and crosses one undefined tributary at two locations.

Panel G West Haul/Access Road and Alternate Corridors

The West Haul Road would cross the upper reaches of Deer Creek and the South Fork of Deer Creek, both of which are identified as Waters of the U.S. (**Figure 3.6-1**). Maxim (2004h and 2004i) identified a fen-marsh complex/PEM-PSS wetland in the upper reaches of South Fork Deer Creek at the confluence of two tributaries. A riverine/PSS wetland also occurs along Deer Creek. As the corridor gradually turns toward the northeast, then north, an area of PSS wetland and an unnamed tributary channel located above the upper reaches of Deer Creek occur within the corridor. The corridor would either follow the upper reaches of the South Fork of Sage Creek to the northern end of the Panel F Lease Area (Proposed Action), or, alternately (Transportation Alternative 5), turn south above the upper reaches of the North Fork of Deer Creek and enter the Panel F South Lease Modification Area. A small wetland area was identified at the headwaters of the South Fork of Sage Creek in Sage Meadows. The delineation did not include the majority of the Sage Meadows area, because potential haul road access corridors are outside the area.

Middle Haul Road and Middle Access Road Corridor

The Middle Haul/Access Road corridor crosses a defined, but non-perennial reach of Deer Creek north of Panel G. Maxim (2003b) indicates this reach of stream is just above a large riverine/PSS wetland complex (**Figure 3.6-1**). The Middle Access Road corridor would cross a narrow section of this wetland complex. At its northern end, the corridor crosses a small wetland located at the head of a tributary to the North Fork of Deer Creek. The corridor also crosses five undefined channels (Maxim 2004i) situated between the main channel of Deer Creek and the headwaters of the North Fork of Deer Creek.

East Haul/Access Road
From south to north, this corridor crosses an undefined tributary to Wells Creek east of the southern portion of Panel G and then turns east and crosses an undefined channel in Nate Canyon. This corridor would then cross a large wetland complex (approximately 0.9 acre), identified as a riverine/PSS-PEM wetland, associated with the lower reaches of Deer Creek just west of Crow Creek Road (**Figure 3.6-1**). North of Deer Creek, this corridor would cross six undefined drainages, including the undefined Manning Creek channel. The corridor would also cross a non-perennial channel east of the northern end of Panel F and a defined but non-perennial reach of the South Fork of Sage Creek in the same corridor as the Panel F Haul/Access Road corridor.

A Modified East Haul Road alignment would cross Deer Creek higher in the drainage (above the East Haul/Access Road corridor). This alignment would cross a riverine/PSS-PEM wetlands complex adjacent to the Deer Creek channel at the crossing location (**Figure 3.6-1**).

Crow Creek-Wells Canyon Access Road
The Crow Creek-Wells Canyon access road would generally follow the existing Crow Creek Road. A proposed access road corridor has been identified north of Wells Creek and would access the southern boundary of Panel G.

Maxim (2004h and 2004i) identifies eight Waters of the U.S. crossings and approximately 15 wetland areas along Crow Creek that may occur within the Crow Creek Road corridor (**Figure 3.6-1**). From south to north, the eight Waters of the U.S. (Non-wetland waters) crossings identified in Maxim, 2004h are: a ditch north of Wells Canyon; Deer Creek; Quakie Hollow; Sage Creek; an unnamed tributary to Crow Creek; Herdmane Hollow; a second unnamed tributary to Crow Creek; and possibly a reach of Crow Creek. Wetlands that occur along the potential Crow Creek-Wells Canyon Access Road include primarily riverine/PSS and PEM wetlands along Crow Creek and its tributaries.

3.7 Wildlife Resources

The CNF, its uses, and resources are managed with the guidance of the RFP (USFS 2003a). The Desired Future Conditions (DFC) and objectives for wildlife resources are achieved by using the forest-wide standards and guidelines and the standards and guidelines for the Biological Elements section as set forth in the Management Prescriptions of the RFP. Forest Plans provide for viability of vertebrate communities within multiple use objectives. The CNF uses the planning process and ongoing monitoring, evaluation, and adjustment of fish, wildlife, and rare plant standards to prevent listing of species under the Endangered Species Act and to avoid extirpation of species from its actions (USFS 2003a).

Maxim conducted a baseline assessment of wildlife resources within the Study Area during 2003. These studies provide baseline data on wildlife resources that might be influenced by any of the action alternatives. A baseline technical report was prepared and provides details on Maxim’s methodologies, results, and conclusions (see Maxim 2004j). The following is largely summarized from this report. Additional pertinent information is also included and cited appropriately.

The dominant vegetation types in the Study Area are forest, sagebrush, and riparian communities, and are discussed in detail in **Section 3.5** of this document. In summary, the dominant forested habitats are aspen and subalpine fir types. Other forest communities include aspen/conifer, Douglas-fir, and in some cases, mountain mahogany. Aspen is the most productive forest community type on the CNF in terms of wildlife diversity and herbaceous cover (USFS 2003b) as it provides areas for big game calving, browse and foraging areas for a variety of wildlife, nesting areas for arboreal bird species, and security areas. The sagebrush community is dominated by mountain big sagebrush and various forbs and grasses. Rangeland communities, including sagebrush, provide a wide array of habitats for wildlife species found on the CNF. Wetlands and/or riparian habitats occur along Crow Creek, Deer Creek, South Fork Sage Creek, and in Wells Canyon. Of the 334 avian, terrestrial, and amphibian species known or suspected to occur on the CNF, 277 are either directly dependent on riparian areas or use riparian habitats at some time during their lives (USFS 2003b). Other non-forest communities include wet meadow, forb/graminoid, and mountain snowberry/sagebrush.

Wildlife groups are discussed below, including Threatened, Endangered, Proposed, and Candidate (TEPC) species; Management Indicator Species (MIS); Sensitive (S) species; Migratory Land Birds, and other mammals, birds, amphibians, and reptiles. MIS have changed since the original CNF Forest Plan; changes to this list of species can be found in the CNF RFP (USFS 2003a) and are incorporated in the MIS section below (see **Table 3.7-4**).

3.7.1 Threatened, Endangered, Proposed, and Candidate Wildlife Species

The US Fish and Wildlife Service (USFWS) identified four TEPC species that are known or expected to occur on the CNF (Species List #1-4-05-SP-0354). These species are listed in **Table 3.7-1**; background information on each species follows the table. Additional information can be found in USFS (2003b:appendix D) and Maxim (2004j).

TABLE 3.7-1 THREATENED, ENDANGERED, PROPOSED, AND CANDIDATE WILDLIFE SPECIES KNOWN OR SUSPECTED TO OCCUR ON THE CARIBOU NATIONAL FOREST

COMMON NAME	SPECIFIC NAME	USFWS STATUS
Gray Wolf	*Canis lupus*	Endangered[1]
Canada Lynx	*Lynx Canadensis*	Threatened
Bald Eagle	*Haliaeetus leucocephalus*	Threatened
Western Yellow-Billed Cuckoo	*Coccyzus americanus*	Candidate

[1]Population in/near Project Area is considered experimental/nonessential

Gray Wolf
Prior to European colonization, the wolf occupied most habitats in the northern hemisphere. Predator control and other persecution have reduced the wolf's range to Canada, Alaska, and portions of the northern tier of the continental United States. Recently, wolves have been reintroduced into some portions of their former range. In 1995, in an attempt to reintroduce wolves into the Yellowstone area, the USFWS began releasing wolves captured in Canada into Yellowstone National Park. Similar reintroductions were attempted in central Idaho. The reintroduced wolves have increased in numbers, and animals have dispersed into some surrounding areas. The populations established by this release effort are considered

experimental, nonessential populations. In Idaho, all wolves south of Highway I-90, which runs through the Idaho Panhandle approximately 400 miles north of the Project Area, are also considered part of an experimental, nonessential population. Wolves east of Interstate 15, which runs through McCammon, Pocatello, and Idaho Falls, and passes approximately 56 miles west of the Project Area, are considered part of the Yellowstone experimental, nonessential population.

Wolves are sociable animals, frequently traveling and hunting in packs. Prey species preferred by wolves include deer, elk, moose, and beaver. Wolves require habitat suitable for denning (i.e., areas with sufficient vegetative cover and isolation from human interests/uses), and "rendezvous sites" for resting and gathering (i.e., meadows adjacent to forested areas). Any habitat in the Study Area could provide movement routes for wolves. Standards associated with wolf habitat (USFS 2003a:3-30) restrict disturbances within one mile of an active den or rendezvous site. Throughout the year, wolves also require accessibility to prey species (i.e., within the ranges of ungulates year-round, and riparian zones for beaver in spring, summer, and fall). Within the ranges of ungulates and their calving grounds, wolves need relatively large spaces in which to hunt.

In recent years, a single wolf was reported in the Caribou County area. In late fall of 2000, a wolf which had been preying on sheep in Caribou County was killed under a taking provision authorized by USFWS (USFWS 2000). Track surveys conducted in the area of sheep kills indicated a single wolf was involved in these predations. This wolf probably dispersed from one of the Yellowstone packs. The closest known wolf pack is located west of Daniels, Wyoming, 50 miles northeast of the Project Area (USFWS et al. 2004). During May 2002, Maxim personnel documented wolf tracks near the confluence of South Fork Deer and Deer Creeks. Wolf tracks were observed in the spring of 2003 approximately ¼ mile west of the confluence of Deer and North Fork Deer Creeks. Though suitable habitat and prey are present, wolves are likely transients in the Study Area, as resident occurrence has not been documented.

Canada Lynx

The Canada lynx is a predator of the northern boreal forests of Canada, Alaska, and the Rocky Mountains and north Cascades. Preferred habitats include boreal forests with openings, bogs, and thickets; old growth taiga; mixed or deciduous forest and wooded step. Early successional stands with high shrub and seedling densities are optimal habitat for snowshoe hare (*Lepus americanus*), the major prey species, and are therefore important to the lynx. Denning occurs in mature forest stands, which also provide important cover and travel corridors (Koehler and Brittell 1990).

It has been determined that suitable lynx habitat on the CNF is too patchy and disjunct to provide suitable resident lynx habitat. Accordingly, it was determined that no Lynx Analysis Units will be identified on the CNF. Habitat on the CNF may however, provide linkage habitat for lynx. Such habitat is used during lynx movement, including dispersal. According to Ruediger et al. (2000), lynx habitats in the Rocky Mountains often occur as "islands of coniferous forest surrounded by shrub-steppe habitats." Lynx movement between these forested habitats is poorly understood, but use of shrub-steppe habitats adjacent to boreal forests has been documented. In the broad sense, connectivity between lynx habitats in Canada and the U.S. may be necessary for the persistence of some southern lynx populations. These southern populations, if isolated, may be too small to maintain themselves over the long term.

Maxim conducted winter track surveys in the Project Area and found no evidence of lynx (Maxim 2004j). Maxim (2000b) notes that a local trapper working in the area for the past 15 years had never seen evidence of lynx. Two unconfirmed lynx were reportedly taken in the area in the 1960s, and an unconfirmed sighting occurred in 1997. A lynx reportedly died a few years ago on the Wyoming Range, 50 miles northeast of the Project Area (USFS 2005a).

Bald Eagle

During the breeding season, bald eagles are closely associated with water and occur along coasts, lakeshores, or riverbanks, where they feed primarily on fish. Bald eagles typically nest in large trees, primarily cottonwoods (*Populus* sp.) and conifers, although they have also been known to nest on projections or ledges of cliff faces. During winter, bald eagles concentrate wherever food is available. Areas of open water, where fish and waterfowl can be taken, are common wintering sites (USFWS 1998).

The CNF mid-winter bald eagle survey results from 1986 to 2005 (USFS 2003c, 2004a, and 2005b) indicate bald eagle use of the Crow Creek drainage in winter. An annual, one-day snowmobile survey is performed in January along Crow Creek Road from the Caribou/Bear County boundary to Poison Creek near the Idaho–Wyoming border (survey route number 48). This route includes the portion of the Study Area encompassing the Crow Creek drainage. During the 2003 survey, an adult bald eagle was observed in the Study Area on a perch near the confluence of Rock and Crow Creeks (Maxim 2004j). Results from the 2004 midwinter survey showed two eagles, one flying north above the creek between Manning Creek and the CNF boundary, the other in an aspen tree at the Sage Creek/Deer Creek confluence (USFS 2004a). During the 2005 midwinter survey, one juvenile bald eagle was observed from Crow Creek Road flying up Sage Creek (USFS 2005b). The nearest confirmed bald eagle nest is located near the Blackfoot River, approximately 20 miles northwest of the Project Area (JBR 2004d). Nests are also known to occur along the Snake River (>60 miles northwest of the Project Area) and around Palisade Reservoir (>30 miles north of the Project Area; USFS et al. 2005).

Standards and Guidelines for occupied nesting zones, primary use areas, and home ranges stated in the RFP (USFS 2003a:3-28 and 3-29) do not apply because there is no nest within 2.5 miles of the Project Area. Guidelines related to minimizing conflicts with bald eagle winter foraging and roosting habitat would apply.

Western Yellow-Billed Cuckoo

Western yellow-billed cuckoos breed in large blocks (>20 acres) of riparian habitat, typically woodlands with cottonwoods and willows. No areas of potential habitat have been identified on the CNF (USFS 2003b:3-212), and the species will not be discussed further in this EIS.

3.7.2 Sensitive Wildlife Species

In addition to TEPC and MIS species, the Regional Forester identifies Sensitive species as those for which population viability is a concern, as evidenced by significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species' existing distribution. Sensitive species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that could result in the need for federal listing (FSM 2672.1). Sensitive species potentially occurring in the Study Area are listed in **Table 3.7-2**, followed by background information on each species. Additional information can be found in USFS (2003b:Appendix D) and Maxim (2004j).

TABLE 3.7-2 USFS SENSITIVE WILDLIFE SPECIES KNOWN OR SUSPECTED TO OCCUR ON THE CARIBOU NATIONAL FOREST

COMMON NAME	SPECIFIC NAME
Pygmy Rabbit	*Brachylagus idahoensis*
Spotted Bat	*Euderma maculatum*
Wolverine	*Gulo gulo*
Townsend's Big-Eared Bat	*Corynorhinus townsendii*
Boreal Owl	*Aegolius funereus*
Greater Sage-Grouse	*Centrocercus urophasianus*
Trumpeter Swan	*Cygnus buccinator*
Peregrine Falcon	*Falco peregrinus*
Harlequin Duck	*Histrionicus histrionicus*
Flammulated Owl	*Otus flammeolus*
Northern Three-Toed Woodpecker	*Picoides tridactylus*
Great Gray Owl	*Strix nebulosa*
Columbian Sharp-Tailed Grouse	*Tympanuchus phasianellus columbianus*
Northern Goshawk	*Accipiter gentiles*
Columbia Spotted Frog	*Rana luteiventris*

Pygmy Rabbit

There are no known occurrences of the pygmy rabbit on the CNF (USFS 2003b:D-155) and it is not expected to occur within the Study Area due to the lack of suitable habitat (i.e., dense sagebrush and soft/friable soils). This species will not be discussed further in the EIS.

Spotted Bat

The spotted bat occurs in a variety of habitats from desert to montane coniferous forest, including pinyon-juniper woodlands, ponderosa pine, open pasture, and coniferous forest up to 8,000 feet elevation. These bats roost in deep rock crevices in canyon walls and cliffs and rarely inhabit caves. Forage areas are primarily over dry, open coniferous forest often associated with riparian or wet meadows (Maxim 2004j).

In Idaho, the spotted bat occurs primarily in the southwest corner of the State. The first specimen collected in Idaho was found in Canyon County (IMNH 2001), and the species has only recently been documented in the canyons of Owyhee County (Groves et al. 1997). An unconfirmed report of spotted bat occurrence in the Long Valley Area of Grey's Lake is the only indication that spotted bats may be present in southeast Idaho (USFS 2005c). Populations are also known to occur in the northeast portion of the Greater Yellowstone Area in Montana and Wyoming. Maxim's 2004 and past surveys on the CNF have not documented the presence of spotted bat (USFS 2003b:3-214).

Wolverine

Wolverines inhabit a wide variety of habitats, though they are usually associated with remote montane-forested areas. Hornocker and Hash (1981) reported that wolverines preferred mature forests, followed by ecotones and rocky areas on timbered benches. Wolverines were most often observed in medium to scattered timber, usually subalpine fir. Wolverines appeared to avoid clearcuts, dense young stands of timber, recent burns, and wet meadows. They are vulnerable to trapping and other human activities.

The Predator Conservation Alliance (2003) estimates that up to 300 wolverines persist in Idaho, based on research and sightings in mountainous portions of the state. Records from Wyoming are from the western third of the State, and there is some evidence that their range has expanded into the southwestern part of the State (Banci 1994). The USFS verified two wolverine tracks located within the CNF at the following locations: 1) approximately 25 to 30 miles north-northwest of the Project Area in the vicinity of Caribou Mountain on the north end of the Caribou portion of the Forest and 2) along the divide between Mink Creek and Liberty Creek in the Bear River Range (Maxim 2004j). Unverifiable ("probable") wolverine tracks were located by USFS six miles southwest of the Project Area. The Idaho Conservation Data Center (CDC) lists one wolverine sighting in 1977, approximately 5 miles north of the Project Area. No evidence of wolverines was observed by Maxim in 2004. Wolverine occurrence is unlikely though possible, as potential denning habitat (subalpine fir) and prey base exist within and in the vicinity of the Project Area.

Townsend's Big-Eared Bat

The Townsend's big-eared bat occurs in much of western North America and is rare or uncommon throughout much of its range. Townsend's big-eared bats occur in a variety of habitats from desert shrub to deciduous and coniferous forest over a wide range of elevations. During the summer, these bats roost in abandoned mines, caves, and occasionally in empty or occupied buildings or bridges. Research in California found two females roosting in tree cavities, which may be an important undocumented source of maternity colonies (IMNH 2001). Maternity colonies and winter hibernacula occur in mines and caves where the species hibernates singularly or in small groups. Townsend's big-eared bats forage near the foliage of trees and shrubs, and individuals have a high degree of site fidelity (Maxim 2004j).

In Idaho, hibernacula for Townsend's big-eared bats have been found in 17 counties, and four maternity colonies have been found in Boundary, Bonner, and Butte counties (IMNH 2001). There are known populations of the species in Yellowstone and Grand Teton National Parks, approximately 75 miles northeast of CNF, and at Craters of the Moon National Park approximately 125 miles northwest (Clark et al. 1989). Although the Townsend's big-eared bat was not detected within the Study Area (Maxim 2004j), past surveys on the CNF have found the species in the Bear River Range, Pruess Range, Portneuf Range, and Elkhorn Mountains (USFS 2003b:3-214). Although no caves were observed during Maxim's surveys, a single cave was observed by JBR in the South Fork Deer Creek drainage, and it is possible that other caves exist in the Study Area. However, the possibility of roost and hibernacula sites for the Townsend's big-eared bat is low.

Boreal Owl

Boreal owls are typically found in mature to old-growth spruce-fir forests in the Rocky Mountains. They often nest in abandoned northern flicker and pileated woodpecker cavities in large dead or dying conifers or aspens within mixed conifer forests. Use of lodgepole pine is infrequent in most areas. Boreal owl roosting and foraging habitat occurs in relatively closed canopy subalpine fir and Engelmann spruce forests. In summer, owls select cool microsites with a high canopy coverage, high basal area, and high tree density. In winter, these owls use a wider variety of habitats due to reduced thermal stress. Foraging occurs year-round primarily in moderately dense stands of subalpine fir and spruce where access to prey is not hindered by thick herbaceous cover or deep-crusted snow (Hayward 1994).

The nearest CDC record of a boreal owl was a 1985 sighting approximately 13 miles northwest of the Project Area. No boreal owls were detected during the February/April 2003 baseline surveys. Douglas-fir and subalpine fir habitat types within the Study Area may provide mature spruce-fir forest for nesting, and subalpine fir and spruce stands for roosting and foraging. Patchy stands of mature Douglas-fir occur in the Manning Creek drainage; however, large stands of closed-canopy spruce-fir forests were not found. Therefore, the absence of good foraging and roosting habitat may deter boreal owls from using the area. The single boreal owl-specific RFP Guideline (USFS 2003a:3-32) is to maintain 40 percent of the forested acres in mature and old age classes within a 3,600-acre area around nest sites.

Greater Sage Grouse

Sagebrush and forb/graminoid habitat types within the Study Area provide cover habitat and potential lek sites for sage grouse. During 2003 field surveys, four sage grouse were flushed in pastureland along Crow Creek (four miles southeast of Panel G), twelve sage grouse were observed near the confluence of Deer and Crow Creeks (three miles southwest of Panel F South Lease), and three sage grouse were observed approximately one mile north of Manning Creek (2-3 miles east of Panel F). No active or historic sage grouse leks, traditional courtship display areas, were identified. Surveys conducted by IDFG located two sage grouse leks within approximately 10 miles of the Study Area (USFS 2005c). The closest lek was located 3.5 miles east of Panel F along Crow Creek basin. The other lek was located 10 miles northwest of the Study Area near the mouth of Stump Creek.

Trumpeter Swan

Trumpeter swans inhabit freshwater marshes, lakes, reservoirs, ponds, and occasionally rivers with wide stream reaches. The species requires a highly irregular shoreline, diverse vegetation, nesting substrate, space for flight take-off, and low levels of human disturbance for breeding (Maxim 2004j). Trumpter swans were trans-located from northern areas into parts adjacent to the CNF, but the species has not been observed on the CNF itself (USFS 2003b:3-219). Neither suitable habitat for trumpeter swans nor evidence of trumpeter swan individuals was found during 2003 surveys (Maxim 2004j). For these reasons, the species will not be discussed further in this EIS.

Peregrine Falcon

Peregrine falcons occupy a wide range of habitats, typically found in open country near rivers, marshes, lakes, and coasts. Foraging habitat includes wetlands and riparian habitats, meadows and parklands, croplands and orchards, gorges, mountain valleys, and lakes that support good populations of small- to medium-sized terrestrial birds, shorebirds, and waterfowl. Cliffs are preferred nesting sites, although reintroduced birds now regularly nest on man-made structures such as towers and high-rise buildings (USFS 2003b:3-216).

There are historical, but currently unoccupied, nesting cliffs, as well as other potentially suitable nesting cliffs on the CNF. As numbers of peregrines increase in Idaho, some of these cliffs may become occupied. The CNF has the potential to contribute to a further increase in peregrine falcon populations in southeastern Idaho. The closest reported nest is located just west of Soda Springs, 20 miles west of the Project Area (USFS 2005c). There is only one known nest site currently on the CNF, near Grays Lake, approximately 30 miles northwest of the Project Area (USFS 2003b:3-217). The Study Area itself contains no suitable habitat for peregrine falcons.

RFP Standards and Guidelines (USFS 2003a:3-30) require that activities or habitat alterations be minimized within two miles of peregrine falcon nest sites, as well as prohibit the use of herbicides or pesticides (which could cause eggshell thinning) within 15 miles of nest sites.

Harlequin Duck

Harlequin ducks inhabit fast flowing mountain streams or rivers with forested banks. Suitable streams are of second- to fifth-order size, have a one to seven percent gradient, and are usually associated with willow, pole-sized lodgepole pine, ponderosa pine, or Douglas-fir. Large streams with faster flow rates, undercut banks, and cobble to boulder-sized substrate are preferred. Reproduction is limited in areas with high human activity, high stream sedimentation, and a low invertebrate supply (Montana Partners In Flight 2000). There is no harlequin duck habitat in the Study Area. The nearest occurrence of a harlequin duck, provided by the Wyoming Natural Diversity Database (WYNDD), is a 1980 record approximately 17 miles east of the Project Area. No incidental observations of harlequin ducks occurred during 2003 data collection activities and the species is not expected to occur on the CNF (USFS 2003b:3-213). The species will not be discussed further in this EIS.

Flammulated Owl

Flammulated owls occur year-round in cool, temperate, semi-arid climates, migrating when necessary to maintain access to their insect prey. Their range is essentially co-extensive with mid-elevation pine forests. Habitat consists primarily of open ponderosa pine or similar dry montane forests (McCallum 1994). Forests used by flammulated owls include an interspersion of dense thickets for roosting within open, mature to old-growth stands of ponderosa pine, Douglas-fir, or aspen. Dense or young pine-fir stands and extensively cutover areas are avoided. Flammulated owls use woodpecker-excavated cavities in pines, aspens, or Douglas-fir, 7 to 25 feet above ground (DeGraaf et al. 1991). Five flammulated owl observations have been documented on the CNF and include: Worm Creek in 1993, Left Fork Fish Haven Canyon in 1992, Smoky Canyon in 1999, head of East Fork Mink Creek in 1989, and Porcelain Pot Gulch in 1998 (USFS 2003b:3-218).

Drier areas of aspen, aspen/conifer, and Douglas-fir habitat types within the Study Area provide potential habitat for the flammulated owl. Dry, open, mature forests are generally absent. However, small, open patches of mature Douglas-fir interspersed with sagebrush and grassland can be found on south facing slopes in the northern portion of the Panel F lease area. Three flammulated owls were detected in the northeast portion of the Study Area (Maxim 2004j) during dedicated surveys in 2003, although no nest sites were identified. RFP Guidelines for flammulated owl habitat (USFS 2003a:3-32) state that no timber activities are allowed within a 30-acre area around nest sites.

Northern Three-Toed Woodpecker

Northern three-toed woodpeckers are primarily associated with dense subalpine fir and Engelmann spruce forests at higher elevations. They also forage in mixed pine, lodgepole pine, and Douglas-fir stands. Mature to old-growth stands are preferred due to an abundance of insect prey in large snags and downed woody debris. Three-toed woodpeckers are often abundant in forests recently disturbed by fire due to ensuing insect epidemics (Koplin 1972). In April 2001, three-toed woodpecker callback surveys conducted within the Panel F Study Area resulted in two responses (JBR 2001d). An observation of a three-toed woodpecker near the headwaters of Manning Creek is also reported in BLM and USFS (2001). During Maxim's surveys, one three-toed woodpecker was observed on the forested north slope of the South Fork Sage Creek drainage. Older/mature stands of the subalpine fir and Douglas-fir habitat types may provide nesting and important foraging habitat (Maxim 2004j). RFP Standards and Guidelines for three-toed woodpeckers are related to maintaining snag habitat (see USFS 2003a:3-27). However, Prescription 8.2.2(g) – Phosphate Mine Areas, which allows for phosphate mining to occur on existing leases, states that snag habitat for woodpeckers shall not be a management consideration.

Great Gray Owl

The great gray owl is widely distributed throughout boreal forests of western North America, where it is associated with coniferous and hardwood forests, primarily Douglas-fir, aspen, and lodgepole pine stands up to 9,600-feet elevation. It forages in open forests, clear cuts, and meadow edges, primarily preying on voles and pocket gophers (Clark et al. 1989).

Open meadows, adjacent to stands of lodgepole pine and Douglas-fir, are common in the Study Area providing adequate nesting and foraging habitat for great gray owls. Two 1992 Conservation Data Center (CDC) records for the great gray owl exist approximately 3 miles north of the Project Area. An additional 1992 record is located approximately 3 miles west of the Project Area. A pair of great gray owls was observed in the Project Area during dedicated surveys in 2003 (map provided in Maxim 2004j). A follow-up survey in 2005 heard multiple responses in the same location, and concluded that a great gray owl territory is located in Panel G (USFS 2005d). RFP Guidelines for great gray owl habitat (USFS 2003a:3-32) state that within a 1,600-acre area around nest sites, maintain over 40 percent of the forested acres in mature and old age classes.

Columbian Sharp-Tailed Grouse

Historically, sharp-tailed grouse occupied native shrub-grasslands interspersed with scattered woodlands, brushy hills and draws, and edges of riparian woodland habitats throughout much of central and northern North America. It is found in relatively open grassland habitats or in areas with low, scattered brush in late summer and autumn. In winter, it uses relatively dense shrub-thickets such as snowberry, willow, sagebrush, and quaking aspen for escape cover, roosting, and feeding. High structural diversity is preferred for high-quality nesting habitat. The Columbian subspecies inhabits sagebrush-grassland and mountain shrub habitats (Connelly et al. 1998).

Based on GIS data provided by the CNF, the nearest known sharp-tailed grouse lek is located approximately nine miles northwest of the Study Area. No incidental observations of sharp-tailed grouse were made during the 2003 surveys (Maxim 2004j). However, suitable habitat, with sagebrush/grassland - deciduous shrub interfaces, occurs along the Deer Creek and Crow Creek drainages.

Northern Goshawk

Northern goshawks inhabit montane coniferous and deciduous woodland in the western U.S., preferring woodland stands of intermediate to high canopy-closure and a thin understory interspersed with small openings, fields, or wetlands. Goshawks generally nest in large trees adjacent to open flight corridors. This species is primarily associated with mature to old growth stands of Douglas-fir, assorted pines, or aspen. In April 2001, JBR biologists identified a single juvenile goshawk within the Study Area (JBR 2001c). During 2003 surveys, Maxim recorded six goshawk detections in four different regions within or near the Study Area (maps provided in Maxim 2004j).

Although attempts were made to locate nests, no active goshawk nests were found in the Study Area, and the presence of nest territories or successful breeding pairs could not be determined. Forested stands within the aspen, aspen/conifer, Douglas-fir, and subalpine fir habitat types with open understory and adjacent small openings provide habitat for the goshawk. However, given suitable habitat and six detections, it is assumed that one or more active nests may occur within, or near, the Study Area. RFP Standards and Guidelines for the goshawk are extensive and are described in USFS (2003a:3-31). One RFP guideline for goshawks states that forest openings larger than 40 acres should not be created in order to preserve foraging and post-fledgling family areas (USFS 2003a:3-31).

Regarding the tree size-class distribution for forested acres guideline, the evaluation area for goshawks has been defined as those portions of the five HUC6 watersheds located north of Crow Creek that contain the Proposed Action footprint. The evaluation area measures 48,893 acres, of which, approximately 31,219 is forested. **Table 3.7-3** shows the size-class distribution for forested acres within this area.

TABLE 3.7-3 TREE SIZE-CLASS DISTRIBUTION FOR FORESTED ACRES WITHIN THE GOSHAWK EVALUATION AREA

SIZE CLASS	ACRES	PERCENT OF FORESTED ACRES	REVISED RFP GUIDELINES
Nonforested (grass, water, rock)	17,674		
Nonstocked/Seedling (<5 years old)	515	2%	<22%
Sapling (5-20 years old)	309	1%	<22%
Pole (20-50 years old)	965	3%	<22%
Mature/Old (>50 years old)	29,430	94%	>33%
TOTAL FORESTED	**31,219**		
GRAND TOTAL	**48,893**		

Columbia Spotted Frog

To date, amphibian surveys on the CNF have not recorded any Columbian spotted frogs, nor has this species been found in southeast Idaho (USFS 2003b:3-223). A segment of the Great Basin population is found in the southwest part of the state, and a segment of the Yellowstone population is found to the north of the CNF. Columbian spotted frogs require still-water habitats, typically laying egg masses just beneath the water's surface on the flooded margins of wetlands, ponds, or lakes (Hallock and McAllister 2002). The species is not expected to occur on the CNF (USFS 2003b:3-213) and will not be discussed further in this EIS.

3.7.3 Management Indicator Species

The CNF designates three bird species as MIS (USFS 2003a:3-224, **Table 3.7-4**). All three species are also USFS Sensitive species and are discussed in **Section 3.7.2**.

TABLE 3.7-4 MANAGEMENT INDICATOR SPECIES AND ASSOCIATED HABITAT FOR THE CARIBOU NATIONAL FOREST

MANAGEMENT INDICATOR SPECIES	HABITAT
Columbian Sharp-Tailed Grouse	Grassland and Open Canopy Sagebrush
Greater Sage Grouse	Sagebrush
Northern goshawk	Mature and Old Forest Structure

3.7.4 Migratory Land Birds

The Study Area provides a diversity of habitats for many species of birds. Riparian, non-riverine wetlands, and sagebrush are three of the four highest priority habitats identified in the Idaho Bird Conservation Plan (Ritter 2000) that are found on the CNF and in the Study Area. The Coordinated Implementation Plan for Bird Conservation in Idaho (IWJV 2005) updated the BCP and included aspen within highest priority habitats. Of the 247 avian species known/suspected to occur on the CNF, 211 are associated with riparian habitats (USFS No Date) found along most perennial streams on the CNF. Of the 108 neotropical landbird species known/suspected to occur on the CNF, 101 are associated with riparian habitats (USFS 1991). Non-riverine wetland areas on the CNF that may be used by migratory birds include seeps, springs, and small beaver ponds. Sagebrush and aspen woodlands are found throughout the Forest (see **Section 3.5.2**).

The needs of birds have been incorporated into the CNF Forest Planning process in several areas: identification of Species at Risk, used to identify species of concern on the CNF; habitat conservation measures for priority habitats (i.e., riparian, non-riverine wetlands, sagebrush, and aspen); individual species (i.e., TECS species) have guidelines to manage habitats and mitigate effects of projects; and cavity nesters are addressed through snag guidelines.

3.7.5 Big Game

Mule Deer (*Odocoileus hemionus*) and Rocky Mountain Elk (*Cervus canadensis*) are the two most visible big game species in the Study Area and can be found there year-round. They are very important species for the local economy and public interest, but are no longer Management Indicator Species (MIS) under the RFP. Moose (*Alces alces*) are also present in the Study Area. USFS (2003b) has identified 18 percent of the CNF as big game winter range habitat. Only 30 percent of the mule deer that summer on the CNF actually use the winter range on the CNF; most move to adjacent private and state owned lands (USFS 2003a).

Regional studies conducted by Kuck (1984) found that most elk in southeast Idaho tend to be nomadic but do not migrate long distances between summer and winter ranges. The mean year-round home range for elk was 26 square miles, with a mean migration distance between summer and winter ranges of 3.6 miles. Mule deer tend to migrate greater distances (mean = 13.7 miles) between summer and winter ranges. Moose tend to use the same high-elevation forested sites year-round; year-round home ranges were small (mean = 10.0 square miles). In general, during winter within the Study Area, deer tend to utilize sagebrush/shrub on southerly and west aspects, elk tend to utilize mountain mahogany on southerly and west aspects, and moose tend to utilize aspen on northerly and east aspects. Based on 2002 GIS data provided by the CNF, approximately 5,400 acres of an 18,230-acre big game winter range polygon occurs within the Study Area (**Figure 3.7-1**). This figure represents 28 percent of the Study Area and 30 percent of the identified winter range polygon. No critical winter range habitat is located within the Study Area.

During field surveys, elk and elk sign were commonly observed in the Study Area on the foothills east and west upslope of Crow Creek, generally on the lower, east-facing slopes of the Webster Mountain Range from South Fork Sage Creek to Wells Canyon during all seasons (Maxim 2004j). The Sage Meadows area was observed being used as a calving area. In winter and fall, herds of elk were observed using aspen and mountain shrub-sagebrush cover types in the lower elevation foothills northwest of Manning Creek and sagebrush-riparian cover types in the Crow Creek bottomlands. Maxim observed mule deer on the foothills upslope of Crow Creek, generally on the lower east slopes of the Webster Range from South Fork Sage Creek to Wells Canyon. Mule deer tracks were common throughout the Study Area during all seasons. Mule deer were observed utilizing sagebrush, aspen-conifer, aspen, and mountain mahogany cover types. Moose sign was most evident in riparian areas. Any habitat type in the Study Area may be utilized by big game individuals during seasonal migrations.

As reported by the Idaho Department of Fish and Game (IDFG), elk populations are near all-time highs, with elk populations doubling in southeast Idaho since 1984 (Compton 2003, as cited in Maxim 2004j). The Idaho portion of the Study Area occurs entirely within IDFG Hunting Unit 76, one of two units comprising the Diamond Creek Elk Management Zone. A population estimate of 3,690 elk, above the 2,100 population objective, in this Zone was estimated from surveys conducted by IDFG in 2002 (USFS 2003b:3-238). The IDFG's objective related to adult bull:cow elk ratios within the Zone is 18 to 24 adult bulls per 100 cows; the current ratio is 19:100. Although elk populations are increasing, mule deer populations are on the decline. Mule deer populations have declined since the 1950s and 1960s. Mule deer have been reduced by approximately 50 percent in southeast Idaho since 1984 (Compton 2003, as cited in Maxim 2004j). The recent decline is a result of severe winters, which resulted in significant winter mortality. For estimating mule deer populations, the IDFG has divided the state into 22 Analysis Areas, which contain groups of Hunting Units. The Study Area occurs within Hunting Unit 76 (889,324 acres), which is part of Analysis Area 22. The current mule deer population estimate for Analysis Area 22 is 6,660 animals; this figure is below the 10,000 minimum population objective (USFS 2003b:3-236). Concerning moose, the most recent estimate in the area was conducted by IDFG in 1999 for Hunting Unit 76. During surveys, 140 moose were observed; population estimates are between 437 - 729 animals (IDFG 2000).

3.7.6 Other Wildlife Species

Predators

In addition to the gray wolf, Canada lynx, and North American wolverine (described above), the American marten (*Martes americana*) and fisher (*Martes pennanti*), also have the potential to exist within and around the Study Area, as potential habitat and prey base are present. No evidence of the American marten or fisher were observed during forest carnivore surveys conducted by Maxim in January and February of 2003 (Maxim 2004j).

During carnivore surveys, and from incidental observations, the following predators were recorded within the Study Area: mountain lion (*Felis concolor*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), black bear (*Ursus americanus*), bobcat (*Lynx rufus*), and long-tailed weasel (*Mustela erminea frenata*). Mountain lion tracks were observed on South Fork Sage Creek, near the confluence of Manning and Crow Creeks, and along lower Deer Creek. Coyote and long-tailed weasel tracks were common throughout the Study Area. A red fox den was located along Crow Creek road near the Idaho and Wyoming border. One black bear was sighted at the south end of the Panel F lease area. The remains of a bobcat were found along Deer Creek near the confluence with Crow Creek. The majority of the predators found in the area feed on small mammals and birds and utilize most of the habitat types found in the Study Area. Mountain lions typically occur in areas with high populations of elk and mule deer.

Bats

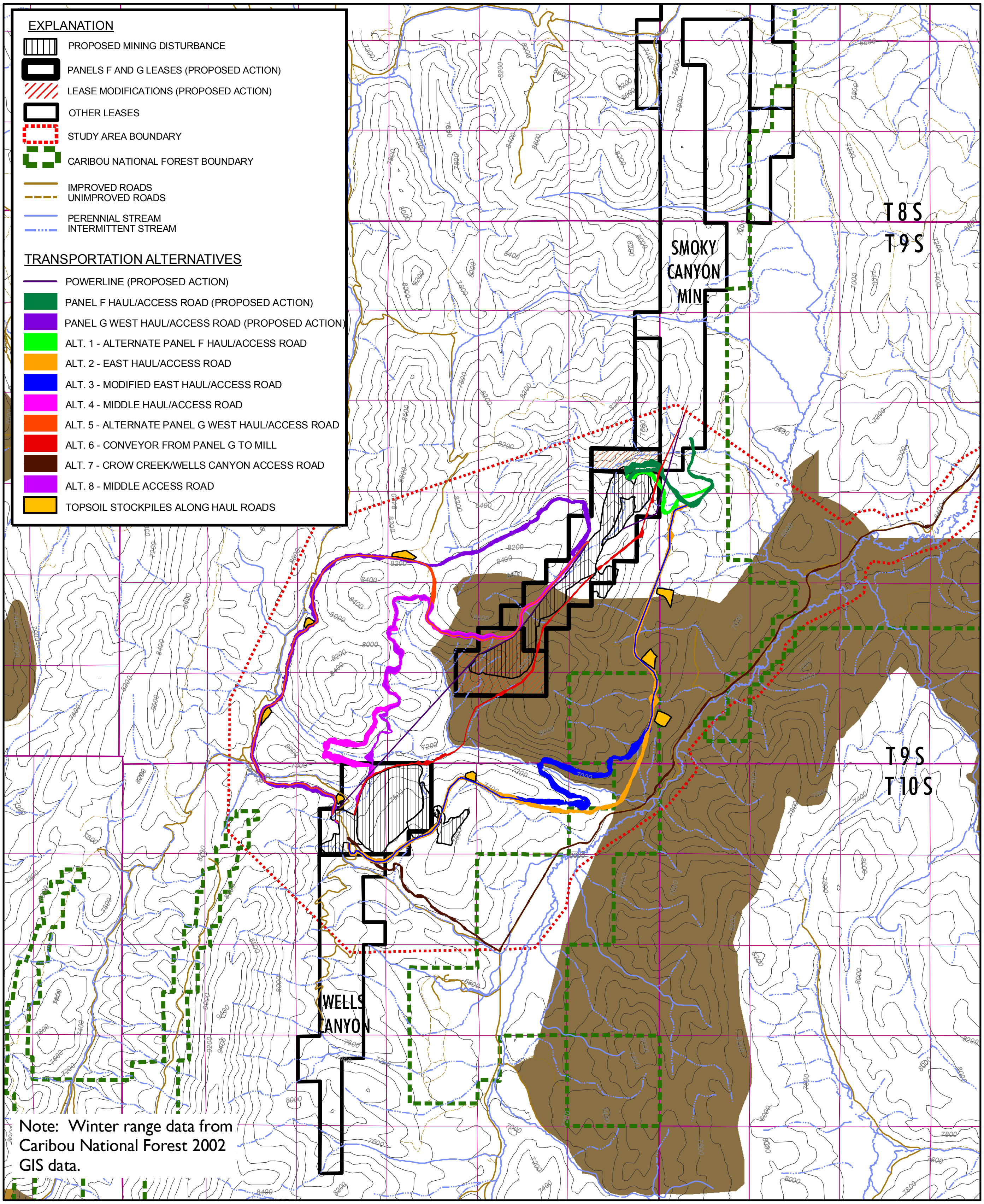
Bat surveys were conducted by Maxim during the summer of 2003 (Maxim 2004j). Sixteen survey sites were selected within the Study Area based on vegetation types and specific habitat features (e.g., beaver ponds, rock outcrops, small ponds, seeps, and stock ponds). These areas were surveyed using mist nets and a tunable, broadband, ultra-sonic bat detector. Six species were detected: big brown bat (*Eptesicus fuscus*), little brown bat (*Myotis lucifugus*), long-eared myotis (*Myotis evotis)*, long-legged myotis (*Myotis volans*), silver-haired bat (*Lasionycteris noctivagans*), and hoary bat (*Lasiurus cinereus*). No TEPCS bat species were detected. The four most abundant species recorded, the little brown bat, long-legged myotis, long-eared myotis, and silver-haired bat, have habitat requirements mainly associated with forested areas. Roost sites for these species include tree cavities, snags, and under exfoliating bark. Long-legged and long-eared myotis will also roost in cliff and rock crevices and in mine adits (IMNH 2001). In general, sites with high bat activity featured mature aspen, or mixed conifer forest including aspen stands. Small ponds, stock ponds, and beaver ponds were also important components of high bat activity areas.

Raptors

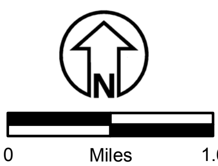
The habitat types in the Study Area provide numerous nesting and foraging opportunities for raptors from early spring (February/March) to late summer (August). Callback surveys were performed for boreal owl (*Aegolius funereus*), great gray owl (*Strix nebulosa*), flammulated owl (*Otus flammeolus*), and northern goshawk (see **Section 3.7.2**). The following raptors were observed or heard during field surveys: great gray owl, flammulated owl, northern goshawk, American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), great horned owl (*Bubo virginianus*), northern harrier (*Circus cyaneus*), northern pygmy owl (*Glaucidium gnoma*), osprey (*Pandion haliaetus*), prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), rough-legged hawk (*Buteo lagopus*), sharp-shinned hawk (*Accipiter striatus*), and Swainson's hawk (*Buteo swainsoni*). Many of these species likely nest in the conifer and aspen stands, and/or forage in the diverse vegetation communities in the Study Area. The only nests identified were two red-tailed hawk nests, one along South Fork Sage Creek and one along Deer Creek.

Upland Game Birds

Sharp-tailed grouse and greater sage grouse are discussed above as Sensitive species. Regarding blue grouse (*Dendragapus obscurus*) and ruffed grouse (*Bonasa umbellus*), forest communities within the Study Area provide habitat for these species, and incidental observations of each were recorded during field surveys conducted by Maxim in 2003.



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.
Modified from Maxim Technologies, Inc., Basline Technical Report-Wildlife Resources, Figure 10 - Big Game Critical Winter Range, February 2004



Big Game Winter Range

Figure 3.7-1
Big Game Winter Range
Smoky Canyon Mine Panels F and G

Woodpeckers

The major forest types used by woodpeckers are aspen, mixed conifer, Douglas-fir, spruce/fir, and lodgepole pine (USFS 2003b); these forest types are found within the Study Area. Within these habitats, woodpeckers rely on dead and dying trees for nesting and foraging. Seven woodpecker species are found on the CNF (Stephens and Sturts 1998): Lewis' woodpecker (*Melanerpes lewis*), red-naped sapsucker (*Sphyrapicus nuchalis)*, Williamson's sapsucker (*Sphyrapicus thyroideus*), downy woodpecker (*Picoides pubescens*), hairy woodpecker (*Picoides villosus*), northern three-toed woodpecker (*Picoides tridactylus*), and northern flicker (*Colaptes auratus*). All but the Lewis' woodpecker were observed in the Study Area during 2003 field surveys. The CNF RFP has set standards and guidelines for snag/cavity nesting habitat; however, Prescription 8.2.2(g) – Phosphate Mine Areas, which allows for phosphate mining to occur on existing leases, states that snag habitat for woodpeckers shall not be a management consideration.

Amphibians and Reptiles

Based on an assessment of habitat types within the Study Area and a review of the Northern Intermountain Herpetological Database, six species of amphibians were determined to potentially occur in the Study Area: tiger salamander (*Ambystoma tigrinum*), boreal chorus frog (*Pseudacris maculata*), Columbia spotted frog (*Rana luteiventris*), northern leopard frog, boreal toad, a.k.a. western toad (*Bufo boreas boreas*), and great basin spadefoot toad (*Spea intermontana*). Three of these are considered rare: Columbia spotted frog, northern leopard frog, and boreal toad. The Columbia spotted frog is a sensitive species and is discussed in **Section 3.7-2**; the northern leopard frog and boreal toad are listed as a Species at Risk by the CNF and have special management criteria in the RFP.

Field investigations in 2003 included two survey periods, spring and summer, to evaluate the presence of amphibians and reptiles. Methods used during the spring survey included calling and visual encounter surveys (VES). Field methods used during the summer survey period included VES, road surveys, seine sampling surveys, aquatic funnel trapping, pitfall surveys, and incidental observations. Tiger salamanders were the most abundant species detected within the Study Area, mainly in beaver ponds. Chorus frogs were also found, as well as western terrestrial garter snakes.

Concerning boreal toads, this species uses three different types of habitat: breeding habitats, terrestrial summer range, and winter hibernation sites. Preferred breeding sites are permanent or temporary water bodies that have shallow sandy bottoms. After breeding, adults disperse into terrestrial habitats such as forests and grasslands. They may roam far from standing water, up to approximately 1.5 miles (Keinath and McGee 2005), but prefer damp conditions. Boreal toads spend much of their time underground; though they are capable of digging their own burrows in loose soils, they generally shelter in small mammal burrows, beneath logs and within rock crevices. They hibernate in burrows below the frost line, up to 1.3 meters deep (Frogwatch 2004). The Study Area provides habitat for this species, and five boreal toad tadpoles were observed in small ponds at Sage Meadows. The population discovered in Sage Meadows is the only known population of boreal toads on the Montpelier Ranger District. **Figure 3.7-2** shows the extent of potential boreal toad migration (1.5-mile radius) from Sage Meadows.

The northern leopard frog inhabits sluggish, permanent waters with rooted aquatic vegetation such as ponds, marshes, lakes, and slow streams. They require moderate to high herbaceous cover to avoid predators, preferring tall grasses or sedges near water. They often forage around springs, and in wet or damp meadows and fields. They are very well adapted to cold conditions and can be found at elevations above 8,000 feet (Groves et al. 1997). Although potential suitable habitat exists within the Study Area, the species was not detected during surveys.

3.7.7 Selenium Issues with Wildlife

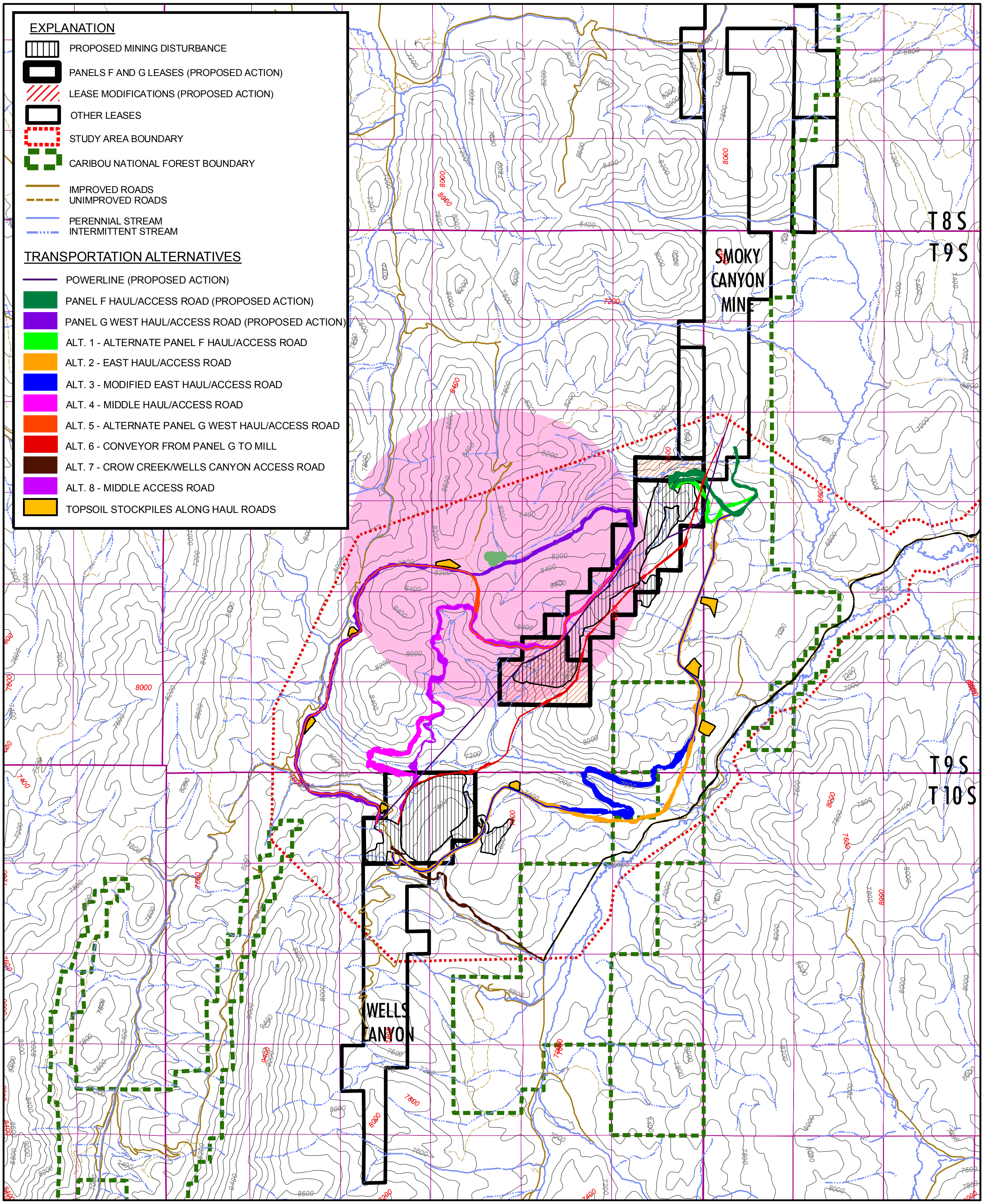
Selenium is an essential nutrient for animals, and the deficiency and toxicity relationships are fairly well understood for livestock and laboratory animals. Less is known about selenosis and background selenium levels in terrestrial wildlife. A number of studies have been conducted in recent years to determine the effects of selenium on terrestrial wildlife in southeast Idaho. Sampling results in proximity to phosphate mine sites and selenium release areas indicate elevated levels of selenium in every environmental media and species of wildlife tested (Tetra Tech 2003).

As summarized in MWH (2003), selenium toxicity and deficiency can both cause adverse effects in wildlife. Idaho and other areas of the West are typically considered selenium deficient; consequently, the effects of chronic selenium deficiencies on free-ranging wild ungulates dominate the focus of selenium concerns in wild ungulates, not selenium toxicosis. Selenium deficiency lowers reproduction rates primarily through increased neonate and pre-weaning mortality. Relatively small elevations in selenium above optimal nutritional levels can result in potentially toxic forage. Selenium poisoning can affect all animals but is more common in species that directly consume seleniferous vegetation than in carnivores consuming wildlife with elevated selenium levels. Acute selenium poisoning is rare under field conditions and is caused by the short-term consumption of forage that is very high in selenium. Death can follow within a few hours after consumption. Chronic selenium poisoning is recognized in two forms: alkali disease and blind staggers. Alkali disease is associated with prolonged consumption of low levels of seleniferous forage, resulting in general lack of vitality, hair loss, hoof soreness, deformation and shedding, and stiffness and lameness. Blind staggers is associated with consumption of seleniferous forage with moderate levels of selenium, ultimately resulting in death.

In recent years there has been a large increase in the number of reclaimed phosphate mine overburden fills. These overburden fills vary in size from a few acres to hundreds of acres but still only account for less than one percent of the phosphate resource area of southeast Idaho

(MWH 2003). Elk, mule deer, and moose disperse across the entire area and use a variety of habitats. The majority of these animals' home ranges do not encompass overburden fills and their associated seleniferous forage (MWH 2003). However, some elk and deer do have home ranges that encompass areas that contain seleniferous forage, and thus, consumption of this forage does occur. The quantity, frequency, and duration of consumed seleniferous forage would be restricted by the tendency for elk to follow the progression of developing nutritious forage across a variety of terrain and vegetation types (MWH 2003). Moose preference for closed canopy aspen/conifer stands and associated forage types limits the potential use and value of phosphate mine reclaimed areas with potential forage high in selenium levels.

Seleniferous forage is not available or used in the winter, except by some elk, allowing most if not all ingested selenium to be metabolized by each spring.



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

N

0 Miles 2

Sage Meadows

Potential Boreal Toad Migration Area

Figure 3.7-2
Boreal Toad Habitat at Sage Meadows
Smoky Canyon Mine Panels F and G

Currently, elk populations in southeast Idaho are at a historic high with a population increase of 1,500 percent, an average of 30 percent annually over the past 50 years (MWH 2003). This high rate of increase supports a conclusion that the presence of selenium in this elk herd's environment has not had a negative effect on the herd (MWH 2003). Elk surveys conducted by IDFG and Idaho Mining Association in the fall of 1999 and 2000 (Montgomery Watson 2000) showed a significant inverse correlation between elevated selenium levels in elk livers versus the distance of harvested elk from the nearest phosphate mine. Approximately 50 percent of elk harvested within a two-mile radius of historic reclaimed phosphate mining areas showed elevated levels of selenium in their organs, whereas elk harvested 10 miles or more from phosphate mine leases did not have elevated selenium exposure. Eleven elk were sampled from within five miles of the Smoky Canyon Mine. Three of these elk showed signs of elevated selenium levels when compared to the control group. None of the 141 elk livers sampled exceeded thresholds for mammalian livestock toxicity and no muscle tissue concentrations exceeded USDA interim standard for beef of 1.2 mg/Kg dry weight (dw, Wright et al. 2002). The IDFG and Idaho Division of Health concluded that elevated selenium levels in a small percentage of elk livers could result in acute gastrointestinal effects to humans, if consumed in large and persistent portions. Subsequently, the IDFG and Idaho Division of Health posted a human health advisory in the fall of 2000, recommending limited consumption of elk livers by area hunters.

The IDEQ concluded that foraging mammals with smaller home ranges than elk could be experiencing higher doses of selenium and associated risks. Small mammal whole body sample concentrations observed in selected impacted areas ranged from 50-70 mg/Kg dw when typical reported background levels were in the range of 1-4 mg/Kg dw (Tetra Tech 2003). NewFields (2005) measured the COPC (including selenium) content of small mammals across Smoky Canyon Mine Panels A, D, and E, where reclamation did not include selenium control measures of any kind, both within and adjacent to reclaimed areas. In deer mice, mean selenium accumulation outside and within mined/reclaimed areas was 0.72 mg/Kg and 5.83 mg/Kg, respectively. In redback voles, mean selenium accumulation outside and within mined/reclaimed areas was 0.57 mg/Kg and 1.44 mg/Kg, respectively.

Ratti et al. (2002) looked at selenium concentrations in 544 bird eggs, 271 from mining areas and 273 from background areas, in southeast Idaho during 1999 and 2000. Eggs were analyzed from 31 species including waterfowl, shorebirds, raptors, woodpeckers, swallows, and many passerines. Data showed that 16 of the 24 (67 percent) bird species analyzed showed significantly higher levels of selenium in eggs collected from phosphate mine sites than background areas. Eighty-seven percent of eggs collected from the mining sites had selenium levels of 10 mg/Kg or less, 8 percent were between 10 and 16 mg/Kg, and 5 percent were greater than 16 mg/Kg. Recent reports concluded that a selenium effects threshold of 12-14 mg/Kg dw, based on chick mortality and developmental malformations, appears appropriate and conservative (Adams et al. 2002). Ratti et al. (2002) suggest that for the range of selenium levels in bird eggs on both background and mining sites, reproductive success was actually enhanced with elevated levels of selenium; however, additional research would be required to confirm this relationship. Garton et al. (2002a) conducted a population level assessment on metapopulations of red-winged blackbirds and American robins in southeast Idaho. The population-level assessment of the impact of selenium on red-winged black birds and American robins demonstrated no substantial impact from phosphate mining in 2001. Follow-up bird egg samples were conducted in IDEQ-identified impacted zones during 2002 and indicated much higher selenium concentrations than previously recorded, many over 20 mg/Kg (Garton et al. 2002b).

Elevated levels of selenium have also been confirmed in salamanders at a phosphate mine on the Fort Hall Indian Reservation, Idaho and at Smoky Canyon Mine. Concentrations of selenium in some individuals were 10 to 100 times the normal level in animal tissue. There is only limited information about the effects of selenium in amphibians. Viral infections found in salamanders at both sites may be linked to high selenium body burdens (USGS 2001a and 2001b). Eggs and larvae of amphibians may be the most sensitive life stages to direct effects of waterborne selenium. In laboratory exposures, amphibian embryos and tadpoles were about as sensitive as aquatic invertebrates and fish larvae/fry to the effects of waterborne selenium (Rattner et al. 2002).

3.8 Fisheries and Aquatics

3.8.1 Introduction

Maxim conducted a baseline assessment of stream morphology (**Section 3.3**), amphibians and reptiles (**Section 3.7**), benthic invertebrates, and fisheries within the Project Area during the summer of 2003. These studies provided baseline data on biological and physical characteristics of the streams that might be influenced by any of the action alternatives. Baseline technical reports were prepared and provide details on Maxim's methodologies, results, and conclusions. These reports also provide maps indicating the locations of sampling areas (see Maxim 2004c and 2004k). The following is largely summarized from Maxim 2004k (2003 Baseline Technical Report) and Maxim 2005 (Addendum to the 2003 Baseline Technical Report).

RFP Standards and Guidelines for aquatic and fisheries resources (USFS 2003a:3-16) are in Prescription 2.8.3 (USFS 2003a:4-45 to 4-53). This prescription applies to the Aquatic Influence Zone (AIZ) associated with lakes, reservoirs, ponds, streams, and wetlands. AIZ widths are described in the RFP. For this analysis, AIZ widths were defined as the following map distance buffers: 300 feet for perennial streams; 150 feet for ponds, lakes, and wetlands greater than one acre; and 50 feet for seasonally flowing or intermittent streams, and for wetlands less than one acre. The Study Area contains approximately 1,225 acres of AIZs**.** Current disturbances, mainly roads, within these AIZs measure approximately 20 acres.

3.8.2 Benthic Macroinvertebrates

Benthic macroinvertebrates live in the bottom parts of waters, usually on or in the stream or water body substrate. Benthic macroinvertebrates are a good indicator of watershed health. Macroinvertebrate sampling within the Study Area followed Barbour et al. (1999). This procedure involves collecting benthic macroinvertebrates from selected stream locations and assessing stream health based on biological indicators such as the relative abundance of macroinvertebrate taxa sensitive to water quality conditions. Drought conditions during 2003 apparently caused degradation or loss of macroinvertebrate habitat in the Study Area, which subsequently reduced the number of proposed sample locations to only those where suitable habitat conditions existed. Eleven macroinvertebrate sampling locations were established within five different streams in the Study Area. Four locations were created on Deer Creek (DC). Two sampling locations each were created on South Fork Sage Creek (SFSC), North Fork Deer Creek (NFDC), and Crow Creek (CC). One sample was collected from Wells Canyon (WC).

Macroinvertebrate data provided a list of species, relative abundance, and number of taxa, dominant taxa, and percent dominant taxa for each stream location. Further analysis was performed to calculate biotic integrity indices; ratios of functional feeding groups (e.g., predators, scrapers, gatherers); ratios of Ephemeroptera (mayflies), Plecoptera (stoneflies), Trichoptera (caddisflies) taxa, and Chironomidae (midges); and tolerance quotients, tolerance values, and community similarity indices. The Shannon-Weaver Index (H') was also calculated for each stream reach. Shannon-Weaver values range from 0 to 4, values <1.0 indicate severe stress, values >2.5 indicate healthy macroinvertebrate populations (Maxim 2004k). **Table 3.8-1** displays the results of the macroinvertebrate sampling. The Shannon-Weaver diversity index indicates relatively poor environmental conditions or the occurrence of environmental stress factors for most streams.

TABLE 3.8-1 MACROINVERTEBRATE DATA SUMMARY OF STREAM REACHES SAMPLED IN STUDY AREA

REACH	CORRECTED ABUNDANCE (# IND)	DOMINANT COMMUNITY COMPOSITION (% ORDER)	DOMINANT EPT TAXA (% ORDER)	RICHNESS (#SPC.)	SHANNON-WEAVER INDEX (H')	DOMINANT FFG (% FFG)
SFSC-500	1,441	22.9 Diptera	6.38 Ephemeroptera	26	0.87	55.38 Gatherers
SFSC-700	609	79.2 Diptera	8.54 Ephemeroptera	24	0.68	72.91 Gatherers
NFDC-200	1,332	34.53 EPT Taxa	18.62 Ephemeroptera	30	1.11	68.09 Gatherers
NFDC-700	1,357	47.83 EPT Taxa	32.42 Plecoptera	28	0.96	48.64 Gatherers
DC-100	436	41.06 EPT Taxa	30.50 Ephemeroptera	23	0.99	64.45 Gatherers
DC-200	1,098	60.11 EPT Taxa	39.07 Ephemeroptera	25	0.99	50.82 Gatherers
DC-400	954	29.04 EPT Taxa	15.83 Plecoptera	30	0.82	63.73 Predators
DC-600	1,462	54.51 EPT Taxa	26.47 Trichoptera	40	1.12	44.46 Gatherers
CC-100	1,114	33.57 Diptera	14.18 Ephemeroptera	27	1.01	49.82 Gatherers
CC-300	1,597	28.62 Coleoptera	18.85 Trichoptera	46	1.13	35.07 Gatherers
WC-900	737	44.50 EPT Taxa	28.49 Plecoptera	30	0.91	56.72 Gatherers

EPT = Ephemeroptera, Plecoptera, Tricoptera; FFG = Functional Feeding Group.

IDEQ evaluates monitoring data using its Water Body Assessment Guidance (WBAG) to determine if each of Idaho's water bodies meets water quality standards and supports beneficial uses (e.g., recreational activities, ability to support aquatic life). This information is reported to the EPA for 305(b) and 303(d) under the Clean Water Act. The Stream Macroinvertebrate Index (SMI), Stream Fish Index (SFI), and Stream Diatom Index (SDI) are direct biological measures of cold-water aquatic life used by the IDEQ. Both the SMI and SFI are based on condition categories in the 25th percentile of reference conditions (SDI has no minimum threshold established), which is considered adequately conservative to identify a site in good condition. Each condition category is assigned a rating of 1, 2, or 3 (**Table 3.8-2**), which allows the IDEQ to integrate multiple indices into one score that is used to determine use support. This "integrated" metric describes overall stream condition.

TABLE 3.8-2 SMI, SDI, AND SFI SCORING AND RATING CATEGORIES

INDEX	MINIMUM THRESHOLD	1	2	3
SMI	<11	11-13	14-16	>16
SDI	NA*	<22	22-33	>34
SFI	<54	54-69	70-75	>75

*A minimum threshold has not been identified.

The IDEQ has sampled portions of Deer Creek and North Fork Deer Creek for its water body assessments since 1998. In 2003, the SFI ratings for cold water aquatic life and for salmonid spawning in the North Fork were both 3 (SFI = 85.11), indicating high quality habitat for fish. The rating in 2003 for salmonid spawning in Deer Creek was 2 (SFI = 78.76), indicating moderately high quality habitat, where salmonid spawning is likely supported. The SMI scores for Deer Creek and North Fork Deer Creek in 2003 were both 3 (Deer Creek SMI = 62.39; North Fork Deer Creek SMI = 58.39), indicating that macroinvertebrate populations are fully supported.

3.8.3 Fisheries

Based on a review of existing data, the following fish species were determined to potentially inhabit aquatic systems within the Study Area: brown (*Salmo trutta*), brook (*Salvelinus fontinalis*), and cutthroat (*Oncorhynchus clarki*) trout; mountain whitefish (*Prosopium williamsoni*); longnose (*Rhinichthys cataractae*) and speckled (*Rhinichthys osculus*) dace; leatherside chub (*Gila copei*); and mottled (*Cottus bairdi*) and Piute sculpin (*Cottus beldingi*). Yellowstone cutthroat trout (*Oncorhynchus clarki bouvieri*) is the subspecies of cutthroat trout native to the Study Area.

Fish Surveys

Methods

In order to document the occurrence of fish species in the Study Area, fish surveys were conducted during August 2003. Fish surveys were conducted in all likely fish-bearing streams in the Study Area using a backpack electrofishing unit. Fish surveys of streams containing abundant fish habitat were conducted by sampling stream reaches composed of several contiguous sampling units. Sampling of reaches was conducted to provide both qualitative (presence/absence of fish and species composition) and quantitative (fish population parameters and fish condition) data. Four sampling reaches were established on Deer Creek, two on North Fork Deer Creek, and two on Crow Creek **(Figure 3.8-1)**. South Fork Sage Creek, South Fork Deer Creek, and the Wells Canyon drainage were determined to harbor limited and/or sparsely distributed fish habitat. Therefore, sampling reaches suitable for quantitative analysis were not established on these streams. Areas containing suitable fish habitat on South Fork Sage Creek and South Fork Deer Creek were qualitatively sampled. A small segment of the Wells Canyon drainage near the confluence with Crow Creek was determined to harbor potential fish habitat. A 10-meter segment of this portion of the drainage was sampled to determine presence/absence of fish; no fish were captured and the effort was terminated.

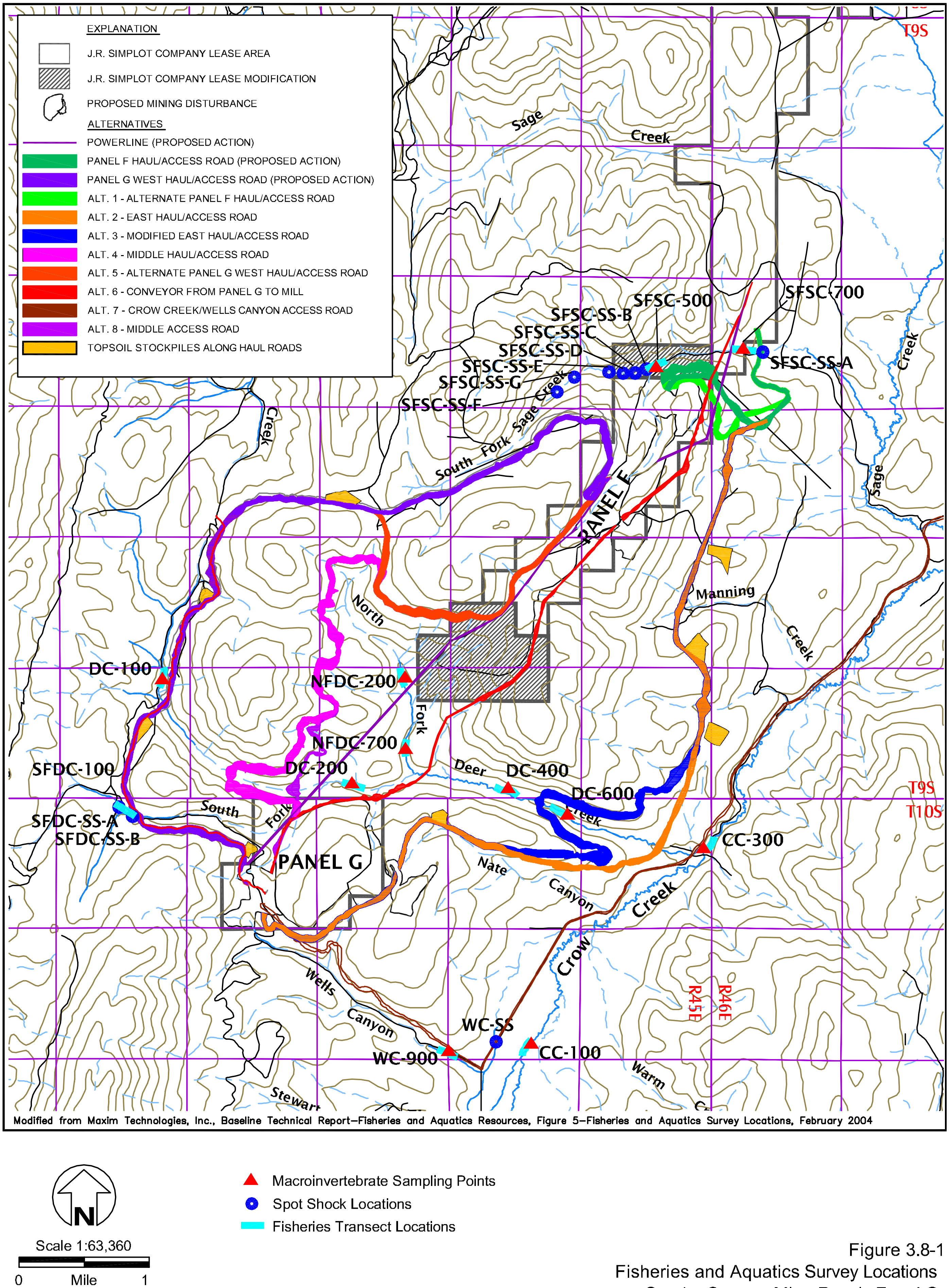


Figure 3.8-1
Fisheries and Aquatics Survey Locations
Smoky Canyon Mine Panels F and G

Manning Creek was found to be an ephemeral drainage with no standing water or potential fish habitat, and was therefore not sampled.

Multiple-pass surveys were conducted on Deer Creek, North Fork Deer Creek, and Crow Creek. Three passes were made in half of these sample reaches (two in Deer Creek, one in North Fork Deer Creek, and one in Crow Creek) while two pass surveys were made in the remaining reaches. Maxim (2004k) reported that population estimates in two-pass reaches were unreliable because the two-pass surveys failed to produce a downward trend in the number of fish captured. As a result, additional surveys were conducted in November 2004 on one reach of Deer Creek (DC-400) and on one reach of Crow Creek (CC-100) at the request of the USFS (Maxim 2005).

Data from multiple pass surveys were used to estimate fish population metrics such as density (number of fish/meter^2) and biomass (Kg/hectare) using the Microfish program developed by Van Deventer and Platts (1983). The Microfish program was also used to compute the mean condition factor for fish captured in sampling reaches on Deer Creek, North Fork Deer Creek, Crow Creek, and South Fork Deer Creek. The Microfish program uses Fulton's condition factor (K) for computation of this metric. The mean value of K for fish sampled is typically close to 1.0 for a robust trout population (Chadwick 2000). Fish per stream mile was calculated as a proportion of the number of fish collected per 100 m. Because population estimates and condition factor results were found to be imprecise for several stream reaches, relative abundance and trophic composition for fish captured in each stream reach were computed to provide additional characterization of fish populations.

<u>Results</u>

Results of fish surveys are summarized in **Table 3.8-3**. Cutthroat trout had the greatest relative abundance in upper reaches of the tributary streams of Deer Creek, North Fork Deer Creek, South Fork Deer Creek, and South Fork Sage Creek. Sculpins and other fish species had the greatest relative abundance in lower stream reaches and in Crow Creek. The greatest number of fish species was captured in Crow Creek, including cutthroat-rainbow hybrid trout. Relative trophic composition results indicate that insectivores (i.e., insect eaters) were primarily captured in upper tributary streams, while both insectivores and piscivores (i.e., fish eaters) were captured in lower reaches and in Crow Creek. All fish captured at North Fork Deer Creek (n = 12), South Fork Deer Creek (n = 7), and South Fork Sage Creek (n = 8) were cutthroat trout. Quantitative analyses were not conducted for these streams due to low sample numbers and limited and/or sparsely distributed fish habitat.

TABLE 3.8-3 SPECIES COMPOSITION, RELATIVE ABUNDANCE, BIOMASS, AND TROPHIC COMPOSITION FOR STREAMS IN THE STUDY AREA

STREAM SAMPLED		RELATIVE ABUNDANCE (%)[1]							RELATIVE BIOMASS (%)[2,3,4]							TROPHIC COMPOSITION[5]		
STREAM	REACH NUMBER	SPECIES[6]							SPECIES[6]							% OMN[7]	% INS[7]	% PIS[7]
		CTT	BT	SC	DA	WF	BNT	CRT	CTT	BT	SC	DA	WF	BNT	CRT			
CROW CREEK	CC-100	---	---	75.8	---	---	24	0.7	---	---	17.4	---	---	81.7	0.9	---	76	24
	CC-300	---	---	64.7	8.9	17.6	7.4	1.2	---	---	NA	NA	NA	NA	NA	---	92.6	7.4
DEER CREEK	DC-100	92.5	7.5	---	---	---	---	---	NA	NA	---	---	---	---	---	---	92.5	7.5
	DC-200	100	---	---	---	---	---	---	100	---	---	---	---	---	---	---	100	---
	DC-400	23	---	77	---	---	---	---	32.4	---	67.6	---	---	---	---	---	100	---
	DC-600	15	---	85	---	---	---	---	35.9	---	64.1	---	---	---	---	---	100	---
NORTH FORK DEER CREEK	NFDC-700	100	---	---	---	---	---	---	100	---	---	---	---	---	---	---	100	---
SOUTH FORK DEER CREEK	SFDC-100	100	---	---	---	---	---	---	100	---	---	---	---	---	---	---	100	---
SOUTH FORK SAGE CREEK	SFSC-SS	100	---	---	---	---	---	---	100	---	---	---	---	---	---	---	100	---

1) Relative abundance (%) = Total number of a given species per reach/combined total number of all species per reach or stream segment X 100
2) Relative Biomass (%) = Total weight (g) of a given species per reach/combined total weight (g) all species per reach or stream segment X 100
3) Computation of relative biomass included only fish greater than or equal to 50 mm in length and less than 1000 grams
4) NA = Not available due to absence or unreliability of weight data
5) Relative trophic composition = % of combined trophic categories captured within reach or stream segment
6) CTT = Cutthroat Trout, BT = Brook Trout, SC = Sculpin Spp., DA = Dace spp., WF = Whitefish, BNT = Brown Trout, CRT = Cutthroat-Rainbow Trout Hybrid
7) OMN = Omnivorous. INS = Insectivorous. PIS = Piscivorous

Deer Creek

Four separate sampling reaches were established on Deer Creek; results are summarized in **Tables 3.8-4, 3.8-5**, and **3.8-6**. Sculpin were the most abundant fish species captured but were only caught in the two lower reaches, DC-400 and DC-600. Cutthroat trout were captured in all reaches, and there were a small number of brook trout caught in the headwaters (DC-100). IDEQ also performed a presence/absence survey of fish on a section of Deer Creek on 14 August 2003 approximately 300m upstream from DC-600; they found cutthroat trout and a large number of sculpin (Maxim 2004k).

In two reaches of Deer Creek (DC-100 and DC-200), cutthroat trout weights were estimated from lengths of individuals using a linear regression on length and weight data collected for cutthroat in DC-400 and DC-600 (R^2=0.9036; Maxim 2005). Young-of-year (YOY) fish were included in population parameters and estimates (**Tables 3.8-4** and **3.8-5**) and also treated separately (**Table 3.8-6**). YOY individuals were defined as individuals measuring <35mm in length. Altered abundance of YOY individuals is an early indicator of detrimental effects from disturbance (Maxim 2005).

TABLE 3.8-4 FISH POPULATION PARAMETERS FOR SAMPLING UNITS OF DEER CREEK

REACH, SPECIES	NUMBER COLLECTED (ALL SIZES)	MEAN LENGTH (MM)	MEAN WEIGHT (G)	MEAN CONDITION (K)
DC-100				
Brook Trout	3	167.0	47.7*	NA
Cutthroat Trout	37	89.8	25.9*	NA
DC-200				
Cutthroat Trout	57	115.4	29.9*	NA
DC-400				
Cutthroat Trout	49	56.2	11.6	1.04
Sculpin	164	69.6	7.8	1.74
Cutthroat Trout	95	118.8	21.8	0.977
Sculpin	220	75.2	6.1	NA
DC-600				
Cutthroat Trout	108	95.8	13.6	1.11
Sculpin	613	61.3	4.8	1.65

K = condition factor; * = estimated; NA = Not available due to absence or unreliability of weight data; Shaded area = November 2004 sample (Maxim 2005).

TABLE 3.8-5 POPULATION AND BIOMASS ESTIMATES FOR QUANTITATIVE SAMPLING UNITS OF DEER CREEK (100-METER DEPLETION SAMPLING UNIT)

REACH, SPECIES	NUMBER COLLECTED	POPULATION ESTIMATE	CI ±	DENSITY ESTIMATE (#/M^2)	FISH PER STREAM MILE	BIOMASS (KG/HA)
DC-100						
Cutthroat Trout	15	15*	1.1	0.042	241	313
DC-200						
Cutthroat Trout	41	42	3.6	0.087	660	654
DC-400						
Cutthroat Trout	28	224	2346.4	0.311	451	704
Sculpin	96	115	22.7	0.160	1,545	749
Cutthroat Trout	13	13	1.3	0.260	209	223
Sculpin	155	199	38.2	3.980	2,494	1,154
DC-600						
Cutthroat Trout	75	141	108.0	0.178	1,207	1,726
Sculpin	359	408	28.2	0.516	5,778	1,820

CI± = Confidence Interval; Shaded area = November 2004 sample (Maxim 2005); * = estimated.

TABLE 3.8-6 YOUNG-OF-YEAR POPULATION AND BIOMASS ESTIMATES FOR QUANTITATIVE SAMPLING UNITS OF DEER CREEK (100-METER DEPLETION SAMPLING UNIT)

REACH, SPECIES	NUMBER COLLECTED	POPULATION ESTIMATE	CI ±	DENSITY ESTIMATE (#/M2)	FISH PER STREAM MILE	BIOMASS (KG/HA)
DC-200						
Cutthroat Trout	2	2	2	0.004	32	2
DC-400						
Cutthroat Trout	14	112	1,732.4	0.156	225	15
Sculpin	8	8	0.8	0.011	129	4
DC-600						
Cutthroat Trout	16	128	1,638.0	0.162	257	14
Sculpin	36	46	18.6	0.058	579	14

Crow Creek

Two separate sampling reaches were established on Crow Creek; results are summarized in **Tables 3.8-7, 3.8-8**, and **3.8-9**. Crow Creek showed the highest species richness of any stream in the Study Area with five different fish species; brown trout, cutthroat-rainbow trout, cutthroat trout, sculpin, mountain whitefish, and speckled dace. Numerous size classes of brown trout, sculpin, and dace indicate resident populations within Crow Creek. The lack of multiple age classes of cutthroat-rainbow trout, in addition to the lack of cutthroat-rainbow individuals in nearby tributaries, points toward migrant populations of fish (Maxim 2004k).

Weights of brown trout and sculpin in one reach of Crow Creek (CC-300) were estimated from lengths of individuals using linear regression on length and weight data collected in CC-100 (R^2=0.9703 for brown trout and R^2=0.956 for sculpin; Maxim 2005). YOY fish were included in population parameters and estimates (**Tables 3.8-7** and **3.8-8**) and also treated separately (**Table 3.8-9)**. Only YOY sculpin and dace were captured in Crow Creek.

TABLE 3.8-7 FISH POPULATION PARAMETERS FOR SAMPLING UNITS OF CROW CREEK

REACH, SPECIES	NUMBER COLLECTED (ALL SIZES)	MEAN LENGTH (MM)	MEAN WEIGHT (G)	MEAN CONDITION (K)
CC-100				
Brown Trout	72	171.8	199.6	1.24
Cutthroat-Rainbow	2	137.5	25.0	0.96
Sculpin	226	61.7	4.3	1.45
Brown Trout	99	155.8	84.2	1.097
Sculpin	528	67.9	4.6	NA
Cutthroat Trout	22	85.7	8.3	0.979
Mountain Whitefish	2	298.5	229.5	NA
CC-300				
Brown Trout	30	245.9	200.0	NA
Cutthroat-Rainbow	5	232.8	169.6	NA
Speckled Dace	36	81.8	20.6	NA
Mountain Whitefish	71	296.4	309.6	NA
Sculpin	261	49.7	4.4	NA

K = condition factor, NA = Condition factor unable to be computed due to lack of weight data; Shaded area = November 2004 sample (Maxim 2005).

TABLE 3.8-8 POPULATION AND BIOMASS ESTIMATES FOR QUANTITATIVE SAMPLING UNITS OF CROW CREEK (100-METER DEPLETION SAMPLING UNIT)

REACH, SPECIES	NUMBER COLLECTED	POPULATION ESTIMATE	CI ±	DENSITY ESTIMATE (#/M^2)	FISH PER STREAM MILE	BIOMASS (KG/HA)
CC-100						
Brown Trout	37	39	5.1	0.036	595	10,438
Cutthroat-Rainbow	1	1	3.4	0.001	16	25
Sculpin	107	153	55.1	0.140	1,722	794
Brown Trout	49	50	2.8	0.167	789	1,806
Sculpin	346	421	42.9	1.403	5,568	1,979
Cutthroat Trout	8	8	1.0	0.027	129	65
Mountain Whitefish	1	1	1.4	0.003	16	259
CC-300						
Brown Trout	17	19	6.3	0.014	274	4,632
Cutthroat-Rainbow	4	4	1.9	0.003	64	NA
Speckled Dace	24	29	11.8	0.021	386	NA
Mountain Whitefish	68	68	1.7	0.050	1,094	NA
Sculpin	137	310	247.2	0.226	2,205	1,737

CI± = Confidence Interval; Shaded area = November 2004 sample (Maxim 2005).

TABLE 3.8-9 YOUNG-OF-YEAR POPULATION AND BIOMASS ESTIMATES FOR QUANTITATIVE SAMPLING UNITS OF CROW CREEK (100-METER DEPLETION SAMPLING UNIT)

REACH, SPECIES	NUMBER COLLECTED	POPULATION ESTIMATE	CI ±	DENSITY ESTIMATE (#/M^2)	FISH PER STREAM MILE	BIOMASS (KG/HA)
CC-100						
Sculpin	11	11	0.6	0.010	177	5
CC-300						
Speckled Dace	3	3	1.5	0.002	48	NA
Sculpin	79	188	215.5	0.137	1,271	63

Special Status Species

No Threatened, Endangered, Proposed, or Candidate (TEPC) fish species are known or expected to occur on the CNF (Species List #1-4-05-SP-0354), as identified by the US Fish and Wildlife Service (USFWS). Based on a review of the Idaho Conservation Data Center (CDC) rare species database, the USFS Region 4 Sensitive species list, and other existing data sources, two rare fish species, Yellowstone cutthroat trout and leatherside chub, have the potential to occur in the Study Area. Yellowstone cutthroat trout are Sensitive; leatherside chub are designated as Species of Concern by the state of Idaho. The Regional Forester identifies Sensitive species as those for which population viability is a concern, as evidenced by significant current and predicted downward trends in population numbers, density, and/or habitat capability that would reduce a species' existing distribution. Sensitive species must receive special management emphasis to endure their viability and to preclude trends toward endangerment that could result in the need for federal listing (FSM 2672.1). Sensitive fish species potentially occurring on the CNF are listed in **Table 3.8-10**, followed by background information on each species. Additional information can be found in Maxim (2004k).

TABLE 3.8-10 SENSITIVE FISH SPECIES KNOWN OR SUSPECTED TO OCCUR ON THE CNF

COMMON NAME	SPECIFIC NAME	USFS STATUS
Bonneville Cutthroat Trout	*Oncorhynchus clarki utah*	Sensitive
Yellowstone Cutthroat Trout	*Oncorhynchus clarki bouvieri*	Sensitive

Bonneville Cutthroat Trout

Intensive surveys for Bonneville cutthroat trout have been conducted on the CNF since 1998. This subspecies appears to be distributed throughout the southern part of the CNF within the Bonneville Basin, outside of the Study Area. The species is not expected to occur in the Study Area (Maxim 2004k) and is not discussed further in this EIS.

Yellowstone Cutthroat Trout

The Yellowstone cutthroat trout occurs in southeastern Idaho, in tributary rivers to the Snake River above Shoshone Falls. Intensive surveys for Yellowstone cutthroat trout have been conducted on the CNF since 1996. This subspecies appear to be well distributed throughout the parts of the CNF within the Snake River Basin, but populations in various streams or stream segments vary in strength.

Yellowstone cutthroat trout are adapted to cold water. Water temperatures between 4.5 and 15.5° C appear to be optimum. Streams selected for spawning are commonly low gradient (up to 3 percent), perennial streams, with groundwater and snow-fed water sources. Use of intermittent streams for spawning is not well documented, but has been noted in some intermittent tributaries to Yellowstone Lake. Spawning occurs where optimal size gravels (10-80 mm in diameter with 5-15 percent fine sediment; see **Appendix 2A**) and optimum water temperatures (5.5-15.5° C) are found. Juveniles congregate in shallow, slow-moving parts of the stream (USFS 2003b:D-194).

During fish sampling surveys within the Study Area, Yellowstone cutthroat trout were noted in Deer Creek, its North and South forks, South Fork Sage Creek, and Crow Creek. Cutthroat-rainbow trout hybrids were also observed in Crow Creek (see below).

3.8.4 Abiotic Condition

Stream reference reaches were located and established along Crow Creek (two), South Fork Sage Creek (two), Deer Creek (four), North Fork Deer Creek (two), South Fork Deer Creek (one), and Wells Canyon (one, see Maxim 2004k). Stream cross-sections and longitudinal profiles were measured, and stream morphology characteristics were either measured or evaluated in the field for each of the 12 reaches. As part of the longitudinal surveys, an R4 Level I fish habitat inventory was also conducted in each reach. Field methods employed were in accordance with protocols provided by Overton et al. (1997). Habitat inventories involved defining habitat type; measuring length, width, and depth of pool/riffle/run features; and identifying streambed materials.

A wide variety of channel types, patterns, and habitats were observed within the Study Area. The majority of reaches were determined to consist of stable meander riffle-pool channels, with the exception of two sites within Deer Creek (DC-100 and DC-400) and two within the North Fork Deer Creek (NFDC-200 and NFDC-700) that exhibited a potentially more sensitive degrading channel. The large woody debris recruitment potential throughout the Study Area was observed to be low to none except within the upper South Fork Sage Creek drainage. Bank vegetation consisted of various shrubs and grasses, frequently providing ample cover for aquatic life, and channels within the Study Area appear to be capable of handling a wide range of flows.

Substrate Composition

Substrate composition, or the relative proportions of fine sediment, gravels, cobbles, and larger rocks on the stream bottom, was evaluated in each stream reference reach. Trout reproduction and food supply are quite dependent on substrate composition. Egg mortality is directly related to the proportion of fine sediment to gravel (see **Appendix 3B**). Sedimentation into a stream from road or culvert construction can thus reduce or eliminate the possibility that trout will find the local area suitable for spawning. Sedimentation effects can also spread downstream from a local disturbance. Ideal conditions for cutthroat trout spawning consist of approximately 5-15 percent fine sediment (particles <6 mm), with the majority of gravels 10-80 cm in diameter. Trout are more likely to spawn in habitats characterized by faster-moving water because currents must be strong enough to carry fines downstream as they are cleared from the nest during redd development (Chapman 1988).

All stream reference reaches were first divided into habitat types (i.e., pool, riffle, or run; Maxim 2005), then substrate composition was evaluated within each area of the reach. For simplicity, the categories of small gravel (2-8 mm), cobble (128-256 mm), and small boulders (>256 mm) were eliminated from this analysis because less than 9 percent of the total areas evaluated (n = 267) contained any substrate within these ranges (see Maxim 2005 for complete data). Wells Canyon (WC-900) substrate was determined to contain 100 percent fine sediment throughout (Maxim 2005), and was also eliminated from further analysis. This substrate composition and the lack of fish observed during baseline surveys in Wells Canyon eliminate the possibility that this reach contains suitable spawning habitat for trout.

The majority of the stream reference reaches evaluated by Maxim contained a mixture of fines (particles <2mm in diameter), gravels (8-64mm), and small cobbles (64-128mm). Concerning spawning habitat, “riffles,” which include pool tailouts, evaluated in the Study Area contained an average of 12 percent fines (range = 0-68%; **Table 3.8-11**). In their proper functioning analysis of riparian habitats, Maxim rated Crow Creek, Deer Creek, and Deer Creek tributaries as functioning-at-risk South Fork Sage Creek was rated as properly functioning (**Section 3.5**; Maxim 2004e).

TABLE 3.8-11 SUBSTRATE COMPOSITION SUMMARY

REACH	HABITAT TYPE* (N)	MEAN % FINES (<2MM)	MEAN % GRAVEL (8-64MM)	MEAN % SMALL COBBLE (64-128 MM)
CC-100	Pool (8)	38	63	0
	Riffle (9)	0	78	22
	Run (5)	12	64	16
CC-300	Pool (6)	20	40	40
	Riffle (6)	0	60	40
	HG Riffle (1)	0	0	0
	Run (3)	40	0	60
DC-100	Pool (17)	51	44	6
	Riffle (3)	0	40	47
	HG Riffle (3)	13	60	27
	Run (12)	13	77	10
DC-200	Pool (12)	8	29	33
	Riffle (13)	0	26	68
	Run (5)	0	20	76
DC-400	Pool (9)	53	38	7
	Riffle (9)	2	38	60
	Run (6)	47	48	3
DC-600	Pool (7)	24	51	24
	Riffle (7)	1	14	84
	HG Riffle (2)	0	5	40
	Run (2)	0	15	85
NFDC-200	Pool (5)	36	35	36
	Riffle (11)	39	48	13
	HG Riffle (4)	13	26	60
	Run (3)	17	50	33
NFDC-700	Pool (7)	11	86	3
	Riffle (11)	20	47	33
	HG Riffle (2)	5	15	80
	Run (3)	27	60	13
SFDC-100	Pool (7)	89	11	0
	Riffle (5)	68	32	0
	HG Riffle (1)	90	10	0
	Run (4)	95	5	0
SFSC-500	Pool (13)	46	22	17
	Riffle (12)	0	70	30
	HG Riffle (1)	0	60	40
	Run (4)	0	90	10
SFSC-700	Pool (13)	43	14	38
	Riffle (1)	0	60	40
	HG Riffle (13)	5	48	45
	Run (2)	80	20	0
TOTAL	**(267)**	**24**	**42**	**29**

*The relatively rare "cascade" habitat type was eliminated from this analysis; HG=high gradient.

Crow Creek

The average proportion of fine sediment in Crow Creek substrates (reaches CC-100 and CC-300) is 15-16 percent across all habitat types. There were no (0 percent) fine sediments in riffle habitats within either reach, and both reaches contained an adequate mean proportion of gravels (**Table 3.8-11**). Reach CC-100 also has relatively high-quality spawning habitat in run habitats whereas reach CC-300 does not (**Table 3.8-11**). The overall quality of potential spawning habitat in Crow Creek appears to be relatively high and resilient to small increases in fine sediment.

Deer Creek

Across habitat types, the average proportion of fine sediment in Deer Creek substrates (reaches DC-100, DC-200, DC-400, and DC-600) ranges from 3-33 percent. Average percent fines range from 0-2 percent in riffle habitats across all four reaches (**Table 3.8-11**). Although the mean proportions of gravels across riffles in Deer Creek reaches are not ideal for spawning (i.e., not the majority substrate), the low level of fine sediment in riffles (and in most run habitats, excluding DC-400) makes the quality of potential spawning habitat in Deer Creek relatively high and appears to be resilient to small increases in sediment.

North Fork Deer Creek

Across all habitat types, the average proportion of fine sediments in North Fork Deer Creek substrates (reaches NFDC-200 and NFDC-700) range from 17-31 percent. Riffle habitats in these reaches range from marginal (fines = 20% in NFDC-700) to unsuitable (fines = 39% in NFDC-200) for spawning (**Table 3.8-11**). Run habitats in North Fork Deer Creek may provide marginal spawning habitat, although average fines in runs for both reaches are greater than 15%. The overall quality of potential spawning habitat in North Fork Deer Creek appears to be relatively low and vulnerable to further degradation from small increases in fine sediment.

South Fork Deer Creek

The South Fork Deer Creek reach evaluated by Maxim (SFDC-100) is currently constrained by a dirt road and does not contain suitable spawning habitat. Mean sediment content is greater than 60 percent in riffle habitats, the most likely area for spawning (**Table 3.8-11**). The perennial reach of South Fork Deer Creek lies mainly upstream from a culvert proposed under the Proposed Action West Haul Road. The overall quality of potential spawning habitat in South Fork Deer Creek appears to be relatively low and vulnerable to further degradation from small increases in fine sediment.

South Fork Sage Creek

The average proportion of fine sediment in South Fork Sage Creek substrates (reaches SFSC-500 and SFSC-700) ranges from 20-27 percent across all habitat types. There were no fine sediments in riffle habitats within either reach (**Table 3.8-11**). These are suitable conditions for trout reproduction considering South Fork Sage Creek riffles also contain a high mean proportion of gravels (**Table 3.8-11**). Habitat quality in these reaches may also be relatively robust in the face of small sediment increases.

3.8.5 Trace Elements

Selenium

From studies of warm water fish in closed basins, Lemly (1993) proposed a biological effect value of 4.0 mg/Kg dry weight (dw) in whole body tissue concentrations for selenium. Hamilton (2002) also used this value, and Maier and Knight (1994) proposed a similar value (4.5 mg/Kg dw selenium). At these concentrations, mortality of juvenile fish and reproductive failure of adults are effects of selenium exposure (Lemly 1993). The EPA has proposed that aquatic life should be protected such that concentrations of selenium in whole-body fish tissues do not exceed 7.9 mg/Kg dw (GLEC 2002). This value, if finalized, will supersede previous aquatic life water quality criteria for selenium used by the EPA and will be used to establish water quality standards under the Clean Water Act for the protection of aquatic life from the toxic effects of selenium.

Maxim obtained collection permits from IDFG in order to analyze fish tissues. Fish from various size classes were collected from South Fork Sage Creek, South Fork Deer Creek, main stem Deer Creek, North Fork Deer Creek, and Crow Creek during electrofishing surveys, and analyzed for whole body concentrations of selenium and cadmium. Fish sampled from portions of South Fork Sage Creek and South Fork Deer Creek were found to have selenium tissue concentrations below the biological effect threshold value of 4.0 mg/Kg (**Table 3.8-12**). Two fish analyzed from North Fork Deer Creek and Deer Creek had levels of selenium that exceeded the threshold, as did fish in Crow Creek reaches upstream of Deer Creek (CC-100) and downstream (CC-300). Elevated selenium values observed in fish from North Fork Deer Creek and Crow Creek suggest that fish in these streams may be already affected by exposure to natural sources of selenium unrelated to mining activities. No fish collected were above the EPA's draft chronic exposure value (7.9 mg/Kg). Noticeable differences in the concentrations of selenium in cutthroat trout can be seen in **Table 3.8-12**.

Hamilton and Buhl (2003) sampled selenium levels on Deer Creek (DC), 0.5 km upstream from its confluence with Crow Creek, and on Crow Creek (CC), just upstream of its confluence with Deer Creek. Selenium concentrations in water were below their detection levels (0.002 mg/l). Concerning sediment, their results were reported to be 4.5 mg/Kg for DC and 2.1 mg/Kg for CC. Selenium concentrations in whole-body fish tissue were reported as 11.5 mg/Kg for DC and 10.4 mg/Kg for CC. In addition to sampling water, sediment, and fish, they also sampled aquatic plants and invertebrates. Selenium concentrations in aquatic plants were 4.3 mg/Kg and 4.6 mg/Kg for DC and CC, respectively. Selenium concentrations in aquatic invertebrates were 8.7 mg/Kg and 6.7 mg/Kg for DC and CC, respectively. Their results indicated a statistically significant correlation between selenium concentrations in aquatic plants and invertebrates and between selenium concentrations in aquatic invertebrates and fish. They concluded that selenium bioaccumulation in aquatic plants lead to bioaccumulation in aquatic invertebrates, which resulted in elevated concentrations in fish.

Selenium concentrations in fish have been shown to follow a similar pattern of accumulation as stream sediments, aquatic plants, and aquatic invertebrates. Studies show that fish bioaccumulate selenium primarily via ingestion (Hamilton et al. 2004). Invertebrates and plants can concentrate dissolved selenium from the water, and this selenium can then be part of the food base for fish feeding in contaminated reaches of streams. The effect of this dissolved selenium on the ecosystem would be expected to vary with the selenium concentration in the water. Studies conducted in southeast Idaho have shown that dissolved selenium concentrations downstream from phosphate mining sources do vary seasonally, peaking during spring runoff and decreasing during low-flow periods (Presser et al. 2004). Selenium that is initially released to streams as dissolved compounds or particulates can also be removed from the water through chemical and microbial reduction, adsorption to clay and organic detritus, reaction with iron, precipitation, co-precipitation, and settling. The eventual location for this selenium may be in the bottom sediment of surface streams where it may be perennially available for bioaccumulation in plants, benthic invertebrates, and fish, even though selenium concentrations in the water may seasonally be less than published aquatic life toxicity thresholds for selenium concentrations in water (2 to 5 µg/L, USDI 1998 and 5 µg/L, EPA 1987).

TABLE 3.8-12 TRACE ELEMENT ANALYSIS SUMMARY FOR SELENIUM AND CADMIUM

LOCATION	SPECIES	LENGTH (MM)	WEIGHT (G)	SELENIUM MG/KG DW	CADMIUM MG/KG DW
SOUTH FORK SAGE CREEK					
SFSC-SS-B	Cutthroat trout	126	20	2.6	0.26
SFSC-SS-B	Cutthroat trout	178	70	2.5	0.25
SFSC-SS-B	Cutthroat trout	191	80	2.2	0.16
NORTH FORK DEER CREEK					
NFDC-700	Cutthroat trout	113	15	3.6	0.51
NFDC-700	Cutthroat trout	115	16	5.0*	0.48
NFDC-700	Cutthroat trout	240	170	7.1*	0.26
DEER CREEK					
DC-100	Cutthroat trout	240	170	0.76	0.27
DC-200	Cutthroat trout	116	20	0.57	5.9**
DC-200	Cutthroat trout	178	60	0.34	0.37
DC-200	Cutthroat trout	220	115	0.42	0.19
DC-400	Sculpin	85	10	0.7	0.32
DC-400	Sculpin	90	10.5	6.4*	0.63
DC-400	Sculpin	100	13	5.8*	0.75
DC-400	Cutthroat trout	120	15	0.48	0.27
DC-400	Cutthroat trout	130	20	0.8	0.21
DC-400	Cutthroat trout	230	120	0.64	0.29
SOUTH FORK DEER CREEK					
SFDC-100	Cutthroat trout	105	13	2.3	0.07
SFDC-100	Cutthroat trout	130	24	1.9	0.04
SFDC-100	Cutthroat trout	165	51	2.7	0.06
CROW CREEK					
CC-100	Sculpin	75	5.3	4.7*	0.12
CC-100	Sculpin	75	5.3	3.9	0.27
CC-100	Sculpin	75	5.3	6.5*	0.29
CC-100	Brown trout	320	1000	4.6*	0.2
CC-100	Brown trout	370	1000	6.7*	0.12
CC-300	Brown trout	315	360	5.4*	0.03
CC-300	Mountain whitefish	352	500	5.0*	0.03

*Values Exceed Current Biological Effect Thresholds
**This fish was re-analyzed by Silver Valley Laboratory and results of the second analysis were similar to the first. This fish appears to be an anomaly.

Recent studies have been conducted to determine selenium concentrations and other trace elements in water, stream bottom sediment, aquatic plants, aquatic invertebrates, and fish from streams in southeastern Idaho near phosphate mining areas (e.g., Hamilton and Buhl 2003, Hamilton et al. 2004, NewFields 2005). Selenium data derived from samples of fish tissue, macroinvertebrates, sediment, or water have been reported in the Blackfoot River watershed, in upper and lower East Mill Creek and Dry Valley Creek (Hamilton et al. 2004), as well as in the Salt River and Bear River watersheds within Blackfoot River, State Land Creek, upper and lower Georgetown Creek, Deer Creek, and Crow Creek (Hamilton and Buhl 2003). The mean selenium concentration in fish tissue assessed by IDEQ in 2001 in upper and lower East Mill Creek (3 sample locations) was 20.7 mg/Kg (TtEMI 2002d), and by Montgomery Watson was 24 mg/Kg (Montgomery Watson 1999), exceeding values reported above the proposed biological threshold. Although still above the threshold, fish in the Salt River watershed (including two sample locations in Sage Creek) had a much lower mean selenium concentration of 8.2 mg/Kg (TtEMI 2002d). NewFields' fish samples at five out of six sites in Sage Creek were below the threshold (NewFields 2005). Moreover, NewFields' Sage Creek and South Fork Sage Creek samples both up- and downstream of Panel D and E mining activities, respectively, were below the threshold. The finding of elevated selenium in Deer and upper Crow Creek, where mining activities have not yet taken place, implies that these selenium levels have accumulated via erosion of naturally occurring Meade Peak shales in these watersheds (see **Sections 3.3.2** and **4.3.2**).

Selenium residues in some salmonids sampled within the phosphate mining area were above concentrations found to cause adverse effects in early life stages of fish, including salmonids (4.5 mg/Kg; Hamilton et al. 2000). Lemly (1999) documented reproductive failure and congenital deformities in other fish (not trout) living in waters with levels of selenium twice the IDEQ removal action level (0.01 mg/L). Hardy (2003), however, showed that cutthroat trout grown for 44 weeks on a steady diet of selenomethionine (the form of selenium found in the aquatic food chain) showed no signs of toxicity, including cranial-facial deformities in fry, despite measured whole-body selenium levels of up to 12.5 mg/Kg.

A health advisory was issued in the fall of 2002 by the Idaho Division of Heath recommending limited consumption of fish from East Mill Creek by children based upon elevated selenium concentrations in edible fish tissue. Their exposure calculations indicated a potential risk to child subsistence level users, although they agreed that subsistence use of this area is considered highly unlikely. Under the child subsistence lifestyle scenario, it is assumed that the receptor lives near the impacted media and that the only source of some component of their diet is from a single area over an extended period, assumed to be six years for a child. Consumption of fish and elk in the southeast Idaho phosphate mining area by the recreational user was evaluated in the Area Wide Human Health and Ecological Risk Assessment (TtEMI 2002d). The risk assessment calculated a hazard index of less than one for the adult recreationalist, indicating no adverse health effects were expected. The child recreationalist hazard index was 2.0 for ingestion of aquatic life but less than one for elk consumption. Based on fish sampled from East Mill Creek, a hazard index of greater than one indicates a potential for adverse noncarcinogenic health effects.

Cadmium

Fish that were analyzed for whole body selenium concentrations were also analyzed for whole body cadmium concentrations. IDEQ has proposed a cadmium removal action level for sediments supporting aquatic life of 5.1 mg/Kg dw for aquatic life (IDEQ 2003c). These action levels have been established to identify impacted areas, uncontrolled release areas, and those that are in violation of federal or state law. The majority of fish that were sampled within the Study Area were below the proposed threshold value. One exception was a fish collected from DC-200 with a cadmium concentration of 5.9 mg/Kg dw, which appears to be an anomaly.

3.9 Grazing Management

Livestock grazing has been a historic and traditional use of CNF lands in and around the Study Area. Sheep were brought into the area as early as the 1830s-1840s by missionaries and emigrants (Fiori 1981: 145-146). Small herds of cattle were driven into the region during the 1860s. Evidence of historic livestock grazing is still present within the Project Area, as described further in the Cultural Resources section of this EIS.

The Baseline Technical Report for Land Use, Access, Recreation and Grazing (Maxim 2004g) that was prepared for use in this EIS describes various laws, regulations, and policies that authorize grazing and set forth grazing management strategies. Forest Service Handbook 2209 (USFS 2004b) forms the basis for the grazing administration program, including developing permit terms and conditions. For the CNF, grazing management strategies are incorporated into the RFP (USFS 2003a) through the identification of management prescriptions, such as Prescription 2.8.3 *Aquatic Influence Zones*, which includes livestock grazing standards and guidelines for riparian areas. Under *Grazing Management*, the RFP includes the goal of providing "opportunities for livestock grazing within the capability and suitability of the land and in coordination with other resources goals."

There are seven range allotments on CNF lands (or portions of allotments) in the Study Area: Manning Creek Sheep Allotment, Deer Creek Sheep Allotment, Green Mountain Sheep Allotment, Sage Creek Sheep Allotment, Sage Valley Allotment, Lower Crow Creek Allotment, and Wells Canyon Allotment. **Figure 3.9-1** shows the allotment boundaries and range improvements, and **Table 3.9-1** provides allotment information on suitable acreage, range improvements, and stocking rates as well as other relevant notes. Most of this information was compiled by Maxim (2004g); the Lower Crow Creek Allotment information came directly from the CTNF. These allotments consist of varying proportions of the following vegetation community types: aspen, aspen/conifer, conifer, grass/shrub, mahogany, and riparian. Additional allotment details can be found in Maxim (2004g).

On CNF lands, the suitability of land within an allotment for grazing either cattle or sheep refers to whether it is compatible with management direction for a management area's other uses and values. It represents the integration of rangeland capability (the biophysical characteristics conducive to livestock grazing) and appropriateness of grazing livestock on a particular area, considering economics, social concerns, and compatibility with other land uses. For the CNF, capability was assessed based upon topographic slope, distance from water, and vegetative cover type. Suitable acres can change over time or with different management options. The suitable acreage numbers used in this EIS are those determined during the forest planning process for the alternative (7R) that was chosen for implementation (CNF RFP EIS). However, it is important to note that these numbers do not bind the CNF to any certain level of grazing. One way that suitability designations can change is during the site-specific allotment planning process and regardless of suitability numbers, actual livestock use of vegetation is based upon proper implementation and monitoring of forage utilization standards.

As part of its planning process, the CNF determines capability, suitability, and rangeland condition and then administers livestock permits on various allotments through site-specific Allotment Management Plans (AMPs). AMPs include livestock rotation schedules, utilization requirements, planned structural and non-structural improvements, maintenance standards, and tentative grazing capacities. Site-specific standards are also included in the Annual Operating

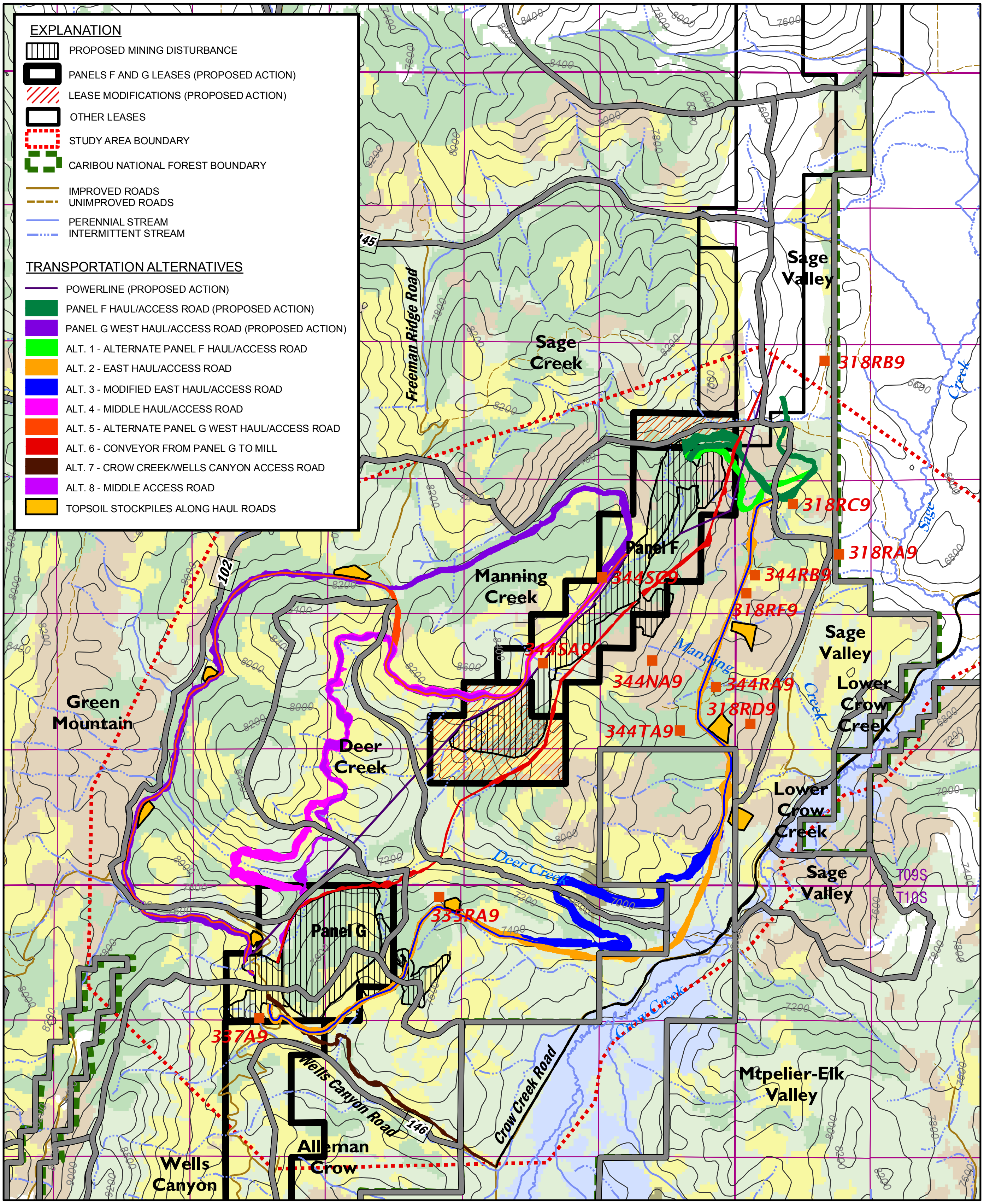
Instructions (AOI) that are issued annually to livestock permittees. Typical AOIs include approximate numbers and rotation dates for grazing throughout the season. The RFP prescribes allowable utilization levels that represent the maximum vegetation use in general locations such as riparian or upland areas; allotment-specific use levels can be can be stipulated to be lower, if necessary, in the AMP process.

TABLE 3.9-1 RANGE ALLOTMENT INFORMATION FOR THE STUDY AREA

ALLOTMENT	SUITABLE ACRES		RANGE IMPROVEMENTS	STOCKING RATE (ANIMAL MONTHS)	
	FOR CATTLE	FOR SHEEP		CATTLE (COW/CALF MONTHS)	SHEEP (SHEEP MONTHS)
Sage Valley	1,308	1,656	Stock ponds (3I8RA9)(3I8RB9) (3I8RC9)(3I8RD9)	528	N/A
Sage Creek	1,223	2,348	None	N/A	2,000
Green Mtn.	2,979	4,163	None	N/A	2,390
Manning Creek (currently being temporarily managed as one unit with Deer Creek)	3,001	4,877	Headbox & troughs (344SC9) (344SA9) Stock ponds (344RB9 & 318RP9) Water pipeline (344NA9) (344TA9) Reservoir (344RA9)	N/A	3,250
Deer Creek	942	1,601	Nate Canyon Stock Pond (335RA9)	Currently being included in the Manning Creek Allotment	
Wells Canyon	1,527	2,163	Headbox and troughs (337A9)	Allotment is currently vacant, can be used with either the Deer Creek or Green Mountain Allotment.	
Lower Crow	107	129	None	15	N/A

Generally, livestock may be trailed or trucked through the CNF, depending upon the AMP and AOI stipulations. Trailing corridors in the Study Area include a route along Rock Creek to Manning Creek to access the Manning Creek and Deer Creek Allotments from the south and a route along Diamond Creek to Sage Creek to access the Sage Creek Allotment from the north.

For the Study Area allotments, grazing is allowed for varying specific dates between June 1 and September 30. Most of the allotments allow about two month's consecutive time; the Sage Valley Allotment can be grazed over the entire 4-month timeframe. However, if CNF personnel determine a shortage of forage production or other unacceptable impacts, early removal of livestock from an allotment or pasture may be required. Livestock grazing on USFS lands relies upon nearby stream and spring water sources, with water rights held by the CNF; some of these sources are developed with head boxes and troughs. Sheep typically are moved to new areas every day for feed, which helps to maintain water quality and rangeland condition.



Modified from Maxim Technologies, Inc., Basline Technical Report-Land Use, Access, Recreation and Grazing, Figure 3.10-1 - Range Allotments/Vegetation Cover, April 2004

N

Scale 1:63,360

0 Miles 1

Range Allotment Boundary and Name

Range Improvements

110 Forest Route

Vegetation Cover

- Aspen/Conifer
- Aspen
- Conifer
- Grass/Shrub
- Mahogany
- Riparian

Figure 3.9-1
Grazing Allotments in the CEA
Smoky Canyon Mine Panels F and G

In addition to the structural range improvements on CNF allotments listed in **Table 3.9-1**, other range improvement projects on area allotments include continued treatment of noxious weeds such as musk thistle, Dyer's woad, and Canada thistle. As established by prescriptions in the recently completed RFP (USFS 2003a), additional improvements, revisions to AOIs and AMPs, riparian zone restrictions, utilization guidelines, and other changes may be made for various allotments in the future to ensure that forage can continue to be provided while maintaining diverse and healthy rangelands.

Although the USFS lands in the Study Area comprise most of the lands that are grazed, state-owned and privately owned lands are also subject to livestock uses. Grazing on private land is based upon a given landowner's preferences and detailed records of amount, type of use, etc. are not necessarily available to the public. There is one section of land in the Study Area (Section 36 in T 9 S, R 45 E) that is owned by the State of Idaho, and grazing in that area is regulated by the Idaho Department of Lands. According to their records (Jeff Nauman, personal communication, 2004), there are two leases currently operating in that section. One is comprised of 560 acres and 45 billable animal unit months, with grazing allowed between July 1 and September 20. The other is in the East ½ of the SE ¼, covering 80 acres with 32 animal unit months. Its period of use is from June 1 to September 30. The former, larger parcel has no perennial water sources, while the latter has a riparian area that is reportedly spring-fed. In the last cycle of lease renewal, a range assessment indicated that vegetation conditions were good in both of these State lease areas.

3.10 Recreation and Land Use

3.10.1 Recreation

The majority of the Study Area is within the Montpelier Ranger District of the CNF. The Study Area also includes Idaho state land, private lands, and Wyoming county and/or private lands. Recreation information and use data is available predominately for CNF lands. Many recreation opportunities are offered on the CNF, such as camping, hiking, fishing, hunting, snowmobiling, horseback riding, and mountain biking. Within the Study Area, all of these are available, although there are no developed campgrounds. Recreation and travel access are closely related topics; access is discussed below under Land Use (**Section 3.10.2**).

Recreation visits to the CNF have increased an average of four percent annually since 1980 (USFS 2003b). CNF use figures are based on personal observation by CNF staff and fee receipts from campgrounds and recreation special uses. Percentages of various recreation uses on the CNF include camping/picnicking (43 percent), motorized activity (25 percent), hunting/fishing (17 percent), and other (15 percent) (USFS 2003b). The CNF is conducting recreation use surveys from October 2004 to October 2005 to update and broaden the base of use data for the CNF and for future planning efforts.

The State of Idaho has prepared a 2003-2007 Statewide Comprehensive Outdoor Recreation and Tourism Plan (SCORTP). This plan was developed with input from all types of recreation management agencies and groups in Idaho.

Recreation sites and activities are divided into two broad categories – Developed and Dispersed. Developed recreation sites are areas of concentrated development, such as a campground or trailhead with improvements. Dispersed recreation requires few, if any improvements and occurs typically in conjunction with roads or trails. Dispersed activities are often day-use oriented and involve many types of activities, including fishing, hunting, berry picking, off-road vehicle use, hiking, horseback riding, picnicking, camping, viewing and photographing scenery, and snowmobiling. Most recreation in the Study Area is dispersed.

In order to inventory and manage recreation areas and activities, the CNF uses a planning tool called the Recreation Opportunity Spectrum (ROS), which categorizes recreation settings by the amount of development and other attributes. ROS categories include: Primitive, Semi-Primitive Non-motorized, Semi-Primitive Motorized, Roaded Modified, Roaded Natural, and Urban. Recreation use is allocated using the ROS classes, which help visitors find the setting that best provides for their desired experience.

There are two ROS categories in the Study Area listed below. Their class setting descriptions include the following factors:

<u>Semi-primitive Motorized (SPM)</u> - The setting for SPM lands includes a moderate probability of: solitude, closeness to nature, a high degree of challenge and risk using motorized equipment, predominantly natural-appearing environment, few users but evidence shows on trails, and few vegetation alterations that are widely dispersed and visually subordinate. Semi-primitive Motorized areas range from 2,500 to 5,000 acres that are screened by vegetation or topography, creating a “buffer” from surrounding development. The majority of lands in the Study Area are designated as SPM, comprising a block of approximately 14,890 acres.

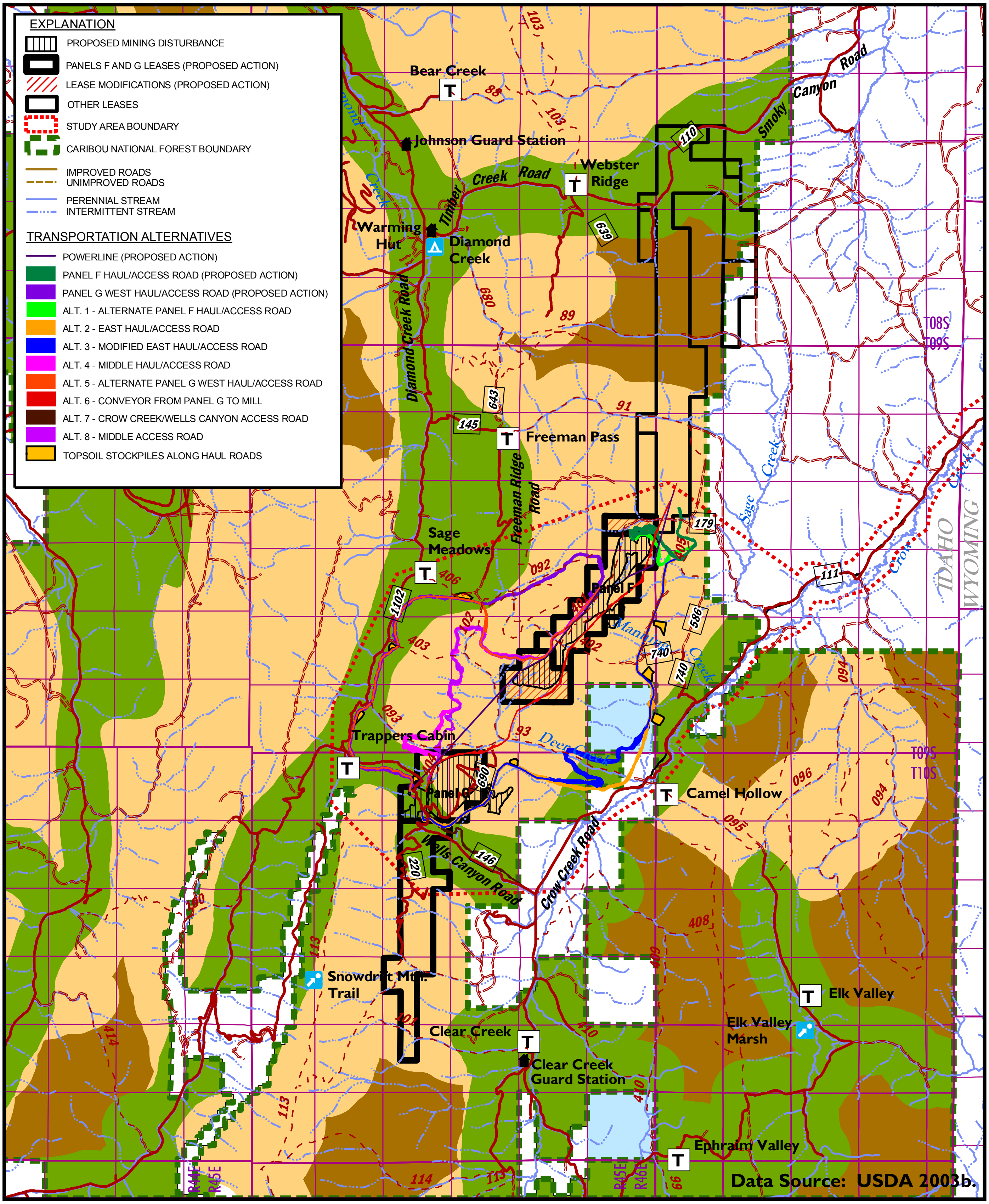
<u>Roaded Modified (RM)</u> – The setting for RM lands includes the opportunity to be with others in developed sites, little challenge or risk, relatively natural appearing environment as viewed from roads and trails, moderate evidence of human activity; access and travel by standardized motor vehicles, and resource modification and utilization is evident but generally harmonizes with the natural environment. The RM corridors in the Study Area (for Diamond Creek Road, Wells Canyon Road, Timber Creek Road, and Crow Creek Road) generally surround the SPM block noted above.

The ROS categories are shown on **Figure 3.10-1**. The RFP Guidelines suggest project planning that meets the ROS per the CNF ROS map.

Developed Recreation

<u>Campgrounds & Guard Stations</u>

There are no developed campgrounds within the Study Area. Diamond Creek Campground, approximately 7 miles north and Summit View Campground, approximately 5 miles west, are the closest designated campgrounds to the Study Area. Diamond Creek Campground is a rustic campground, consisting of 12 sites, without tables or grates. It experiences moderate use during summer months for general recreation and relatively heavy use during the fall big game hunting season. There are no fees charged for use of the Diamond Creek Campground. The site has been fenced to exclude livestock use of the area.



Modified from Maxim Technologies, Inc., Basline Technical Report-Land Use, Access, Recreation and Grazing, Figure4-Recreation, April 2004

N

0 Miles 2

Roads and Trails
- Improved Road
- Unimproved Road
- Trail
- 145 Forest Route
- 101 Trail

Recreation Points
- Point of Interest
- Cabin
- Campground
- Trailhead

Recreation Opportunity Spectrum
- Roaded Modified
- Semi-primitive motorized
- Semi-primitive non-motorized

Figure 3.10-1
USFS Road Designations
and Recreational Points
Smoky Canyon Mine Panels F and G

The Diamond Creek Warming Hut is adjacent to the campground and consists of two A-frame structures moved from the Johnson Guard Station to the current location in 2000. The hut was constructed as a joint effort of the Caribou Trail Riders, the CNF, and the Idaho Department of Parks and Recreation. The hut provides a gathering place and shelter for summer and winter recreationists using ATVs (all-terrain vehicles) and snowmobiles. The Caribou Trail Riders maintain the site under an agreement with the CNF, Soda Springs Ranger District (Moe 2003).

Summit View Campground is at an elevation of 7,200 feet, and is open from 6/1 to 9/30. It includes 23 units and 3 group sites. Use fees are required.

The Johnson Guard Station is located approximately one mile north of the Diamond Creek Campground and is available for rent year round. Clear Creek Guard Station is located on Crow Creek Road (FR 111) about three miles south of the junction with Wells Canyon Road (FR 146) and is also available for rent.

Dispersed Recreation

The dominant type of dispersed recreation in the vicinity of the Smoky Canyon Mine is big game hunting for elk, moose, and deer. Hunters place a high demand on the developed and dispersed campsites, and on CNF roads and trails. ATVs provide many advantages to hunters but also create some hunter conflicts. Elk use typically declines in areas open to motorized vehicles (USFS et al. 2001).

Fishing is also popular on Crow, Deer, and Diamond Creeks. Other dispersed recreation activities occurring in the area include snowmobiling, cross-country skiing, horseback riding, upland bird hunting, camping, picnicking, driving for pleasure/sight-seeing, and off-road vehicle use. Popular dispersed use areas include Manning Creek, South Fork Sage Creek, Deer Creek, North Fork Deer Creek, Upper Diamond Fork, and Sage Meadows.

<u>Big Game Hunting</u>

Game Management Unit (Hunt Area) 76 (Diamond Creek) encompasses the Study Area.

Archery season for deer and elk extends from August 30 to September 30. General (any weapon) season for mule deer generally occurs for a two-week period in early October. There are no controlled hunts for mule deer in Hunt Area 76 (IDFG 2003).

Elk populations are stable or increasing in Idaho. Security areas are blocks of habitat that provide hiding cover for elk and increase the chances that elk will survive the hunting season, increasing hunter opportunity overall. The greatest concentrations of elk are in areas least accessible to motorized vehicles.

Controlled hunts for antlerless elk occur from mid-November thru December. Controlled hunts for antlered moose occur from August 30 through the third week of November and for antlerless moose from October 15 through the third week of November. There are no special permits or hunts for bighorn sheep or mountain goats in Hunt Area 76. For 2004, in Hunt Area 66A, which includes southeastern Idaho from the Utah/Idaho line to McCoy Creek, there were 641 antlered elk permits, 1300 antlerless elk permits, and 9 antlered only-outfitter allocated permits.

Mule deer season for antlered deer is October 5-19. Due to high demand in areas 75, 76, 77, and 78 (includes portions of Franklin, Bear Lake and Caribou counties, Idaho), a limited entry drawing is offered for non-residents, who must then purchase a special Southeast Idaho Deer tag.

Hunting for black bear and mountain lion also occurs within the Study Area. Black bear hunting is allowed from August 30 through October and during a spring season from April 15 to June 15. Mountain lion season extends from August 30 through March 31 (IDFG 2003). Mountain lion harvest in Hunt Area 76 has ranged from 1 to 9 with an average of about 3 per year from 1991 to 2002 (IDFG 2004).

Other Hunting

Hunting of grouse (blue, ruffed) on the CNF occurs from September 1 through December. Sage grouse occur in lower Crow Creek and can be hunted from mid-September through mid-October. Other upland birds such as pheasant, quail, and partridge do not typically occur in the Study Area (IDFG 2003).

Hunting of badger, fox, and raccoon is open year round. Hunting for bobcat is allowed from mid-December to mid-February (IDFG 2003).

Off-Highway Vehicle (OHV) and/or All-Terrain Vehicle (ATV) Use

ATVs have grown in popularity during the past decade, increasing the demand on the CNF to accommodate this type of recreation. In Idaho, 95 percent of ATV and motorbike riding opportunities occurs on USFS or other public land (Maxim 2004g). During the period from 2000 to 2004, Idaho experienced an 87.6 percent increase in registration of ATVs and motorbikes (IDPR 2005). In Caribou County, Idaho, ATV and motorbike registration increased 53 percent in the same time frame. Information on 2004 registrations shows there are over 11,483 OHVs registered in southeast Idaho (IDPR 2005).

Under a USFS policy (New OHV Rule was issued November 2005) for OHV use on National Forest System lands and Grasslands, each forest is required to designate a system of roads, trails, and areas where OHV use would be allowed. OHVs include motor vehicles that are designed or retro-fitted primarily for recreational use off road, such as minibikes, amphibious vehicles, snowmobiles, motorcycles, go-carts, motorized trail bikes, and dune buggies.

The CNF initiated a Travel Plan Revision in March 2003 to address summer and winter travel, and tier to the RFP (USFS 2003a), which provides limits on open motorized route densities. The CNF Revised Travel Plan EIS and ROD were signed in November 2005.

Hiking

Most hiking in the area occurs during the fall months and is likely associated with big game hunting. There are several trailheads in the Study Area: #33 Sage Meadows; #34 Camel Hollow; and #35 Trappers Cabin are shown on CNF maps, although the ‘trailheads’ are undeveloped, and similar to other points where trails intersect roads. Parking provided at trailheads varies from three to five spaces. No other facilities are provided. Trails partially or completely within the Study Area are shown on **Figure 3.10-1.** Location and approximate length of trails that occur in the Study Area are described in **Table 3.10-1.** Trail lengths and restrictions may change pending revisions to the Travel Management Plan.

TABLE 3.10-1 TRAILS WITHIN THE STUDY AREA

TRAIL NO.*	NAME	APPROXIMATE LENGTH	LOCATION DESCRIPTION
092	S. Fork Sage Cr.	4 miles	Extends from FR 145 to FR 144 through S. Fork Sage Creek.
093	Deer Cr.	5 miles	Extends from Diamond Creek Road (FR 1102) to Crow Creek Road (FR 111). Portion of trail near Crow Cr. crosses private land.
095	Camel Hollow	2 miles	Extends from Crow Creek Road (FR 111) connecting to Pine Creek Trail No. 096.
102	N. Fork Deer Cr.	2.5 miles	Extends from FR 145 to Deer Creek Trail No. 093.
401	Panther Springs	2 miles	Connects between S. Fork Sage Creek Trail No. 092 and Manning Creek Trail No. 402.
402	Manning Basin	3 miles	Extends from FR 740 connecting with S. Fork Sage Creek Trail No. 092
403	Pinnacle Peak	1.5 miles	Extends from Diamond Creek Road (FR 1102) connecting with N. Fork Deer Creek Trail No. 102.
404	Well Park	1 mile	Extends from FR 146 connecting with Deer Creek Trail No. 093.
405	Sage Valley	3 miles	Extends from end of FR 586 to FR 179.
406	Sage Meadows	1 mile	Extends from Diamond Creek Road (FR 1102) to FR 145.

Source: USFS 2002.
*These trails are all non-motorized.

A designated CNF Point of Interest near the Study Area is The Snowdrift Mountain Trail (No. 113). This high ridge often holds snow yearlong. Huge snowfields pile up on the leeward side and often slide as avalanches to canyons below (USFS 2002). The Snowdrift Mountain Point of Interest is shown on **Figure 3.10-1.**

Winter Season Recreation Use

Snowmobile registration in Idaho increased 110 percent (from 22,300 to 46,800) between 1989 and 2001(USFS 2003b), and 10 percent from 2001 to 2004 (IDPR 2005). In 2004 there were 760 snowmobiles registered in Caribou County, Idaho (IDPR 2005). Most of the Study Area currently is open to cross-country snowmobile use. However, the Travel Map (USFS 2002) restricts snowmobile use to designated routes in some areas of big game winter range. Although big game winter range occurs between Deer Creek and Manning Creek, the area is not restricted. The Bear Lake State Park program and Caribou Trail Riders club help provide groomed trails, signing and warming shelters. The Diamond Creek Warming Hut is operated and maintained by the Caribou Trail Riders club. Diamond Creek Road (FR 1102), Crow Creek Road (FR 111), Wells Canyon Road (FR 146), and Freeman Pass areas are popular snowmobile routes. Currently in the winter months along Crow Creek Road, snow plowing stops approximately three miles southwest of the Idaho/Wyoming border. Trucks and trailers can park here and unload snowmobiles.

Cross-country Skiing

Cross-country skiing in the Study Area is limited. The area is distant from population centers where other more attractive and nearby cross-country skiing experiences are available.

Mountain Biking

All roads in the Study Area are open to mountain biking.

3.10.2 Land Use

The types of lands within the Study Area provide for a variety of uses. CNF lands are used for recreation, CNF products such as timber sales and firewood, livestock grazing (see **Section 3.9**), wildlife habitat (see **Section 3.7**), and minerals extraction. Private lands in the Study Area are used for seasonal homes, ranching, and recreation. Rights-of-way provide access and utilities. All of these uses, in addition to ongoing or event-type, natural and human-induced disturbances influence the land or ecosystem condition. The desired condition of CNF ecosystems is one of sufficient complexity, diversity, and productivity to be resilient to disturbances (USFS 2003a).

The CNF lies on the western edge of an area defined as the Greater Yellowstone Ecosystem (GYE). At over 12 million acres overall, the GYE is the largest block of relatively undisturbed plant and animal habitat in the contiguous U.S. The United Nation (U.N.) has defined the area as a Biosphere Reserve (CTNF 2004). The Study Area covers approximately 20,414 acres, less than 0.2 percent of the area of the GYE. Wildlife habitat and plant habitats in the Study Area are discussed in **Sections 3.7** and **3.5**, respectively. Inventoried Roadless Areas, Research Natural Areas, and Wilderness areas are discussed in **Section 3.11**.

Land Status/Ownership

Lands in the Study Area are a compilation of CNF, State of Idaho, and private ownership (**Figure 3.10-2**). CNF lands make up the majority of the Study Area. The State of Idaho has one section within the Study Area.

The larger private parcels are predominantly ranching properties along Crow Creek Road; however, smaller parcels (from under 1 acre to 6 acres) are also held privately. According to Caribou County records, the landowners along the Crow Creek Road are listed as follows and shown on **Figure 3.10-2**: Peter Reide, Fred K. Nate, Larry Alleman et al., Karolyn Alleman, Nevada Rock & Sand Company, Tolman Family Association, Dickson Whitney and Osprey Partners, Dan C. Peart, Ruth L. Rasmussen, Bruce W. Jensen, and Karen Oakden,

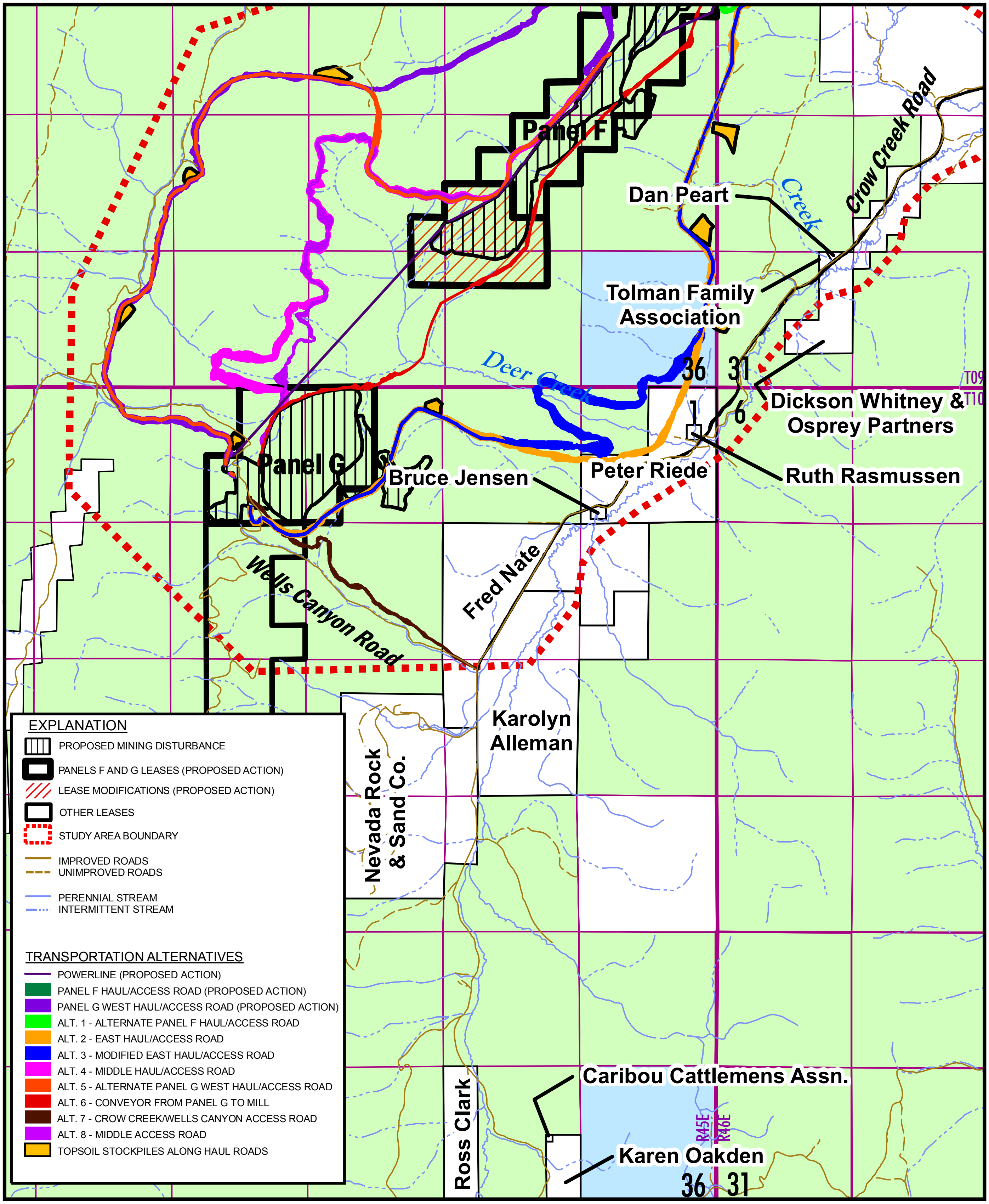
CNF Management

The Caribou and Targhee National Forests were officially combined in 2000. The RFP for the Caribou portion was approved early in 2003. Goals identified in the RFP for the CNF (USFS 2003a) include development of phosphate resources using practices for surface resource protection and reclamation, and with consideration to social and economic resources. Based on this premise, proposed development of Smoky Canyon Mine Panels F and G would be consistent with the RFP for the CNF, Travel Plan for the CNF, and the current management regulations concerning roadless areas (as described previously in **Section 1.3.2**).

In addition to the goals for development of phosphate resources, the RFP also has management prescriptions (MPs) that are designed to meet the DFC's of the CNF.

Management Prescriptions

Management prescriptions are a set of practices applied to a specific area to attain multiple-use and provide a basis for consistently displaying management direction on land administered by the CNF. Prescriptions identify the emphasis or focus of management activities for an area, but do not necessarily construe exclusive use. Management prescriptions do not stand alone, but are part of the management direction package for the CNF that also includes *Forest-wide* goals, objectives, standards (S), and guidelines (G). Where a management prescription allows an



Base data from Caribou Naion Forest Gis data sets.

N

LandStatus

National Forest Land
State Land
Private Land

0 Miles 1

Figure 3.10-2
Private Owners
Smoky Canyon Mine Panels F and G

activity, such as recreation or livestock grazing, the standards and guidelines in the prescription or in the CNF-wide direction provide specific parameters within which the activity must be managed. In areas where prescriptions are applied, direction in this section would overrule CNF-wide direction only if the prescription conflicts with the CNF-wide S&Gs (USFS 2003a). Although the management prescription that applies to the majority of the Proposed Action is 8.2.2, all components of the Proposed Action that occur outside the ½-mile buffer area (i.e. haul access roads) need to follow the appropriate management prescription that would be in effect. Management prescriptions in the Study Area are shown on **Figure 3.10-3** and include:

Prescription 2.7.2 – Elk and Deer Winter Range

This management prescription emphasizes management actions and resource conditions that provide quality elk and deer winter range habitat. Access is managed or restricted to provide security for wintering elk and deer. Motorized travel is restricted to designated roads and trails. This prescription applies to an area including the southern half of Panel F.

Prescription 5.2 – CNF Vegetation Management

Emphasis of this prescription is on scheduled wood-fiber production, timber growth, and yield while maintaining or restoring forested ecosystem processes and functions to more closely resemble historical ranges of variability with consideration for long-term CNF resilience. Motorized use is prevalent for timber management activities and recreation. This prescription applies to an area including the northern half of Panel F.

Prescription 6.2 – Rangeland Vegetation Management

This prescription focuses on maintaining and restoring rangeland ecosystem processes and functions to achieve sustainable resource conditions. Activities in these areas are designed to achieve restoration of non-forested vegetation to the historic range of variability and include watershed restoration, thinning, prescribed fire, wildfire for resource benefit, and noxious weed treatments. Dispersed recreation activities occur throughout these areas. Motorized transportation is common, but some seasonal restrictions may occur. This prescription applies to an area including Panel G.

Prescription 2.8.3 – Aquatic Influence Zone (AIZ)

As stated in various previous sections, this prescription applies to the habitats associated with aquatic areas (wetlands, streams, springs, bogs, lakes, ponds, etc.), in order to protect, restore, and maintain health of these areas. AIZ attributes must be maintained in areas developed for minerals. Standards require minimum instream flows to be maintained at road crossings or other instream facilities, and fish passage provided where needed**.** **Figure 3.3-2** displays the AIZs within the Study Area.

Prescription 8.2.1 – Inactive Phosphate Leases

This prescription applies to existing federal phosphate leases that have not been or are not scheduled for development and KPLAs. A KPLA is land known to contain phosphate deposits that have been formally classified by the U.S. Geological Survey as subject to leasing. A ½-mile buffer of land around each KPLA is also included in this management prescription. Exploration and road construction may be allowed in these areas, subject to NEPA analysis.

Prescription 8.2.2 – Phosphate Mine Areas

These areas are federal phosphate lease areas where mining, post-mining reclamation, or exploration is taking place. This prescription realizes the dynamic process involving research and technology that affects the BMPs that are implemented for mining operations. Phosphate deposits on federal land are managed under the 1920 Mineral Leasing Act, as amended, and Federal Regulations at 43 CFR, Part 3500. BLM is the designated federal agency with authority to issue or modify federal phosphate leases and/or approve exploration and development activities. Where Forest land is involved, the USFS provides BLM with formal recommendations for lease issuance and development proposals, but the final authority rests solely with BLM. The USFS issues decisions with formal BLM recommendations for off-lease activities.

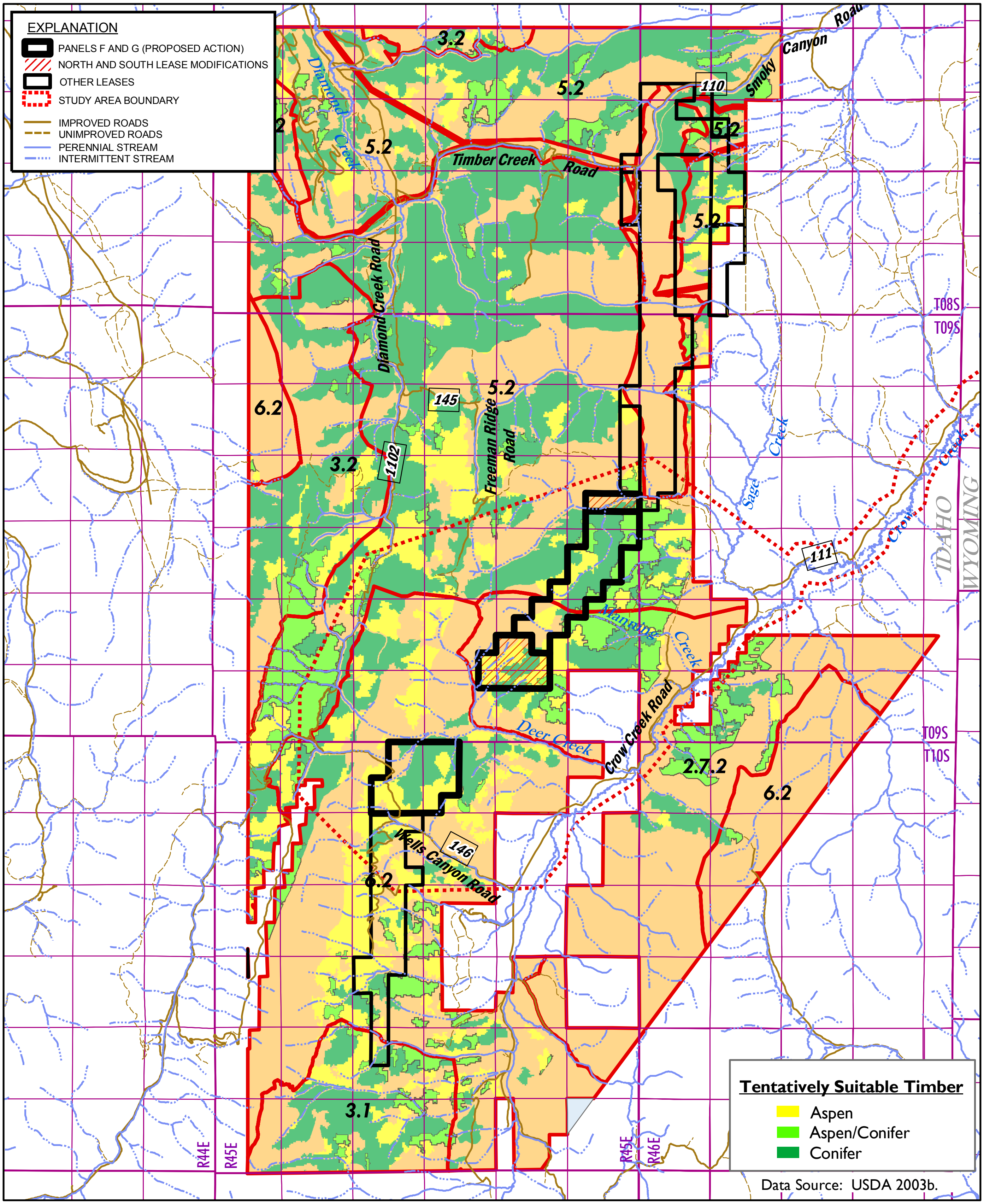
In addition to Prescription 8.2.2, which applies to Phosphate Mine Areas and provides goals and objectives for development of existing leases, a direction is provided in the RFP under Reclamation of Mined/Drastically Disturbed Lands. This management prescription applies to the majority of the Project Area, with the exception of any areas that occur outside the ½-mile buffer area. In those cases, the appropriate management prescription described above applies.

Special Use Authorizations

The RFP (USFS 2003a) allows special uses that are compatible with other resources. Special Use Authorizations (SUAs) are issued for uses that serve the public, promote public health and safety, protect the environment, and are legally mandated. Bonds or other security instruments are required if the CNF determines that a use has potential for disturbance that may require rehabilitation or when needed to ensure other performance. The CNF establishes and maintains rental and user fees for all SUAs. Current SUAs located in the Study Area are described in **Table 3.10-2** and their general locations are shown on **Figure 3.10-4**.

TABLE 3.10-2 SPECIAL USE AUTHORIZATIONS

SPECIAL USE AUTHORIZATIONS				
PERMITEE	**AUTHORIZATION NO.**	**DATE ISSUED**	**EXPIRATION DATE**	**DESCRIPTION**
U.S. Fish & Wildlife Service	CAR0004-01	Nov. 1954	Dec. 2017	Covers 10 acres in NW¼, Sec. 5, T. 10 S., R. 45 E. on South Fork of Deer Creek for the purpose of constructing and maintaining a cabin for use by trappers engaged in predator control and game management on the CNF.
Stewart Brothers	CMT31	July 2003	Dec. 2022	Issued for irrigation pipe and related intake system in Sec. 15 & 16, T. 10 S., R. 45 E.
Tolman Family Association	CAR5429-01	Nov. 1997	Dec. 2017	Issued on .15 acres in NW¼ NE¼, Sec. 31, T. 9 S., R. 46 E. for headbox, water collection system and pipeline.
Bridger-Teton National CNF	CAR0008-01	July 1975	Dec. 2015	Issued for 0.5 acres in Sec. 12, T. 9 S., R. 45 E. to establish an electronic site on Sage Peak consisting of small buildings and related antenna facilities.
Lower Valley P&L Co,	CAR4033-02	Nov. 1982	Dec. 2012	Issued for powerline right-of-way 40-feet in width and 1.42 miles in length in Sec. 31 & 6, T. 10 S., R 46 E.; and Sec. 2, T. 10 S., R. 45 E.
J.R. Simplot Co.	CAR4067-02	Sept. 1992	Dec. 2021	Issued for 1,070 acres for the purpose of mill site, stockpile waste dumps, service roads, warehouse facilities, offices, parking area, maintenance shops, processing plant, and related facilities associated with processing phosphate rock from Federal Phosphate Lease I-012980.
	SSC17	April 2002	Dec. 2007	Issued to allow Simplot and subcontractors access to Deer and Manning Creek lease areas to begin baseline data collection activities.



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.
Modified from Maxim Technologies, Inc., Basline Technical Report-Vegetation Resources, Figure 3 - Management Prescriptions-Suitable Timber, February 2004

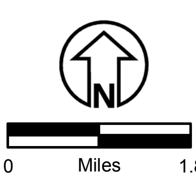
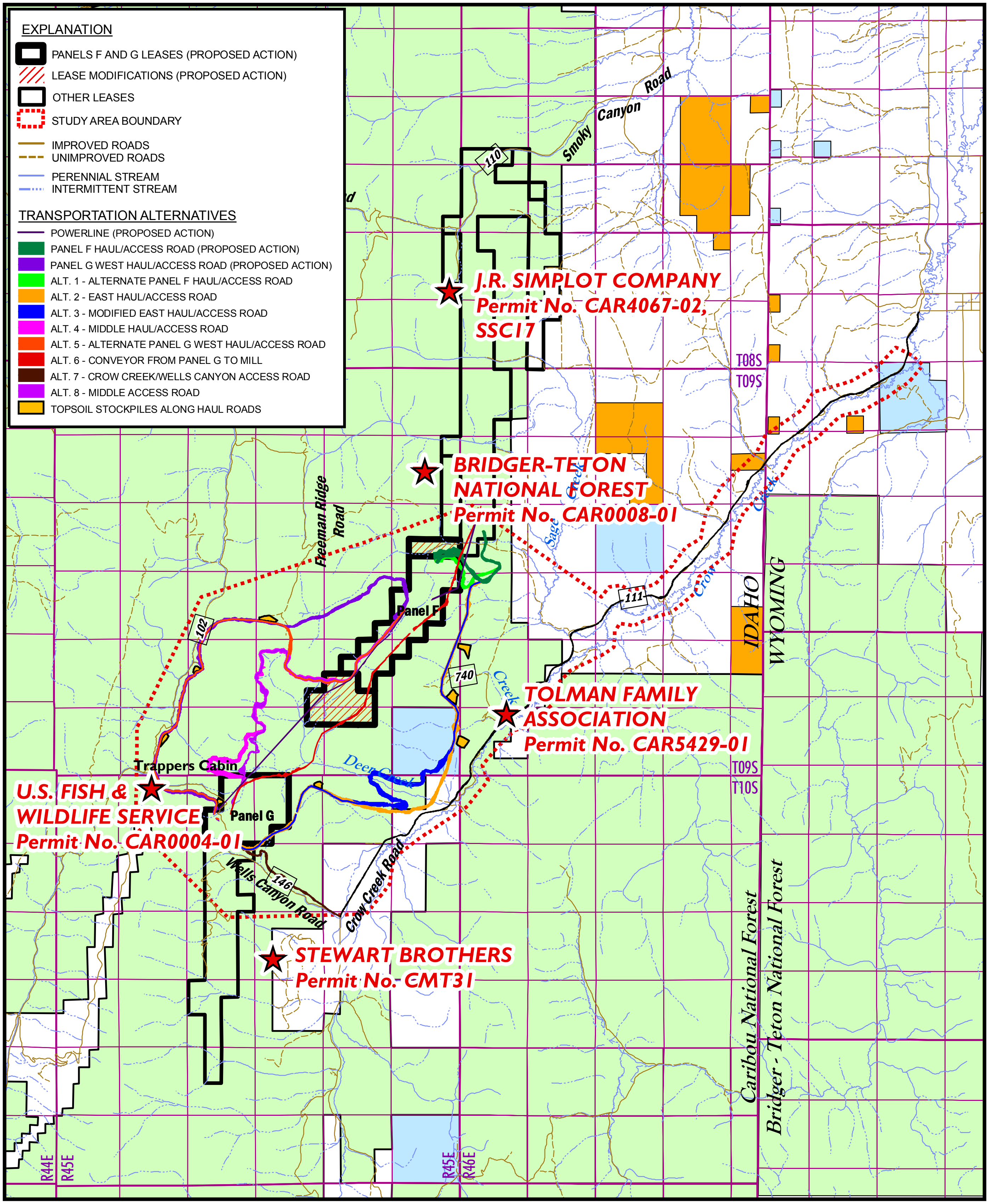


Figure 3.10-3
Management Prescriptions - Suitable Timber
Smoky Canyon Mine Panels F and G



Base data from Caribou National Forest Gis data sets.

LandStatus

- National Forest Land
- State Land
- BLM Administered Land
- Private Land
- Special Use Permit

0 Miles 2

Figure 3.10-4
Land Status and Special Use Permits
Smoky Canyon Mine Panels F and G

The CNF can issue SUAs for those portions of exploration and mining operations that lie on CNF land outside mineral lease boundaries. Off-lease mine related SUA facilities could include portions of haul roads, mill sites, power lines, communication sites, temporary stockpiles (topsoil/ore/waste rock), or drainage control structures. However, permanent disposal of mine overburden solid waste is not permitted under SUAs [36 CFR 251.54].

Other Utilities and ROWs in the Study Area

In addition to SUA areas, which are located on CNF lands, other rights-of-way occur within the Study Area. The portion of Crow Creek Road north of Wells Canyon and within the CNF is in an easement granted to Caribou County by the CNF for operation and maintenance of the road; it extends 33 feet each side of the road center line. Other sections of Crow Creek Road outside the CNF are under county jurisdictions – Caribou County in Idaho, and Lincoln County in Wyoming.

The Wells Canyon Road east of the CNF boundary is under a ROW easement granted by the property owner to the CNF. It extends 12.5 feet each side of centerline for a total width of 25 feet.

Timber Management

The timber harvest in Idaho has declined by 31 percent since 1990 (USFS 2003b), along with national trends of reduced demand for timber. The decline in USFS timber harvest during this time has been even more dramatic, a 78 percent decrease. Each year, the CNF offers timber for sale, and these sales are completed based upon supply/demand. An operator has a specified period to harvest timber once a sale is completed. The CNF provides a variety of wood products to the public, including saw timber, house logs, chips, firewood, Christmas trees, posts, and poles.

The Montpelier District had no timber sale offerings in 2003. The Twin Creek Timber Sale located in Georgetown Canyon will be offered in 2006 in the watershed to the west of the Study Area. No timber sales are planned in the Crow Creek watershed in the 5-year timber sale plan.

Tentatively suitable timberlands have been reassessed as part of the RFP for the CNF (USFS 2003a). Tentatively suitable acres are those forest land areas available and capable of sustainable timber production. These lands represent the maximum acres that could be managed for regular predictable timber outputs and are used in determining the Allowable Sale Quantity (ASQ) (USFS 2003b). Allowable Sale Quantity is the amount of timber that may be sold from the area of suitable land covered by the CNF Plan for a time period specified by the Plan. This quantity is normally expressed as the "average annual allowable sale quantity" (USFS 2003b). Other forested areas can be cut under the Plan for different management reasons, regardless of whether or not the ASQ is met for a specific year.

Under the RFP (USFS 2003a), Management Prescription 5.2 – CNF Vegetation Management, is the only prescription where suitable timber is included in the ASQ. Timbered land in all other prescriptions within the Study Area has been removed from the suitable timber base and does not contribute to the ASQ on the CNF.

The Panel F and Panel G Lease areas encompass a total of approximately 2,000 acres (including lease modification areas of Panel F). The lease areas contain approximately 1,600 acres of tentatively suitable timber. However, only the portion of Panel F that lies within Prescription 5.2 is included in the ASQ. This portion of Panel F contains 641 acres of tentatively suitable timber (108 acres aspen, 170 acres aspen/conifer, and 363 acres conifer).

Overall, Panel F contains 1,057 acres of tentatively suitable timber (359 acres aspen; 210 acres aspen/conifer; 488 acres conifer); Panel G contains 553 acres of tentatively suitable timber (276 acres aspen; 1 acre aspen/conifer; 276 acres conifer).

3.10.3 Access Roads and Trails

Public access to the Panels F and G Project Area is via County Road 236 from Afton and Fairview, Wyoming and southwest on Crow Creek Road for several miles into the CNF. From Montpelier, Idaho, access is via Highway 89, up Montpelier Canyon and north on Crow Creek Road. Access from Georgetown, Idaho is up Georgetown Canyon to FR 1102.

Primary access routes to the Study Area include the Crow Creek, Georgetown, Wells Canyon, and Diamond Creek roads. Crow Creek Road (FR 111) extends approximately 50 miles northeast from U.S. Highway 89 near Montpelier to near Afton, Wyoming. Georgetown Canyon Road (FR 102) extends northeast from its intersection with Hwy 30 at Georgetown, Idaho to its intersection with the Wells Canyon Road. Diamond Creek Road (FR 1102) extends south from its intersection with the Blackfoot River Road in Upper Blackfoot River Valley approximately 25 miles to the intersection with the Wells Canyon Road (FR 146). Wells Canyon Road (FR 146) extends northwest from its intersection with the Crow Creek Road approximately 4.2 miles to its intersection with the Georgetown Canyon and Diamond Creek Roads. Access to the area is also possible using the Smoky Canyon/Timber Creek Road (FR 110). Active mine areas are closed to public, motorized travel for safety reasons.

Traffic on CNF roads in this area is light to moderate. Shift changes at Smoky Canyon Mine reflect periodic traffic increases along Smoky Canyon Road (FR 110) between the mine and the Star Valley area. Moderate traffic on Crow Creek Road (FR 111) is mostly local access with some through traffic (seasonal) to Montpelier Reservoir and the town of Montpelier. Diamond Creek Road (FR 1102), Georgetown Canyon Road (FR 102), and Wells Canyon Road (FR146) traffic varies from light to moderate on weekdays and weekends, respectively. Traffic increases noticeably on all CNF roads in the area during the fall hunting season (Duehren 2003).

An objective identified in the RFP is to revise the CNF travel plan to incorporate RFP direction for access management. RFP Standards and Guidelines that are applicable to travel planning include:

- Open Motorized Route Densities (OMRDs) shall not exceed the limits identified in the Plan OMRD Map. OMRD is defined as the miles of designated motorized roads and trails per square mile within a specific prescription polygon.
- The OMRD standard and restrictions depicted on the travel plan map do not restrict responses to emergency events to protect human life, property values, structures, and CNF resources.
- The travel planning process shall consider additional areas for non-motorized winter recreation.
- Any motorized vehicle access on a restricted road or trail or in a restricted area shall be for official administrative business only and shall be officially approved.
- Unless otherwise posted, motorized access is allowed for parking, wood gathering and dispersed camping within 300 feet of an open designated road.
- The construction of new or maintenance of existing motorized and non-motorized access routes should be consistent with the ROS class in which they are located.

Mine access roads, as well as other special use roads, that are not open to the public are not included in the OMRD calculations.

Travel plans are legally enforced through the issue of a Special Order signed by the CNF Supervisor. In 2003, a Special Order was added to the 2002 CNF travel plan map prohibiting cross-country motorized access during the snow-free season on most areas of the CNF. In areas that were formerly open to cross-country, motorized use, all roads and trails depicted on the 2002 map became the designated routes, until the revised travel plan analysis and decision are complete. This was done to comply with RFP direction.

The 2003 RFP closed 96 percent of the CNF to cross-country motorized travel (USFS 2003a). Only a small area on the Soda Springs Ranger District remains open for this type of use. In addition, the RFP set a ceiling for motorized route densities for each management prescription area OMRDs. The Revised Caribou Travel Plan will establish and identify which roads and trails will remain open to motorized travel and which will be closed to motorized travel to meet the OMRDs in the RFP. This is reflected in the 2005 Draft EIS for the Caribou Travel Plan Revision (USFS 2005b).

Under the Proposed Action for the Revised Travel Plan, the following summer travel routes within the Study Area would remain open to motorized use:

20111 – Crow Creek Road
20740 – Manning Creek Road
20586 – Sage Valley Road
20146 – Wells Canyon Road
20220 – Snowdrift Road
20690 – Middle Deer Creek Road
20535 – Trappers Cabin Road
21102 – Diamond Creek Road
20102 – Georgetown Canyon Road
20145 – Sage Meadows Road
20179 – South Fork of Sage Creek Road

Winter travel routes include snowmobile routes up Manning Canyon and Wells Canyon. Within elk and deer winter range, which includes the entire northern end of the Study Area, snowmobile use would be limited to designated routes only. Non–motorized travel is generally allowed on all routes.

RS 2477 (Revised Statute 2477) is legislation that allows counties to assert that they have access rights on roads and/or trails that existed prior to the establishment of the CNF. The RFP provides for resolution to RS 2477 issues. There are no known RS 2477 assertions within the Study Area. However, the Crow Creek Road was established prior to the reservation of the forest and would probably qualify as a RS 2477 route.

Under the Revised Travel Plan, the construction of new roads or maintenance of existing routes should be consistent with the ROS classes in which they are located.

3.11 Inventoried Roadless Areas/Recommended Wilderness and Research Natural Areas

3.11.1 Inventoried Roadless Areas/Recommended Wilderness

As displayed on **Figure 3.11-1**, portions of the Proposed Action and Action Alternatives lie within portions of two Inventoried Roadless Areas (IRAs): the Sage Creek Roadless Area (SCRA) and the Meade Peak Roadless Area (MPRA). The SCRA encompasses approximately 12,710 acres of which 3,021 acres are under existing active phosphate leases. The majority of Panel F, including proposed lease modifications, the majority of Panel G, and the majority of the haul/access roads to Panel G lie within the SCRA. An additional 2,287 acres are within unleased KPLAs that represent 18 percent of the SCRA. The MPRA encompasses approximately 44,585 acres of which approximately 1,140 acres are leased for phosphate mining with an additional 2,580 acres having been identified as KPLAs (USFS 2003b). A small portion of the extreme southwestern area of Panel G and a short segment of the Proposed Action Panel G haul/access road occurs within the MPRA. National Forests are required to re-evaluate and re-inventory roadless areas for possible inclusion in the National Wilderness Preservation System as part of Forest Plan revisions. Under the RFP (USFS 2003a), no Recommended Wilderness areas occur within the Study Area. The IRA characteristics (i.e. roadless and wilderness attributes) for each of the IRAs in the Study Area are summarized below. The summarized information applies to the entire IRA being described, not just the portion of the IRA within the Study Area. Currently, according to the roadless rule, lessees are permitted to access leases and produce minerals within the IRAs.

Sage Creek Roadless Area

Roadless Attributes

The SCRA is described by the Roadless Area Conservation Initiative (RACI) resource attributes listed below, which have been summarized from USFS 2003b.

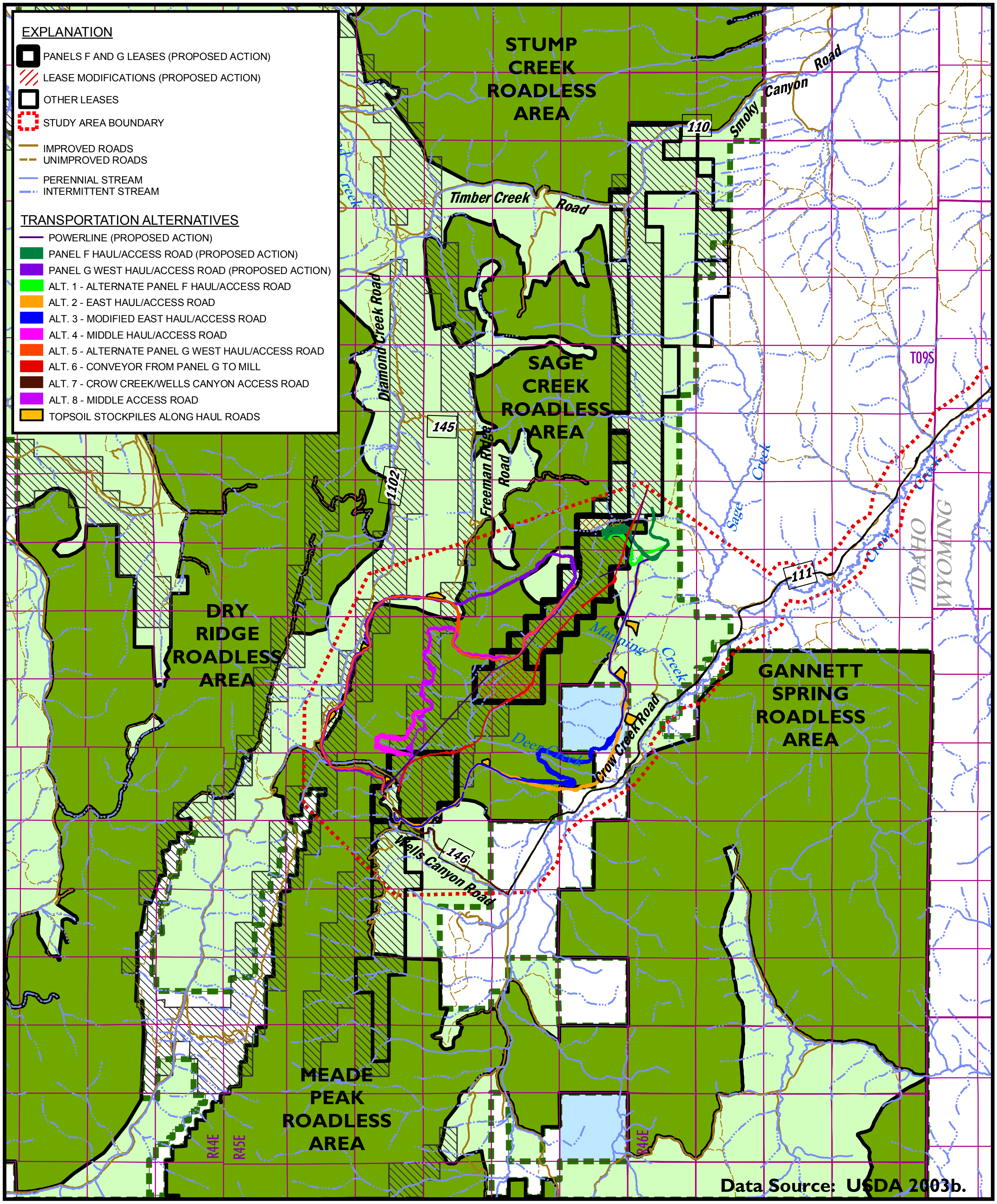
Soil: Soils are mainly stable in the SCRA; only two percent of the soils are rated unstable. Approximately 23 percent of the area has an erosion hazard.

Air: The SCRA is within the twenty-mile sensitive receptor radius and is within 200 kilometers of a Class I area. Nearby towns that are classified as sensitive air quality receptors are Afton, Wyoming and Soda Springs, Idaho.

Water/Sources of Public Drinking Water: Overall the watersheds are rated in moderate condition. Three tributaries of Crow Creek, South Sage, Manning, and Deer Creeks, drain the area. In contrast to neighboring watersheds to the north and west, the Deer Creek watershed has been relatively unimpacted by mining and related activities.

Diversity of Plant and Animal Communities

Vegetation: Vegetation communities are composed of forest and grass/shrub communities. Forests comprise approximately 78 percent of the vegetation; grass/shrub communities account for approximately 22 percent of the vegetation. Conifers cover over 40 percent of the area. Forested communities are composed of Douglas-fir, aspen, mixed conifer, lodgepole pine, and aspen/conifer. Aspen decline is rated high because of aging and conifer encroachment of aspen stands. The ratings for both insect and fire hazard in forested communities are moderate because of the older conifer composition



Modified from Maxim Technologies, Inc., Basline Technical Report-Land Use, Access, Recreation and Grazing, Figure2-Surface Ownership, April 2004

Roadless Areas
110 Forest Route
State Land
Private Land
Known Phosphate Lease Areas

N

0 Miles 2

Figure 3.11-1
Inventoried Roadless Areas of
Sage Creek, Meade Peak and Gannett Spring
Smoky Canyon Mine Panels F and G

and fuel buildup in the understory. Grass/shrub communities occur only in small patches in the area. Invasive species (Canada thistle and Musk thistle) comprise less than one percent (0.2) of the area (22 aces). The South Fork Sage Creek, Pole Canyon, and Sage Creek Timber Sales and historic and active exploration and mining activities are past/current disturbances to vegetation in the area.

Wildlife and Fish: The Noss ranking analysis was not completed for this area (Noss et al. 2001), but the area was ranked low for wildlife biological strongholds during the resource management plan analysis. In addition, the departure from Proper Functioning Condition (PFC) is moderate (USFS 2003b). The grass/shrub habitats are rated low for sage grouse because of the patchy grass/shrub habitat and the distance to the nearest sage leks (5 miles). Fisheries biological strongholds are rated high because of the presence of Yellowstone cutthroat trout, a Forest sensitive species, is expected in Sage and Deer Creeks (USFS 2003b). Forest personnel also believe Yellowstone cutthroat trout occur in the North Fork of Deer Creek. Fisheries surveys in 2003 have verified and confirmed that Yellowstone cutthroat trout are present in Deer Creek and the North Fork of Deer Creek.

Threatened, Endangered, Sensitive, and Rare Species Occurrence/Habitat: Threatened and endangered species known to occur in the area include the gray wolf. The area is rated high for lynx linkage habitat because of the following factors: 1) the presence of a major north-south ridge, which could provide a movement corridor; 2) the area has 41 percent conifer; 3) location midway between the Targhee and south end of the Preuss Range; and 4) the area offers about 9 percent for security areas. The area is ranked low for the gray wolf because of the low amount of security.

USFS sensitive species that have documented occurrences include three-toed woodpecker, Northern goshawk, and great gray owls. The area is rated high for forest-associated sensitive species.

Rare plants, rare plant communities, or plant community references have not been documented in the area.

Reference Landscapes: The Deer Creek watershed has not been impacted by mining and could be used as a unique aquatic reference (i.e., control comparison watershed at landscape level).

Scenic Integrity: Scenic integrity is low including partial retention areas with moderate scenic integrity (4,043 acres), and modification areas with low scenic integrity (8,688 acres).

Recreation (Primitive, Semi-Primitive non-motorized, and Semi-Primitive Motorized): Recreation use has increased in the area. The area is managed for both summer and winter recreation. In summer, part of the area (10,764 acres) is managed for semi-primitive motorized recreation experience while the remaining land (2,037 acres) is managed for Roaded Modified experiences. In winter, the entire area is managed for semi-primitive motorized recreation experiences.

Traditional Cultural Properties and Sacred Sites: Four cultural resource sites have been found in the SCRA. The sites were surface scatters composed of lithics (chert and obsidian), waste flakes, and some artifacts.

Special Use Permits, Utility Corridors: Several special use permits (SUPs) have been granted for phosphate mine related uses, including a phosphate slurry pipeline along the northern boundary of the area, and a power line on the northeastern boundary of the area; an additional SUP is for the USFS radio repeater tower site (2 acres).

Wilderness Attributes

In addition to the roadless attributes described above, the SCRA is also characterized by the wilderness attributes described and summarized by the CNF (USFS 2003b).

Natural Integrity/Apparent Naturalness: Natural integrity is the extent to which long-term ecological processes are intact and operating. Impacts to natural integrity are measured by the presence and magnitude of human induced change to an area. Apparent naturalness means that the environment looks natural to most people using the area.

The SCRA has been rated as low in natural integrity and apparent naturalness, as the area has been affected by the following physical or man-caused impacts: range improvements, prescribed fire, mineral exploration and development, and unimproved roads. Further, the appearance of man-made facilities or management activities in the area detract from the natural appearance because of grazing and recreation activities, timber harvest activities, roads, past fire history, and minerals.

Solitude/Primitive Recreation: Solitude is a personal and subjective value, defined as isolation from the sights, sounds, and presence of others as well as human developments. Primitive recreation is a perceived condition of being secluded, inaccessible and out of the way. The physical factors that can create primitive recreation settings include topography, vegetative screening, distance from human impacts such as roads and logging operations (sight and sound) and difficulty of travel. A user's sense of remoteness in an area is also influenced by the presence or absence of roads, their condition and whether they are open to motorized vehicles.

The opportunity for solitude within the SCRA is low because of its small size, moderate topographic and vegetative screening, and moderate distances from the perimeter to the center of the area (USFS 2003b). The existing Smoky Canyon Mine occurs on the northeast side of the SCRA. Primitive recreation opportunities are rated as moderate because of the small area of the SCRA, road corridors projecting into the area, moderate topographic and vegetative screening, and because limited facilities are present.

Challenging Experience: A challenging experience is described as one that requires self-reliance through application of woodsman and outdoor skills.

There are few opportunities for challenging experiences within the SCRA, as terrain is typical of the mountains in southeast Idaho.

Special Features/Special Places/Special Values: These consist of unique geological, biological, ecological, cultural or scenic features that may be located in a roadless area.

Unique or special features are not represented within the SCRA.

Wilderness Manageability/Boundaries: These are elements that relate to the ability of the Forest Service to manage an area to meet size criteria and the attributes discussed above. The shape of an area and changes of that shape influence how it can be managed.

The manageability of the SCRA along inventoried boundaries would be fair. Minor boundary adjustments could eliminate conflicts, including the Smoky Canyon Mine.

Meade Peak Roadless Area

Roadless Attributes

The MPRA is also described by the RACI resource attributes listed below and have been summarized from USFS 2003b.

Soil: Approximately 17 percent of the MPRA soils is considered unstable; about 64 percent of the area is considered an erosion hazard.

Air: The MPRA is outside the twenty-mile sensitive receptor radius and is not within 200 kilometers of a Class I area. Nearby towns that are classified as sensitive air quality receptors are Montpelier and Soda Springs, Idaho (USFS 2003b).

Water/Sources of Public Drinking Water: No 303(d) streams are present in the MPRA and the northern portion (within the Study Area) is drained by Crow Creek.

Diversity of Plant and Animal Communities

Vegetation: Vegetation communities are composed of aspen, aspen/conifer, grass/shrub cover, and mixed conifer. A wildfire occurred in the early 1900's in the area. In addition, the Snowdrift area was treated with prescribed fire, and the Clear Creek and Home Canyon timber sales have occurred in these areas. As of 2003, approximately 1.4 percent of the MPRA contained invasive species. These species included Canada thistle, Dyers woad, and Musk thistle.

Wildlife and Fish: According to the Noss study, this area has some of the highest game values in Idaho. The MPRA was ranked moderate for wildlife biological strongholds during the resource management plan analysis. In addition, the departure from PFC is moderate (USFS 2003). Approximately 52 percent of the area has grass/shrub cover, which is within five miles of the nearest sage grouse leks (5 miles). Fisheries biological strongholds are rated high because the presence of Yellowstone cutthroat trout in Crow Creek that drains into the Snake River Basin and Bonneville cutthroat trout in Preuss Creek (south of the Study Area) that drains into the Bear River Drainage.

Threatened, Endangered, Sensitive, and Rare Species Occurrence/Habitat: Threatened and endangered species known to occur in the area include the gray wolf and lynx. The area is rated moderate for lynx linkage habitat because of the following factors: 1) the amount of security areas (31 percent); and 2) the major ridge along Snowdrift Mountain and the major drainage along the Montpelier drainage. Because of the moderate amount of security (27 percent), the MPRA also ranks moderate for wolverine and wolves. The northern goshawk has been documented in the MPRA. The area is rated low for forest-associated sensitive species but high for grass/shrub habitat-associated MIS.

Two proposed sensitive plants: Uinta Basin Cryptantha and Starveling milkvetch have been documented in the MPRA. Rare upland plant communities are found within the Meade Peak Research Natural Area (RNA) discussed in **Section 3.12.2**; the riparian/wetland communities around the Preuss Creek headwaters are considered plant community reference areas.

Reference Landscapes: The Meade Peak RNA and the Snowdrift prescribed fire treatment area could serve as unique reference values.

Scenic Integrity: High scenic integrity is maintained along and adjacent to Highway 30, the City of Georgetown, Idaho, and Crow Creek Road. Partial retention (moderate) is maintained on 28,457 acres, while Modification (low scenic integrity) is maintained on 13,084 acres.

Recreation (Semi-Primitive non-motorized and Semi-Primitive Motorized): The area is managed for both summer and winter recreation. In summer, 9,827 acres are managed for semi-primitive non-motorized recreation experience, while 11,403 acres are managed for semi-primitive motorized. In winter, a wildlife closure of 6,400 acres is managed as semi-primitive non-motorized. The remaining 34,277 acres are managed for semi-primitive motorized recreation experiences.

Traditional Cultural Properties and Sacred Sites: No information on Traditional Cultural Properties and/or Scared Sites has been documented within the MPRA.

Special Use Permits, Utility Corridors, Other: No special use permits or utility corridors are found in the area. There are 636 acres of State land in-holdings within this IRA.

Wilderness Attributes

In addition to the roadless attributes described above, the MPRA is also characterized by the wilderness attributes described below.

Natural Integrity/Apparent Naturalness (defined previously): The MPRA has been rated as moderate because of the evidence of human activities such as unimproved roads and timber harvest activities.

Solitude/Primitive Recreation (defined previously): The opportunity for solitude within the MPRA is rated as moderate because of road intrusions into the area. Primitive recreation opportunities are rated as moderate because of the small size of the MPRA, but there are many road intrusions.

Challenging Experience (defined previously): There are few opportunities for challenging experiences within the MPRA, as terrain is typical of the mountains in southeast Idaho.

Special Features/Special Places/Special Values (defined previously): The MPRA contains Meade Peak, the highest point on the CNF, and a Research Natural Area (discussed below). The area also includes good wildlife and fish habitat.

Wilderness Manageability/Boundaries (defined previously): The manageability of the MPRA is considered poor due to the road intrusions into the area. A core area could be achieved, with boundaries along natural features.

3.11.2 Research Natural Areas

Research Natural Areas (RNAs) are part of a national network of ecological areas designated in perpetuity for research and education and/or to maintain biological diversity on National Forest System lands (USFS 2003b). RNAs are for non-manipulative research, observation, and study. They also assist in implementing provisions of the National Forest Management Act, 1976 (USFS 2003a). Currently there are seven established RNAs on the CNF. None of the alternatives analyzed in this EIS are located inside any RNAs. Meade Peak RNA is the closest to the Project Area and occurs approximately 5.5 miles south of the Panel G lease area. The

Meade Peak RNA was established in 1988 and contains about 300 acres. The objective for this RNA is to maintain and preserve the subalpine conditions it represents in as near an undisturbed (by man) condition as possible without the use of practices such as livestock grazing and prescribed burning and without disruptive effects of wildlife (USFS 2003b). This RNA provides an area undisturbed by man where relationships between a severe environment and the resulting vegetation can be observed and studied. The other six RNAs occur at least 10 miles away from the Project Area and are not addressed further in this EIS (USFS 2003a).

3.12 Visual and Aesthetic Resources

3.12.1 Overview

Visual resources are a composite of basic terrain, geologic features, water features, vegetative patterns, and land use activities that typify an area and influence the visual appeal that area may have to people. The measure of visual appeal, or viewer response to the landscape, in combination with the visual quality and character of an area, is expressed as aesthetic value. Aesthetic value and visual appeal are inherently subjective. The opportunity to experience the landscape and interpret scenery and visual change is dependent upon the degree of public access and use of an area. Public access to the CNF in the Project Area is via paved county and gravel FS roads from Afton and Fairview, Wyoming, and Montpelier and Georgetown, Idaho. Public use of the CNF lands in this area is highest during elk and deer hunting seasons, and otherwise occurs mainly as dispersed recreation (See **Section 3.10**).

The Simplot Panels F and G Project Area ranges in elevation from approximately 6,500 to 8,500 feet. The western portions of the Project Area include the northern part of Snowdrift Mountain, and the southern extent of Freeman Ridge, which are characterized by high elevation forested slopes and sagebrush meadows, and incised drainages with steep gradients. Lower elevation slopes extend easterly to Sage Valley and Crow Creek – including meadows, pastures, and several large ranches along Crow Creek Road.

3.12.2 Visual Resource Management (Scenery Management)

National Forest lands are typically inventoried based upon a system of Visual Quality Objectives (VQOs) as part of the forest unit planning process. The VQOs are categories of acceptable landscape alteration measured in degrees of deviation from the natural landscape. The VQOs are interpreted as guidelines for phosphate activities, since it is understood that most post-phosphate mining activities after reclamation do not meet Modification (defined below). All CNF lands have been classified by VQOs in the Visual Management System (VMS). They are described as follows from most restrictive (Preservation) to least restrictive (Maximum Modification):

- Preservation (P) - Ecological change only.
- Retention (R) - Human activities should not be evident to the casual Forest visitor.
- Partial Retention (PR) - Human activities may be evident but must remain subordinate to the characteristic landscape.
- Modification (M) - Human activity may dominate the characteristic landscape, but at the same time must utilize naturally occurring elements of the landscape including form, line, color, and texture.
- Maximum Modification (MM) - Human activity may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as a background.

The majority of lands within the Project Area are classified as Partial Retention and Modification (See **Figure 3.12-1**). According to the RFP (USFS 2003a), the scenic environment of the Forest will be maintained through adherence to existing VQOs, with the exception of phosphate mining. Phosphate mining activities and reclamation may or may not meet the given VQO (USFS 2003b:Vol.II p. 4-9 Final EIS for the CNF RFP). In the case where the VQO is not met, the mine operation and reclamation plan would mitigate visual changes to the degree that reclamation methods and economics allow.

The visual management program is applied to resource development activities on a project-by-project basis. Since 1996, National Forests have been directed to use a revised system for project planning, based upon the USDA publication Landscape Aesthetics: A Handbook for Scenery Management (USDA Handbook 701). Under this Scenery Management System (SMS), SMS values are assigned based upon the VMS data, bridging the two systems.

Concern Levels categorize the importance of scenic resources to forest visitors. Concern Level 1 roads are those such as designated scenic highways and byways; they are managed at a level of at least high scenic integrity. There are no designated scenic trails, highways, or byways in the Project Area.

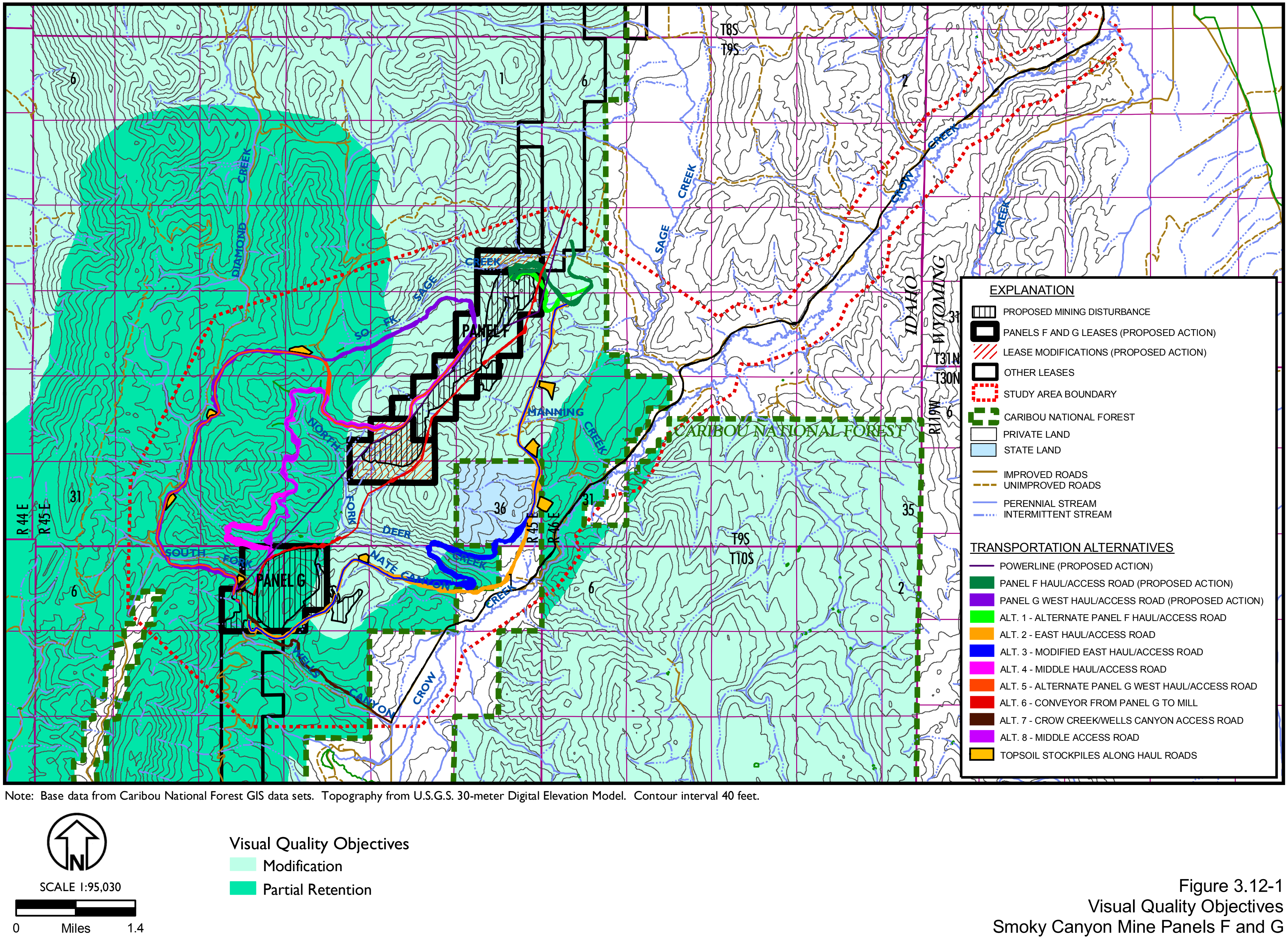
Scenic integrity indicates the current status of a landscape. It is determined on the basis of visual changes that detract from the scenic quality of the area (USDA 1996). The Scenic Integrity Objective (SIO) refers to the degree of acceptable change or alteration of the valued landscape theme. Under the SMS, higher SIOs represent highly valued natural landscapes where management activities would result in little or no deviation from those values. Greater modification to the landscape is acceptable in low SIO landscapes.

High Scenic Integrity applies to an area that appears unaltered and where the valued landscape character appears intact. Moderate Scenic Integrity may appear slightly altered, but alterations are visually subordinate to the overall landscape. In Low Scenic Integrity areas, deviations may begin to dominate the landscape view. The Project Area landscape in Partial Retention Areas has moderate scenic integrity; in Modification areas, low scenic integrity would apply.

3.12.3 Access & Use

The importance of scenic values is affected by access, ownership, and development, and by recreational and seasonal uses of an area. Crow Creek Road is designated as a Forest Highway (FR 111) for the section in Bear Lake County and serves as one of the main routes of access to the Project Area. Private lands along Crow Creek Road nearest the Project Area are used for seasonal ranching operations and recreation. Several homes and outbuildings, as well as fences, gates, a power line, and pasturelands, are evident along the road. The backdrop for these ranches and summer homes is one of brush-covered hills and steep, forested slopes so the area retains its rural, agricultural setting.

Crow Creek Road nearest the Project Area is closed due to snow cover about 6 months of the year; year-round access is maintained only to the boundary of Sections 20 and 21 in T.9S R.46E, near the confluence of Sage Creek and Crow Creek. This is outside, or east of, the CNF boundary. The unplowed portions of Crow Creek Road through the Forest, as well as Wells Canyon Road, are groomed snowmobile trails in the winter.



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

Figure 3.12-1
Visual Quality Objectives
Smoky Canyon Mine Panels F and G

Traffic counts taken on Crow Creek Road to the south of the Project Area (approximately 10 miles south of Wells Canyon Road) between July 26 and October 25, 2000 indicated that summer use of this road averages about 20 vehicles per day during the week and 60 vehicles per day (includes both directions) during the weekends. During hunting season in October, those averages triple during weekdays and nearly double during weekends. These counts provide an example of use near the Project Area; however, actual use north of the Wells Canyon intersection along Crow Creek Road is expected to be higher (Tate 2004).

Diamond Creek Road, Georgetown Canyon Road, and Wells Canyon Road are also considered primary routes across the CNF. These roads provide the only east-west route across the CNF for 30 miles. Traffic counts on these roads would be slightly lower than those discussed above, but would have the same type of distribution. Several trails, described in Recreation (**Section 3.10**), also provide hiking access to back-country views in the Project Area.

Active mine areas are closed to public travel for safety reasons.

3.12.4 Viewers & Views in the Project Area

Those who reside seasonally along Crow Creek Road and those who hike or camp regularly in this portion of the CNF are likely to value the scenic quality of the surrounding landscapes in this area. Seasonal residents, in particular, have commented during public scoping on this EIS, on the visual beauty of the area. Hunters, who comprise the highest use category for the Project Area, would be expected to value the scenic landscape as a part of their recreational experience, though a successful hunt would not necessarily depend on the scenery.

The following photos show some of the views in the Project Area, from points on Crow Creek Road (FR 111), Wells Canyon Road (FR 146), and Diamond Fork Road (FR 1102). Following the photos are representations (**Figures 3.12-2 through 3.12-8**) of what portions of the landscape are 'seen' or 'unseen' from specific points along Crow Creek Road or from other potential viewpoints in the Crow Creek Valley. The seen/unseen point shown in **Figure 3.12-2** is taken from a high elevation point along a horse trail on the Stewart Ranch property. **Figure 3.12-3** is taken from the Stewart Ranch buildings area. **Figures 3.12-4**, **6**, and **7** represent views of the Project Area from points along Crow Creek Road. The view area from the Osprey Ranch is shown in **Figure 3.12-5**. **Figure 3.12-8** shows view from a high elevation point along a CNF hiking trail on the northwest-facing slopes above Crow Creek Valley. Seen/unseen representations are plotted from a height of approximately 5 feet, to show what areas of the surrounding landscape would be included in the view of a person standing at a given point.

View northwest up Sage Creek from Crow Creek Road (T9S. R46E. Sec. 20)

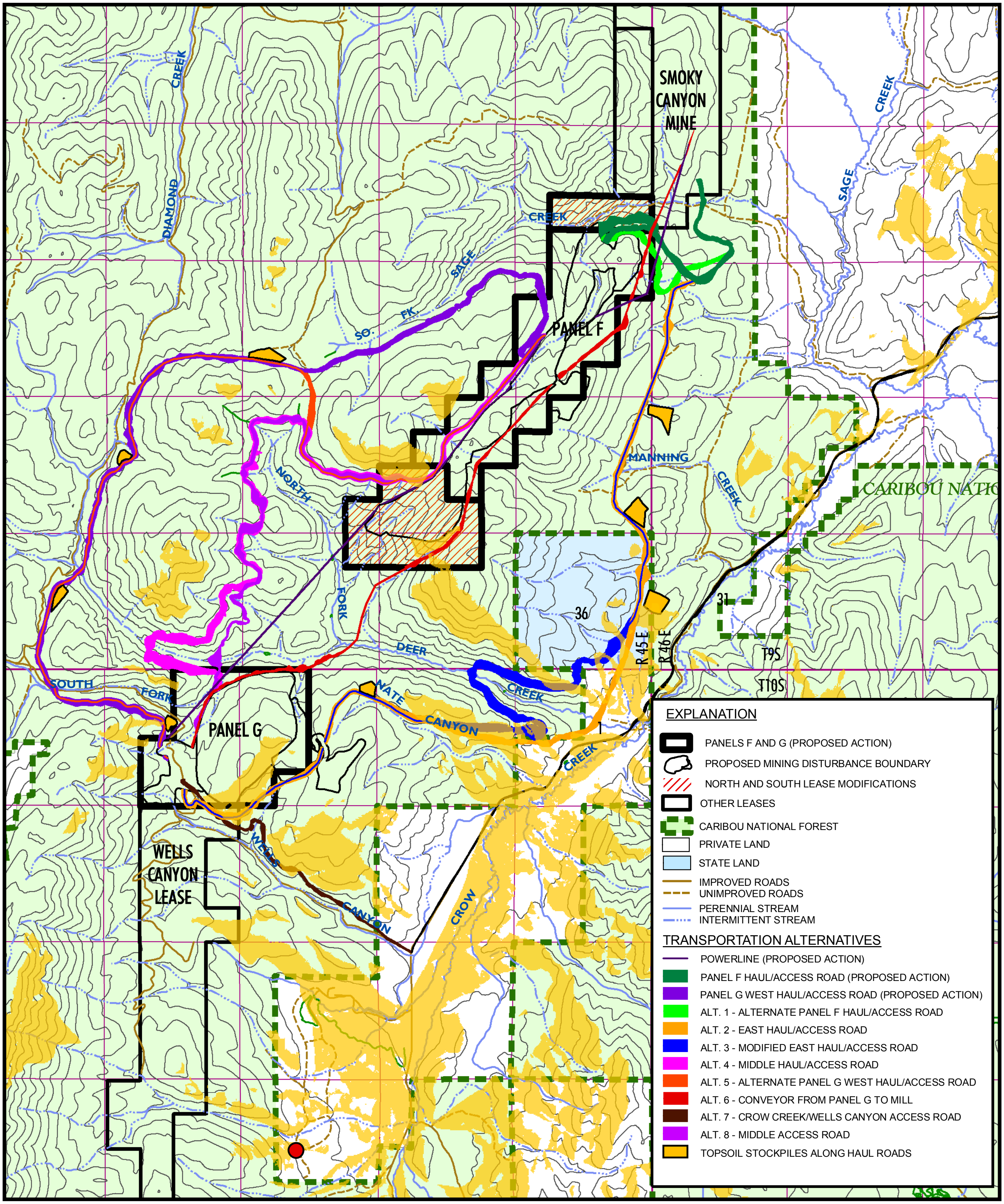
View north along Crow Creek Road from vicinity of Stewart Ranch
(T10S. R45E. Sec. 14)

View of Snowdrift Mountain from Panel G (looking south)
(T10S. R45E. Sec. 4)

View south along Diamond Creek Road west of Freeman Ridge (T9S. R45E. Sec. 21)


Osprey Ranch from Crow Creek Road, view to southeast (T9S. R46E. Sec. 31)


Panel G area from viewpoint near Wells Canyon Road. Panel G is on the forested slope in the middleground and the south end of Panel F is in the pass on the background horizon.



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

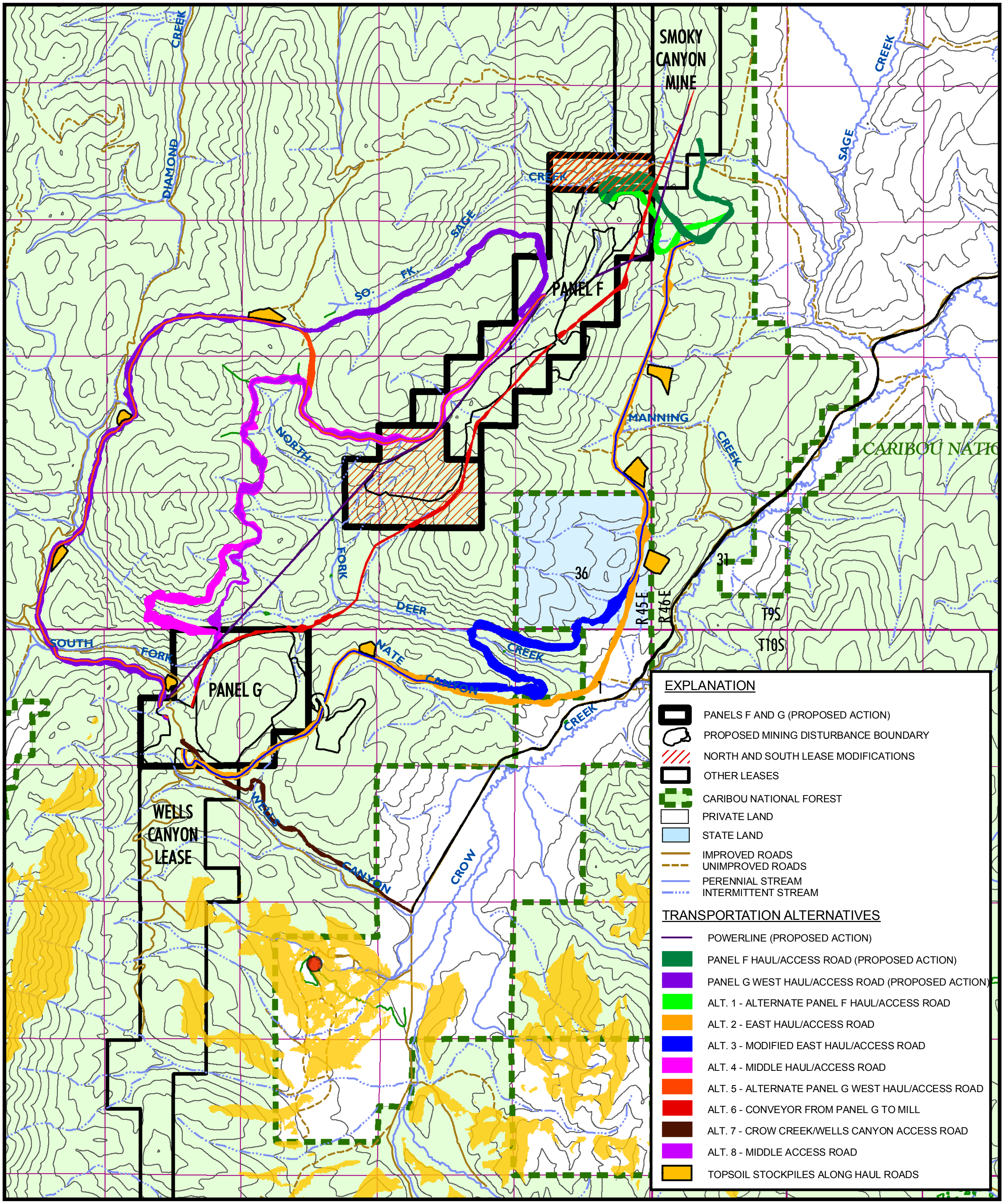
View Point

Area Seen from View Point

Scale 1:63,360

0 Miles 1

Figure 3.12-2
Viewshed
Smoky Canyon Mine Panels F and G



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

N

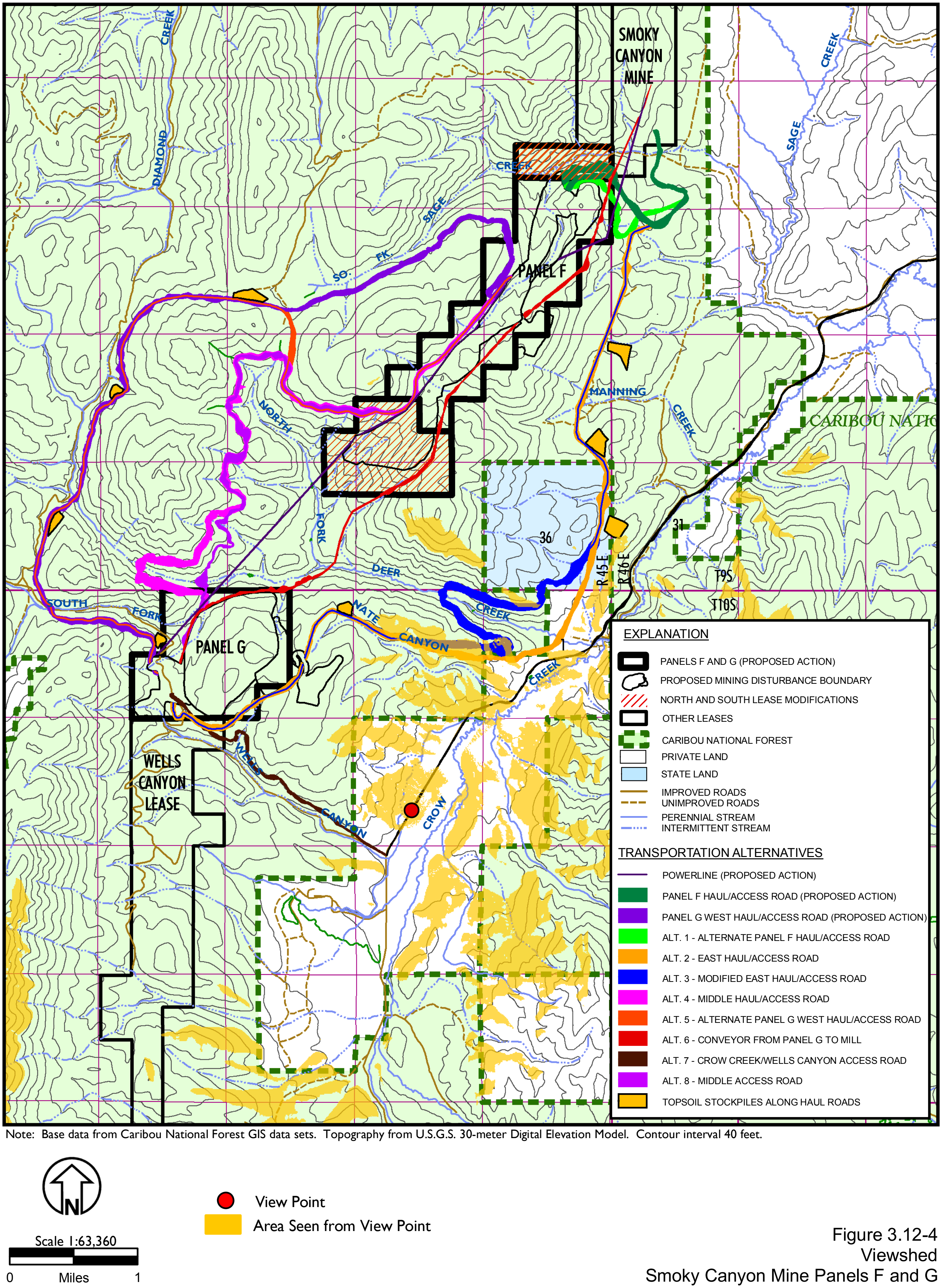
Scale 1:63,360

0 Miles 1

View Point

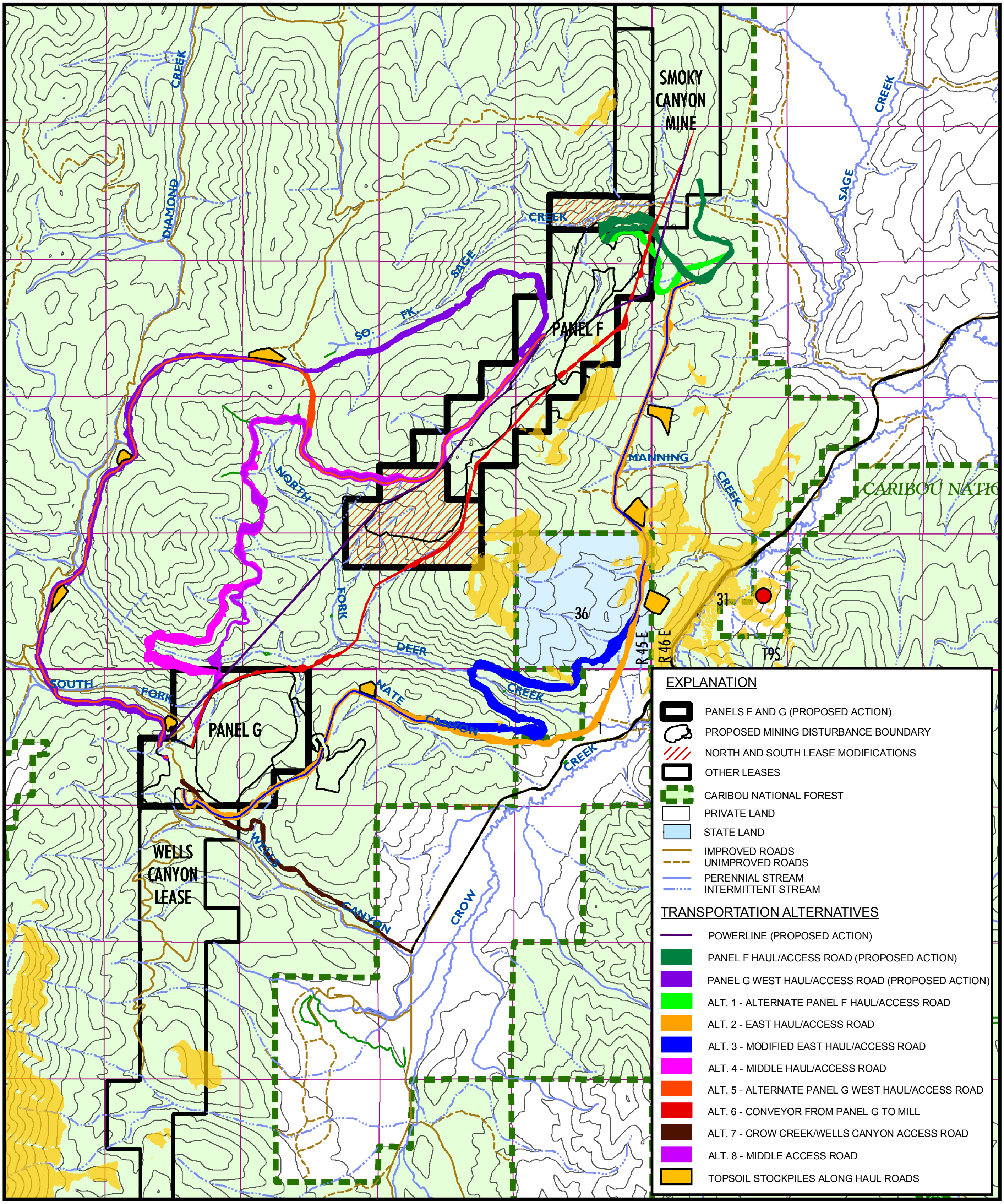
Area Seen from View Point

Figure 3.12-3
Viewshed
Smoky Canyon Mine Panels F and G

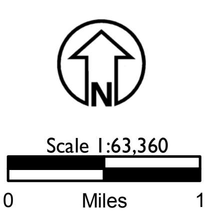


Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

Figure 3.12-4
Viewshed
Smoky Canyon Mine Panels F and G



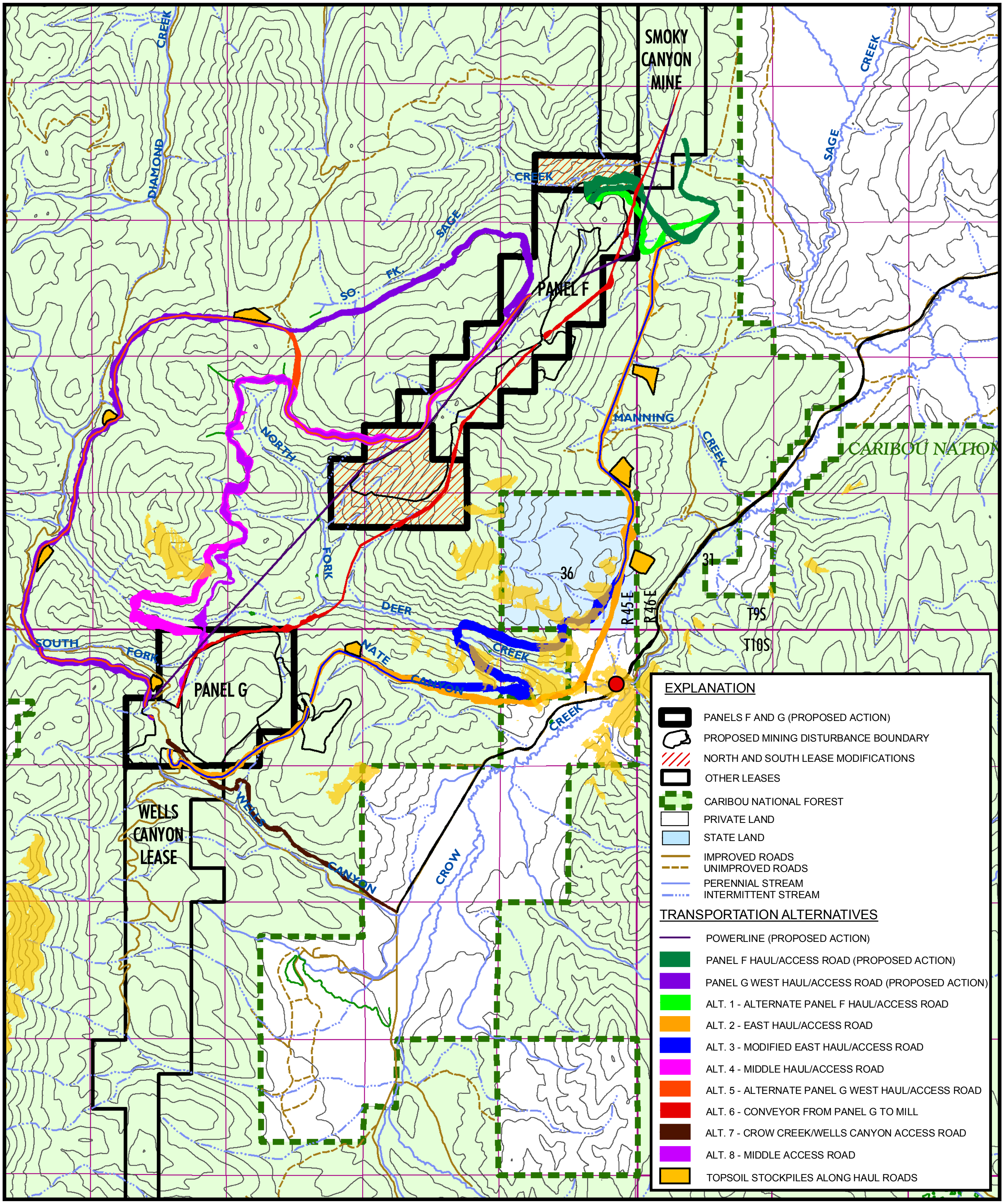
Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.



View Point

Area Seen from View Point

Figure 3.12-5
Viewshed
Smoky Canyon Mine Panels F and G



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

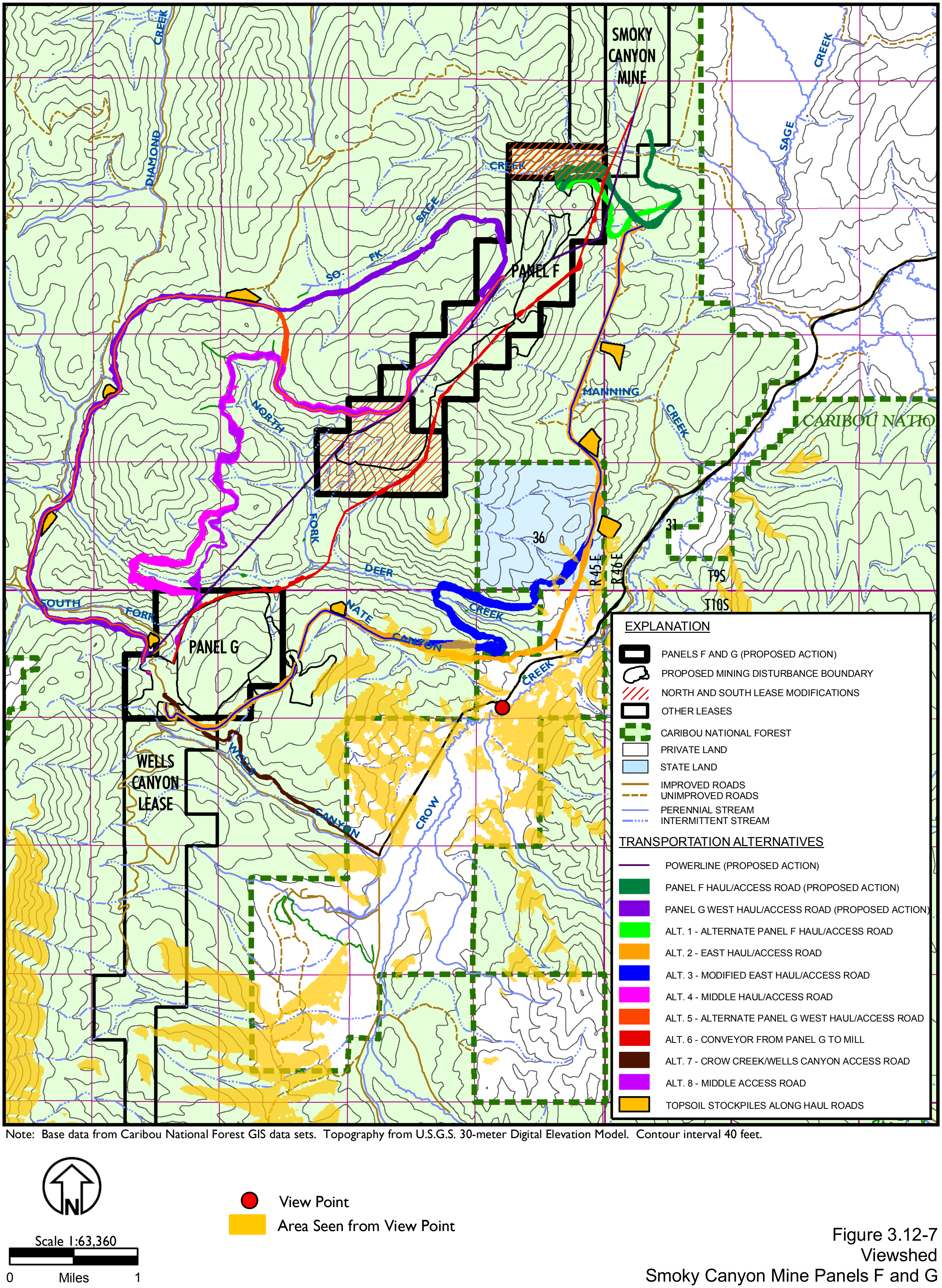
View Point

Area Seen from View Point

Scale 1:63,360

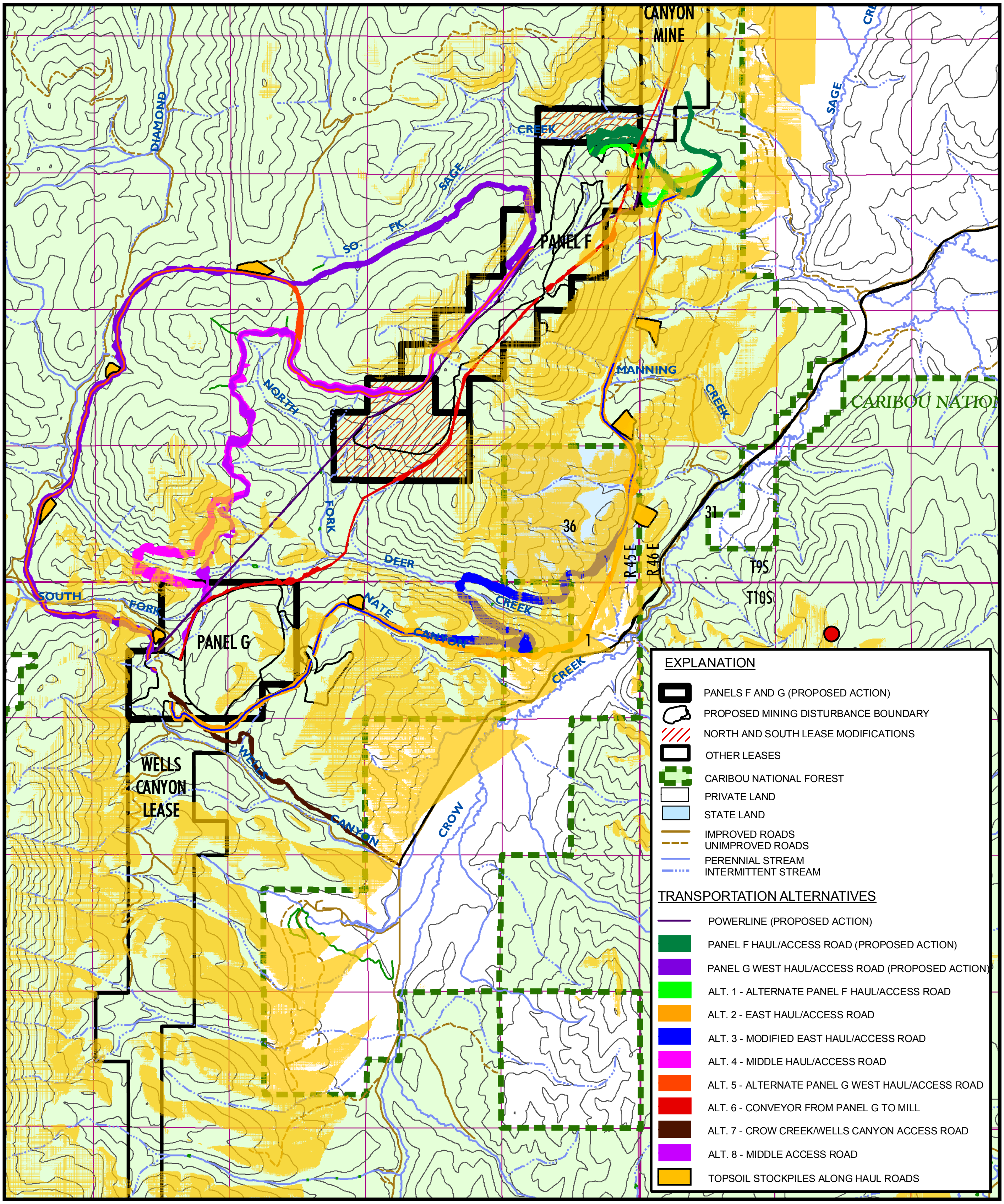
0 Miles 1

Figure 3.12-6
Viewshed
Smoky Canyon Mine Panels F and G



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

Figure 3.12-7
Viewshed
Smoky Canyon Mine Panels F and G



Note: Base data from Caribou National Forest GIS data sets. Topography from U.S.G.S. 30-meter Digital Elevation Model. Contour interval 40 feet.

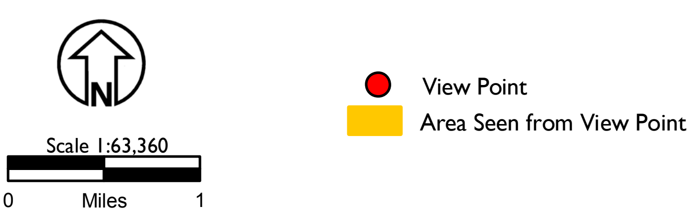


Figure 3.12-8
Viewshed
Smoky Canyon Mine Panels F and G

3.13 Cultural Resources

Cultural resources are non-renewable resources. Federal regulations obligate federal agencies to protect and manage cultural resource properties and prohibit the destruction of significant cultural sites without first mitigating the "adverse effect" to the site. Mitigation measures include, but are not limited to, complete, detailed site documentation, complete avoidance of the site, and/or data recovery efforts. The National Historic Preservation Act (NHPA) of 1966 (as amended) and the Archaeological Resources Protection Act (ARPA) of 1979 are the primary laws regulating preservation of cultural resources.

Section 106 of the *National Historic Preservation Act of 1966*, as amended, requires federal agencies to take into account any action that may adversely affect any structure or object that is, or can be included in the NRHP. These regulations, codified at 36 CFR 800, provide a basis for which to determine if a site is eligible. Beyond that, the regulations define how those properties or sites are to be dealt with by federal agencies or other involved parties. These regulations must be considered for historic properties or sites of historic importance, as well as for archaeological sites.

Cultural resources provide data regarding past technologies, settlement patterns, subsistence strategies, and many other aspects of history. The guidelines for evaluation of significance and procedures for nominating cultural resources to the National Register of Historic Places (NRHP) can be found in 36 CFR 60.4. In order to be nominated to the NRHP, a cultural resource site/historic property must meet at least one of the four National Register Criteria:

a) association with events that have made a significant contribution to the broad patterns of our history, or
b) association with the lives of persons significant to our past, or
c) embody the distinctive characteristics of a type, period, or method of construction; or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or
d) have yielded or may be likely to yield information important in prehistory or history.

A Traditional Cultural Property (TCP), as defined in the NHPA, is a property that is eligible for inclusion on the National Register of Historic Places "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community" (Parker and King 1994). Stated another way, a significant TCP is defined as a property with "significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (Parker and King 1994).

The term "Heritage Resources", used by the Forest Service, encompasses not only cultural resources but also traditional and historic use areas by all groups (Native Americans, Euro-Americans, etc.). Heritage resources include lifeways or the way humans interact and survive within an ecosystem (USFS 2003b). Objects, buildings, places, and their uses become recognized as "heritage" through conscious decisions and unspoken values of particular people, for reasons that are strongly shaped by social contexts and processes (Avrami et al. 2000). Heritage resources define the characteristics of a social group (i.e. community, families, ethnic group, disciplines or professional groups). Places and objects are transformed into "heritage" through values that give them significance.

3.13.1 Cultural Context

Evidence of 11,000 years of prehistoric occupation and use of the CNF has been documented through rock shelters, stone circles, hunting blinds, bison kill sites, and projectile points (USFS 2003a). The prehistory of southeastern Idaho and the northeastern Great Basin has been previously detailed (Butler 1978 & 1986; Carambelas et al. 1994; Franzen 1981; Gehr et al. 1982; Lohse 1993; Madsen 1982; Meatte 1990; Ringe et al. 1987; Swanson 1972 & 1974). Overviews specific to the history of southeastern Idaho have been written to address the needs of cultural resources management (Franzen 1981; Fiori 1981; Sommers and Fiori 1981; Wegars and Bruder 1992) and to identify a number of significant themes for the region. The following brief prehistoric overview is summarized from the Final EIS for the CNF Phosphate Leasing Proposal (BLM and USFS 1998).

Prehistory

The prehistory of southeastern Idaho can be divided into at least three periods; Paleo-Indian (ca. 10,000 to 7,000 B.P.), Archaic (7,000 to 300 B.P.), and Protohistoric (300 B.P. to present). These periods are generally defined by distinct artifact types and characterized by different settlement and subsistence patterns.

<u>Paleo-Indian Period</u>

The Paleo-Indian period largely is defined by three projectile point types: Clovis, Folsom, and Plano. Paleo-Indian groups who occupied the region focused their subsistence efforts on large, migratory animals as indicated by the association of Folsom spear points and large animal remains. It may be reasonable to assume that Paleo-Indian groups in southeastern Idaho also traveled over large annual ranges (Goodyear 1979; Letourneau 1992) and exhibited a high degree of residential mobility (Binford 1980; Kelly and Todd 1988).

<u>Archaic Period</u>

The Archaic period is generally defined by the introduction of stemmed (Pinto series) and notched (Northern Side-notched and Elko series) projectile points and the apparent broadening of the resource base. The shift from large, lanceolate-shaped points to small, stemmed and notched points is believed to be related to the introduction of the atlatl and dart from two separate regions, the Great Basin and the Plains (Butler 1986:130, citing Gruhn 1961). Although data indicates that large mammals were the primary food resource of Archaic groups, the exploitation of a wider array of resources is evidenced in ground stone artifacts and small mammal remains at some sites (Sant and Douglas 1992). The Archaic Period can be subdivided into three subperiods based on variation in artifact assemblages and settlement and subsistence practices (Sant and Douglas 1992). These subperiods are the Early Archaic (7,000 to 4,500 B.P.), Middle Archaic (4,500 B.P. to 1,300 B.P.), and the Late Archaic (1,300 to 300 B.P.).

Subsistence and settlement patterns in southeastern Idaho remained fairly consistent between the Early and Middle Archaic (Sant and Douglas 1992; citing Gruhn 1961; Ranere 1971; Swanson 1972), although artifact assemblages differ. The Late Archaic is defined by the introduction of ceramics and small triangular and side-notched points. These artifact classes, particularly the ceramics, indicate the occupation of at least two groups or "cultural manifestations" (Butler 1986:131) in southeastern Idaho: the Fremont (ca. 1300 to 650 B.P.) and the Shoshonean (ca. 700 B.P. to present).

The Fremont are typically thought of as horticulturalists. Evidence for horticulture has not been found in southeastern Idaho (Holmer 1986:243; Ringe et al. 1987); therefore, the presence of Fremont artifacts has been problematic to some. Sant and Douglas (1992) suggest that Fremont artifacts arrived in southeastern Idaho through trade. Some have argued that northern Fremont populations were primarily hunters and gatherers, rather than horticulturalists (Madsen 1982:217-218; Sharp 1989; Simms 1990); if that is the case, then the presence of Fremont artifacts in southeastern Idaho would likely be a consequence of Fremont hunter-gatherers occupying the area.

Occupation of southeastern Idaho by the Shoshone and Bannock coincides with the expansion of Numic speaking people from the southwestern Great Basin to the north and east. Brown-ware ceramics and Desert Side-notched and Cottonwood triangular projectile points are thought to be temporally and ethnically sensitive artifacts. Artifacts recovered from the Wahmuza site, in southeastern Idaho, indicate continuous Shoshonean occupation since 700 B.P. (Geminis 1986, cited by Sant and Douglas 1992). The Shoshone and Bannock groups are characterized as relatively mobile hunter-gatherers.

<u>Protohistoric</u>

The introduction of the horse has been credited with changes to Shoshone and Bannock lifeways in southeastern Idaho over the past few hundred years (Manning and Deaver 1992; Murphy and Murphy 1986; Stewart 1938:201). According to Stewart (1938:201), the horse transformed the Shoshoni economy by facilitating the use of new hunting techniques, which ultimately yielded more resources and enabled people to live in large, relatively permanent settlements. Rather than being tethered to their food caches, these groups could forage over greater distances and transport food to a central location (Stewart 1938:201).

Two horse-owning groups may have passed through the Manning Creek Tract during their annual forays. According to Stewart (1938:218-219, Figure 12), the Cache Valley Shoshone hunted and gathered along the Bear River and crossed the Wasatch Mountains (south of the Project Area) during bison hunting excursions to Wyoming. Bannock and Shoshone groups living at Fort Hall also may have passed through the area while hunting elk, deer, and mountain sheep and gathering berries along the Bear River (Murphy and Murphy 1986:288, 292) or when traveling to Wyoming to hunt bison (Stewart 1938:198-216, Figure 10). These hunting and gathering forays began to change during the nineteenth century, when westward expansion and increasing conflicts with Euro-Americans eventually forced most of the Shoshone and Bannock into the reservation system. Mixed bands of Shoshoni signed a treaty with the United States Government at Soda Springs, Idaho on October 14, 1863 (Keppler 1941). Unbeknown to the Shoshone people, this treaty was not ratified by the United States Government. The Western Shoshone signed a treaty in 1863 with the United States Government, which set aside large tracts of Indian land in Idaho, Nevada, Oregon, Utah, and Wyoming (Manning and Deaver 1992). In 1867 and 1868, the Fort Hall and Wind River Valley Reservations, respectively, were established, and by 1868, the Shoshone had relinquished all their lands in Idaho and Wyoming except for lands specifically set aside as reserves (Clements and Forbush 1970:21, cited by Manning and Deaver 1992). The Bannock were assigned to the Fort Hall Reservation in 1869, and between 1879 and 1907, a number of other Native American groups were relocated to Fort Hall (Manning and Deaver 1992).

Sacred sites, such as burials, rock art, monumental rock features and formations, rock structures or rings, sweat lodges, timber and brush structures, eagle catching pits, and prayer and offering locales, are located throughout the region (Manning and Deaver 1992). Much of the landscape in southeastern Idaho also is sacred to local Native American groups and, thus, is not defined by archaeological remains.

Euro-American History

Fur trappers and explorers were the first non-native Americans to pass through the region (Fiori 1981:115-127) and are documented as early as the early 1800s. In the early-1800s, under the command of Robert Stuart, one group of Astorians made their way from the Bear River to the Salt River and thence to the Snake, a route which likely took them through Georgetown Canyon, Crow Creek, and Star Valley. During the early I840's, great numbers of emigrants began moving westward. In Idaho, emigrants could follow the Oregon Trail, via Fort Hall and Fort Boise, or the California Trail at Soda Springs, Fort Hall, or Raft River (Fiori 1981:170). Brigham Young led Mormon pioneers into the Salt Lake Valley in 1847, and by early-1860, had dispatched settlers into southeastern Idaho (Fiori 1981:148). The general area surrounding the Project, including the town of Soda Springs (the County seat), was along the routes of the earliest explorers, fur trappers, and emigrants.

Soda Springs was an early transportation hub (ISHS 1981a) with open valley connections to Bear Lake and Wyoming, with the Blackfoot River north to Montana, with Portneuf Valley used by Oregon Trail emigrants to Fort Hall, with Hudspeth’s Cutoff west to California, and down Bear River to Cache Valley and Salt Lake.

Between the 1860s and 1890s, miners and railroad workers came to southeastern Idaho. Cariboo Fairchild, who had taken part in the gold rush in the Cariboo region of British Columbia in 1860, discovered gold in this region two years later (Welcome to Caribou County 2004). A modest gold rush began in the Caribou Mountain area in 1870 and ended in the early 1900s (USFS 2003a). During this time, Keenan and Caribou City became thriving boomtowns. Sulphur mining commenced in the early 1880's.

The mines in the Cariboo District depended on distant sources for supplies. The miners’ needs provided an enticement for settlers to develop the surrounding country at a time when not too many other economic attractions were available to encourage settlement of southeastern Idaho (ISHS 1981b:9).

<u>Livestock</u>

As necessitated by the mining boom, small herds of cattle were driven into the region during the 1860s. Crowding on the plains prompted cattlemen to locate larger herds in southeastern Idaho during the 1870s and 1880s (Fiori 1981:144). Sheep were brought into the area as early as the 1830s-1840s by missionaries and emigrants (Fiori 1981: 145-146), with larger herds brought in during the mining boom. Large herds of sheep were established in Caribou County during the late 1890's and early1900's (Barnard et al. 1958). Basque sheep herders moved to the area after 1925 (Carambelas et al. 1994:12). Grazing allotments encompass the Project Area (See **Section 3.9** Grazing). Evidence of historic and modern livestock grazing is present within the Project Area in the form of arborglyphs, livestock trails, and temporary campsites. Arborglyphs are etchings or carvings of art and words in aspen trees that over time turn black against the white trunk, becoming more apparent. Recent studies (Mallea-Olaetxe 2000) indicate the relevance of tree carvings in depicting livestock usage/trailways, range boundaries, sheep herder lifeways, cultural affiliations, periods of use, and transportation routes.

Roads

Freighting was the original mode of mass transportation of goods in southeastern Idaho. The discovery of gold and the explosive growth of mining towns in Idaho and Montana resulted in a surge of freighting activities along the trade routes to the mines. By the 1860s, freight and stage roads passed through southeastern Idaho and contributed to its settlement (Franzen 1981; ISHS 1971). Large scale freighting occurred between 1864 and 1884. There were two main routes in this region: the Montana Road (from Corrine, Utah to western Montana) and the Kelton Road (from Kelton, Utah to Boise, Idaho). Approximately 1000 freighters hauled between Idaho and Montana on the Montana Road in 1873 (Franzen 1981). One early report states that the only "direct and safe route [to Cariboo Mountain gold deposits] is to go up the regular Montana road to Ross Fork…"(ISHS 1981b:3). Road conditions were poor, and tolls were often charged to obtain funding for improvements. Railroads diminished the need for freighting except in the areas not served by railroads.

Early settlers developed the Crow Creek Road, in the Project Area, as a path of commerce from Fairview, Wyoming to Montpelier, Idaho (Druss et al. 1979). This road is still well traveled and is known as the Crow Creek Road. It runs southwest and south to Montpelier Canyon and west to the town of Montpelier. It appears on historic General Land Office (GLO) maps (1901, 1902) of the area as *Montpelier to Star Valley Road.*

The Fairview Cutoff was a route from Fairview, Wyoming to Soda Springs, Idaho. The route cut off from Crow Creek at Hardmans Hollow, ran north to Tygee Creek, then southwest through Smoky Canyon to Soda Springs (Druss et al. 1980). Located north of the Project Area, this road is known currently as the Smoky Canyon Road.

Timber

Timber resources in southeastern Idaho are not as abundant as in other parts of the State, but still played a role in the development of the area. As communities were established, lumber was harvested locally through primitive means such as the pit saw (BLM 1981). As the demand for lumber grew, other means of lumbering were needed. A water-powered sawmill was the next technology introduced into the region, built by Samuel Parkinson and Thomas Smart in 1863 in Franklin. In response to railroad construction in the West, Majors Tie Camp was established in 1868 by Alexander Majors, who directed the cutting of thousands of trees along the Bear River. Majors floated the resulting ties down the Bear River to Corrine, Utah, where they were used for the Transcontinental Railroad. A steam sawmill was brought into the area in 1871. Approximately 30 sawmills were operating in southeastern Idaho by 1883. Historic sites associated with sawmills and lumbering activities have been recorded in the general Project Area.

3.13.2 Previous Research

Cultural resource inventories for previous mine expansions have recorded prehistoric and historic sites in and around the current Project Area. Site types in the general vicinity include prehistoric campsites, mining sites, and livestock/ranching sites. Also, historic sites associated with sawmills and lumbering activities have been recorded. Other known historic sites near but not within the Project Area include the Lander Trail, Fairview Cutoff, and Oneida Salt Works. Historic GLO maps show transportation corridors, a telephone line, a cabin, and a ditch were historically present in the Project Area. Prehistoric sites found in the area are generally considered significant due to the paucity of prehistoric sites in this high elevation environment.

Table 3.13-1 presents the seventeen previous cultural resource inventories in and around the current Project Area. Five of these projects were specific to the proposed Panels F and G mine expansion. Class III cultural resource inventories were conducted to encompass each component of the proposed mine expansion (i.e., Panel F lease, lease modifications, access roads, soil stockpiles, etc.) in order to identify any sites within the proposed Mining and Transportation Alternatives. Cultural resource inventory reports are on file at the associated agency office (i.e. Forest Service, BLM) and the State Historic Preservation Office. Site location information is considered sensitive; therefore, these reports are for limited circulation and not available to the general public.

TABLE 3.13-1 PREVIOUS CULTURAL RESOURCE INVENTORIES IN THE PROJECT AREA

PROJECT DESCRIPTION	AUTHOR	YEAR	FINDINGS
Archeological Investigations in the Smoky Canyon Area	Druss, Mark, Max Dahlstrom, Claudia Druss, and Steve Wright (ISU)	1980	10CU86, 10CU88, 10CU89, 10CU90, 10CU76
Stage I Investigation and Analysis of Archaeological Resources in Pit Area, Mill Sites, and Dump Site, Smoky Canyon Lease I-012890	Druss, Mark, Max Dahlstrom, Claudia Hallock, and Steve Wright (ISU)	1980	10CU76, 10CU77, 10CU78, 10CU79
Crow Creek Fish Habitat Improvement	Hendrikson, N. (Idaho State University)	1991	None
Manning Creek Drilling Project (CB-92-262)	Hamilton, J. (USFS)	1992	None
North and Upper Manning Timber Sale (CB-93-307)	Robertson, Mary (USFS)	1993	None
South Fork Sage Creek Timber Sale (CB-94-337)	Robertson, Mary (USFS)	1994	None
Freeman Ridge Phosphate Exploration	Robertson, M. (USFS)	1994	None
Wells Canyon/Deer Creek Exploration Federal Lease I-01441	Robertson, M. (USFS)	1996	None
Manning Creek Exploration Plan Modification (CB-94-333)	Satter, Norris (BLM)	1994	None
Galland Special Use Permit Pipeline	Robertson, M. (USFS)	1996	None
Sage Valley Phosphate Exploration, I-31982	Cresswell, L. (BLM)	1997a	None
Simplot Phosphate Prospecting Permit	Cresswell, L. (BLM)	1997b	None
A Cultural Resource Inventory of 880 Acres of the Manning Creek Property, Caribou County, Idaho.	Penner, William and Richard Crosland (JBR)	2001*	Sites: 10CU245, 10CU246; Isolates: 10CU243, 10CU244
Baseline Technical Report for Cultural Resources, South Manning Creek Exploration Area, Caribou County, Idaho	Statham, William (Frontier Historical Consultants)	2003*	Two isolates: DG-3, DG-4
Baseline Technical Report for Cultural Resources, Deer and Manning Creek Phosphate Lease Areas, Smoky Canyon Mine, Caribou County, Idaho (CB-04-495)	Gray, Dale, Dawn S. Statham, and William P. Statham (Frontier Historical Consultants)	2003*	CB-341 (isolate), CB-342, CB-343
Addendum to Baseline Technical Report for Cultural Resources, Panels F and G Extension and Transportation Corridors, Smoky Canyon Mine, Caribou County, Idaho (CB-04-495)	Gray, Dale and William P. Statham (Frontier Historical Consultants)	2004*	Sites: CB-317, CB-318, CB-319, CB-320 Isolates: CB-326, CB-327, CB-328
Addendum B to Baseline Technical Report for Cultural Resources, Panels F and G Extension and Transportation Corridors, Smoky Canyon Mine, Caribou County, Idaho (CB-04-495)	Gray, Dale (Frontier Historical Consultants)	2005*	None

*Specific to current Project

3.13.3 Cultural Resource Sites

As a result of the Project specific cultural resource inventories, eight historic sites are known to occur within the Proposed Action and Alternatives areas. No prehistoric sites were encountered during the inventories. Six of the eight sites have been evaluated as ineligible for the NRHP (**Table 3.13-2**) while two arborglyph sites are considered unevaluated due to insufficient information (thematic context) to evaluate. Consultation with the Forest Archaeologist and the Idaho SHPO resulted in these unevaluated determinations, as additional research and recordation is needed to establish the relationship of these features to local and regional history. In addition, nine isolates have been documented, but by definition are ineligible for the NRHP.

TABLE 3.13-2 CULTURAL RESOURCE SITES IN THE PROJECT AREA

SITE NUMBER	SITE TYPE	AFFILIATION	NRHP EVALUATION
CB-340	Spring Box	Euro-American	Ineligible
CB-342	Arborglyphs	Euro-American	Unevaluated
10CU245	Arborglyphs	Euro-American	Ineligible
10CU246	Arborglyphs	Euro-American	Ineligible
CB-317	Arborglyphs	Euro-American	Unevaluated
CB-318	Road	Euro-American	Ineligible Segment
CB-319	Telephone Line	Euro-American	Ineligible Segment
CB-320	Footbridge	Euro-American	Ineligible

The Proposed Action mining and Mining Alternatives B, C, D, and F would have the same basic footprint and Alternative A – No North or South Panel F Lease Modifications is slightly smaller but within the same footprint; therefore, each of these Mining Alternatives would encompass the same known cultural resource sites. Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road would be situated within whatever Transportation Alternative is chosen; therefore, there would be no additional disturbance. The Transportation Alternatives, on the other hand, would each include different areas and therefore differ in cultural resources present. **Table 3.13-3** presents the Proposed Action and Transportation Alternatives and the associated cultural resource sites.

Cultural resource sites that have been determined ineligible for the NRHP do not need further protection, and therefore, would not need to be avoided by the Project. Isolates are by definition ineligible. Thus, isolates and ineligible sites are not carried through in the Chapter 4 analysis.

No TCPs or sacred sites have been designated or defined in or adjacent to the Project Area.

TABLE 3.13-3 ELIGIBLE OR UNEVALUATED CULTURAL RESOURCE SITES IN THE PROJECT AREA BY ALTERNATIVE COMPONENT

ALTERNATIVE	COMPONENT	SITE NUMBER	SITE TYPE
Proposed Action	Panel F Lease	No Eligible Sites	
	Panel F South Lease Modification	No Sites	
	Panel F North Lease Modification	No Sites	
	Panel F Haul/Access Road	No Sites	
	Panel G Lease	CB-342	Arborglyphs
	Panel G West Haul/Access Road	CB-317	Arborglyphs
		CB-342	Arborglyphs
TRANSPORTATION ALTERNATIVE			
1	Alternative F Panel Haul/Access Road	No Sites	
2	East Haul/Access Road	CB-342	Arborglyphs
3	Modified East Haul/Access Road	No Eligible Sites	
4	Middle Haul/Access Road	No Sites	
5	Alternate West Haul/Access Road	CB-317	Arborglyphs
6	Conveyor Route Corridor	No Sites	
7	East Access Road via Crow Creek Haul and Wells Canyon	CB-342	Arborglyphs
8	Middle Access Road	No Sites	

3.13.4 Heritage Resources

Southeastern Idaho has been traditionally utilized by the Shoshone-Bannock Tribes for subsistence and ceremonial uses. Since 1868, all unoccupied federal lands have been available to the Tribes' for exercise of Treaty Rights under the Fort Bridger Treaty of 1868 (See **Section 3.14**). Physical remains of prehistoric lifeways on the CNF include campsites and associated artifacts (USFS 2003a). During consultation, the Tribes have stated that the Project Area is currently used for traditional activities such as hunting, gathering, and ceremonial uses. According to the RFP (2003a), representations of historic lifeways on the forest include wagon trails, homesteads, mining sites, and Civilian Conservation Corps camps. Heritage resources in the Project Area also include the historic uses of livestock trailing and grazing. This is in part evidenced in the numerous arborglyphs (tree carvings) present in the Project Area. One permittee's family has utilized the Deer Creek Sheep Allotment for four generations (Peart 2003), trailing their sheep from Utah following a historic sheep driveway through the Kemmerer and Grey River Ranger District to the Deer Creek Sheep Allotment (Heyrend 2004) via FR 740 (Manning Canyon Road) and Trail 402 (non-motorized trail) along Manning Creek. A cabin has been constructed on private property adjacent to the grazing allotment by this permittee in order to be closer to the summer allotment. Grazing availability and allotments in the Project Area are described in **Section 3.9**. Roads and trails in the Project Area are described in **Section 3.15** (Transportation) and **3.10** (Recreation and Land Use), respectively.

The importance (value) of traditional lifeways in the local and regional communities is manifest in histories, cultural resource sites, traditional use sites, and the continued use of the area for these activities.

3.14 Native American Concerns and Treaty Rights Resources

The Shoshone-Bannock Tribes are a sovereign nation with their own governing system and not simply members of the general public. Communication between the Agencies and the Tribes constitutes Government-to-Government consultation and is therefore conducted at the appropriate levels.

Federal agencies are required by law (National Historic Preservation Act of 1966 and Archaeological Resources Protection Act of 1979) to consult with Native Americans on actions that may affect their traditions or uses of public lands. Specifically, the agencies are required to follow the Section 106 process as recorded in 36 CFR 800 - Subpart B, as amended January 11, 2001. As per the Fort Bridger Treaty, Native Americans should comment on proposed actions and participate in decisions prior to implementation, as the product of consultation. The goal of the BLM Manual Section 8160 is to “assure that tribal governments, Native American communities, and individuals whose interests might be affected have a sufficient opportunity for productive participation in BLM planning and resource management decision making.” To this end, the Pocatello BLM Field Office and the CTNF, Soda Springs Ranger District have engaged in consultation with the Native Americans associated with southeast Idaho.

The American Indian Religious Freedom Act (AIRFA) of 1978 states “...henceforth it shall be the policy of the United States to protect and preserve for American Indians their inherent right to freedom to believe, express, and exercise the traditional religions of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonial and traditional rites [42 United States Code (U.S.C.) 1996].” Agencies are required to review their policies and procedures in consultation with traditional native religious leaders.

Executive Order (EO) 13007 - Indian Sacred Sites requires agencies to accommodate access to and ceremonial use of Indian sacred sites and to avoid adversely affecting the physical integrity of said sites. According to EO 13007, a sacred site is defined as “any specific, discrete, narrowly delineated location on Federal land that is identified by an Indian tribe, or Indian individual determined to be an appropriately authoritative representative of an Indian religion, as sacred by virtue of its established religious significance to, or ceremonial use by, an Indian religion; provided that the tribe or appropriately authoritative representative of an Indian religion has informed the agency of the existence of such a site.” Sacred sites may consist of a variety of places and landscapes.

The Department of the Interior (DOI) Departmental Manual 512 DM 2 (DOI 1995) requires that all bureaus within DOI develop policies and procedures to identify, conserve, and protect Indian Trust Assets, trust resources, and tribal health and safety. Indian Trust Assets are legal interests in assets held in trust by the United States for Indian Tribes or individuals and can include: minerals, hunting and fishing rights, and water rights.

3.14.1 Introduction

The Shoshone-Bannock Tribes (Tribes) are headquartered at the Fort Hall Reservation, in southeast Idaho. The current reservation boundary encompasses about 544,000 acres of land along the Snake River. The original reservation totaled over 1.8 million acres but due to the expansion of white settlements, Congress required the Tribes to cede much of this land. However, the Tribes did retain grazing rights on those ceded lands. Some of the CTNF is in those ceded lands. The 1868 Fort Bridger Treaty established off-reservation treaty rights on all unoccupied lands. These rights include hunting, fishing, gathering, and other practices such as trade.

The CTNF is also part of the ancestral homeland of the Northwest Band of the Shoshoni. In their 1863 Treaty they assented to the Fort Bridger Treaty (Treaty with the Shoshoni-Northwestern Bands, July 30, 1863). Thus, tribal members of the Northwest Band also have rights to hunt, fish, and gather on all unoccupied lands of the United States.

Prior to white settlement of the west, the Shoshone and Bannock peoples were comprised of many smaller nomadic bands inhabiting a vast area of the west. Their aboriginal territory includes six states and ranged north into Canada and south to Mexico. The bands were generally extended family groups who moved across the western landscape hunting, fishing and gathering with the changing seasons. The Fort Hall area was a traditional wintering area for many of the bands. In addition to gathering camas bulbs, many bands met on the Camas Prairie for trade events each spring. The CTNF was an integral part of the Shoshone-Bannock Tribes ancestral lands.

Few "traditional use sites" have been documented through consultation with the Tribes. This is due mostly to privacy issues. For this analysis, we assume that the National Forest System lands were, and are, used for traditional practices such as hunting, fishing, and gathering. We also assume that tribal members utilize the CTNF for traditional activities such as ceremonies and religious practices. To protect the privacy of the Tribes, these activities will be discussed and analyzed in general terms. The following information is from "Shoshone-Bannock Tribes" published by the Shoshone-Bannock Tribal Cultural Committee and Tribal Elders.

> *Spirituality and religious ceremonies have always played a significant role in Indian cultures. Natural resources played an integral part of these ceremonies. Items such as sweet sage and tobacco made from a variety of plants were and are used in ceremonies. The Indians gathered many plants for medicinal purposes, including chokecherry, sagebrush, and peppermint. A myriad of other plants were gathered for food and to provide shelter. Rocks and clays were also used for ceremonies, ornamentation and shelter. Some bands inhabiting the upper Snake region were known as the "sheepeaters" since bighorn sheep were a staple of their diet. Buffalo, elk, deer and moose were also hunted and used by the aboriginal people. The Shoshone and Bannock bands also relied on upland game birds and small mammals. Salmon fishing was an integral part of aboriginal culture. Geysers, thermal pools and other water features were also utilized heavily by the Shoshone-Bannock Tribes.*

These activities are still practiced today across the CTNF and southeastern Idaho although the extent of those activities is unknown. Many tribal members hunt, fish and gather for subsistence and to maintain their traditional way of life.

3.14.2 Indian Treaty Rights

The federal government has federal trust responsibilities to Native American Tribes (DOI 1995). As discussed above, the 1868 Fort Bridger Treaty, between the United States and the Shoshone and Bannock Tribes, reserves the Tribes' right to continue traditional activities on all unoccupied federal lands. The Tribes' advocate the preservation of harvest opportunity on culturally significant resources necessary to fulfill inherent, traditional, and contemporary Treaty Rights (Bannock-Shoshone 1994). The Project Area is within the portion of southeast Idaho that is of historical usage for hunting and gathering (Shoshone-Bannock 2003) and continues to retain cultural values.

Article 4 of the 1868 Treaty states, "The Indians herein named…shall have the right to hunt on the unoccupied land of the United States so long as game may be found thereon…" While the Treaty itself only specifies hunting, the lawsuit "State of Idaho v. Tinno" established that any rights not specifically given up in the Treaty were, in fact, reserved by the Tribes. Further, in the Shoshone language, the same verb is used for hunt, fish, and gather so it is assumed that the Tribes' expect to retain rights for all of those practices (from a presentation at the Shoshone-Bannock Tribes, 1868 Fort Bridger Treaty Rights Seminar: April 12-13, 2004).

The Tribes' Fish and Game Department regulates and enforces the 1975 Tribal Fish and Game Code, for all off-reservation hunting and fishing activities. The federal agencies recognize that the Tribes' regulate their own Tribal members for hunting and do not require Tribal members to secure state hunting permits to hunt within BLM or Forest Service lands.

In regard to federal trust responsibilities, known items of interest to the Tribes include:

Tribal Historical/Archaeological Sites

Project-specific cultural resource inventories have been conducted in the Project Area. This information is in **Section 3.13** Cultural Resources. No prehistoric archaeological sites were located within Project boundaries during the inventories.

Rock Art

No resources of this nature have been identified in the Project Area.

Sacred Sites (EO 13007)/Traditional Cultural Properties (NHPA)

Executive Order (EO) 13007 directs federal land-managing agencies to accommodate Native Americans' use of sacred sites for religious purposes and to avoid adversely affecting the physical integrity of sacred sites. Federal agencies managing lands must implement procedures to ensure reasonable notice where an agency's action may restrict ceremonial use of a sacred site or adversely affect its physical integrity. No sacred sites have been identified in the Project Area.

A Traditional Cultural Property (TCP), as defined in the National Historic Preservation Act of 1966, is defined as a property that is eligible for inclusion on the National Register of Historic Places "because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and are important in maintaining the continuing cultural identity of the community" (Parker and King 1994). Stated another way, a significant TCP is defined as a property with "significance derived from the role the property plays in a community's historically rooted beliefs, customs, and practices" (Parker and King 1994). No Traditional Cultural Properties have been nominated or designated in the Project Area.

Traditional Use Sites

Traditional use sites are those historically used by tribes for traditional land uses including fishing, hunting, gathering, ceremonies and religious practices. Few traditional use sites have been documented through consultation with the Tribes as Tribal information regarding these sites is closely guarded. The Tribes have not disclosed specific details of traditional use in the Project Area, however, they have asserted that the area is significant, traditionally used, and retains cultural values.

Water Quality

The Project Area includes lands in South Fork Sage Creek, Manning Creek, Deer Creek, Nate Canyon basin, and Wells Canyon basin, all in the Crow Creek watershed. A detailed discussion of water resources is located in **Section 3.3** of this EIS.

Wetlands

Numerous wetlands were identified throughout the area. See **Section 3.6** for a detailed discussion of wetland resources in the Project Area.

Fisheries

Fisheries and Aquatics resources are addressed in detail in **Section 3.8** of this EIS. Cutthroat trout are the most abundant game fish species in the upper reaches of Deer Creek, North Fork Deer Creek, South Fork Deer Creek, and South Fork Sage Creek and are also present in lower Deer Creek and Crow Creek, although sculpins and other fish species are more numerous.

Studies of macroinvertebrate diversity and channel characteristics indicate relatively poor environmental conditions in the North Fork Deer Creek, South Fork Deer Creek, and some areas in lower Deer Creek; these areas probably do not provide spawning areas for cutthroat trout. Habitat in the upper reaches of Deer Creek, in Crow Creek, and in South Fork Sage Creek is relatively more suitable and could provide areas for spawning and longer-term persistence of a trout population.

A few trout individuals captured in Crow Creek (1 fish) and North Fork Deer Creek (2 fish) had body tissue selenium levels above the currently established “biological effect threshold,” for fish presumably from naturally occurring selenium in these areas.

The Tribes have not designated any specific traditional fishing areas on the CTNF but the whole Forest is used for exercising fishing rights.

Vegetation

Specific information regarding vegetation in the Project Area can be found in **Section 3.5**. Access to traditional plant resources is protected under the Fort Bridger Treaty of 1868. The Tribes have indicated that certain plants are important for traditional uses including, but not limited to, chokecherry, elderberry, current, red-twig dogwood (red willow), tulles, onions, turnips, all water plants (such as mint and watercress), huckleberry, gooseberry, raspberry, strawberry, sweet sage, carrots, bitterroot, camas, aspen, juniper, and lodge pole pine. Many of these plant species are present in the Project Area.

The Tribes use specific sized lodge pole pine trees for tipi poles. Baseline studies indicate that 15 percent of the vegetation in the Project Area is comprised of the Subalpine fir community and 7.8 percent is the aspen/conifer community, both of which include lodge pole pine.

Noxious Weeds and Invasive Species
There is Tribal concern about non-native vegetation replacing native vegetation. See the Vegetation **Section 3.5** for discussion on noxious weeds and invasive species.

Wildlife
Detailed information regarding the wildlife in the Project Area can be found in **Section 3.7**. Big game wildlife important for Tribal hunting includes elk, deer, antelope, and moose. Small game important for Tribal hunting includes sharp-tailed grouse, sage grouse, rabbits, rockchucks (marmots), squirrels, and partridges. Eagle, wolves, and grizzlies are also of concern to the Tribes.

Grizzly bear, antelope, and partridge are likely absent from the Project Area. No bald eagle nests occur within 2.5 miles of the Study Area. No sharp-tailed grouse are known to occur within the Study Area.

There is suitable habitat for the gray wolf, but wolves are known only as transient visitors. Mule deer, elk, and moose roam through most of the Study Area year-round. There is a known elk spring calving ground at Sage Meadows, about 1 to 2 miles from Panel F.

Land Access/Transportation
Currently motorized access to the Project Area is via the Crow Creek Road (FR 111), Wells Canyon Road (FR 146), Smoky Canyon/Timber Creek Road (FR 110), Diamond Creek Road (FR 1102), Manning Creek Road (FR 740), Sage Creek Road (FR 145), and Georgetown Canyon Road (also FR 102).

In addition, there are 4-wheel drive/OHV roads and trails through the Project Area along South Fork Sage Creek, Deer Creek, and Manning Creek. The area can also be accessed by horse and foot with few or no areas of restriction. Additional information regarding access into the Project Area can be found in **Section 3.10**, Land Use and Recreation, and **Section 3.15** Transportation.

Access
The Tribes are concerned with retaining access on unoccupied federal lands in order to exercise Tribal Treaty Rights. The Tribes assert their responsibility to preserve their Treaty Rights for future use of lands to ensure future opportunity, and therefore it is Tribal policy to “promote the conservation, protection, restoration, and enhancement of natural resources”.

According to the Tribes, “access” to exercise Treaty Rights goes beyond the concept of simple entry into the Project Area by vehicle or foot. “Access” also includes continued availability of the traditional natural resources in an area. Therefore, the Tribal interpretation of loss of access extends to the exclusion, limitation, or unavailability of the traditional resources due to mining disturbance and road construction. It would also presumably apply to the displacement of wildlife in those areas.

Recreation
There are no known Tribal traditional camping areas on the CTNF. Most recreation in the Project Area is dispersed (no improvements). There are no developed campgrounds. The area does contain a semi-primitive motorized ROS area (see **Section 3.10**). The dominant type of dispersed recreation is hunting for elk, moose, and deer. Fishing occurs on Crow, Deer, and Diamond Creeks.

As discussed above, Tribal hunting and gathering rights, reserved by the 1868 Treaty, need no state regulations or permits to be exercised by tribal members. The Tribes' Fish & Game Department regulates and enforces the 1975 Tribal Fish & Game Code for all off-reservation hunting and fishing activities. Federal agencies recognize that the Tribes regulate their own Tribal members for hunting, and do not require Tribal members to secure State hunting or fishing permits within BLM or USFS lands.

Land Status

The Project Area is administered by the CTNF and is considered unoccupied federal lands; therefore, it is available for Treaty Rights use as stated in the Fort Bridger Treaty of 1868. These rights include hunting, fishing, gathering, and other practices such as trade. The Tribal concern is that changes in land status can diminish the locations at which the Tribes can exercise treaty rights; thus forcing Tribal members to relocate these activities to other areas or cease to exercise treaty rights on specific areas. It is the Shoshone Bannock Tribes' concern that the transfer or purchase of federal lands, and the extension of leases for mining on federal lands by private businesses enable them to control access and use, which jeopardizes access to certain Shoshone-Bannock traditional fishing, hunting, and gathering areas, as well as grazing and timber use (Shoshone-Bannock 2005).

Air Quality

Specific data regarding air resources is located in **Section 3.2** of this EIS. All lands within the Project Area have been designated Class II for National Ambient Air Quality Standards. The air quality in the vicinity of the Smoky Canyon Mine is good to excellent because of the site's remote location, and relatively limited industrial activity in the area. Air quality in the Study Area is designated as in attainment or unclassifiable for all NAAQS and Idaho Ambient Air Quality Standards.

Socioeconomics and Environmental Justice

See **Sections 3.16** and **3.17**, respectively, for data regarding socioeconomics and environmental justice (EO 12898).

EO12898 Section 4-4 directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife. The affected environment for wildlife and fish can be found in **Sections 3.7** and **3.8**, respectively.

3.14.3 Consultation

Native American consultation began with the initial public scoping effort for this Project. The public scoping letter was sent to the Tribes on September 15, 2003. A follow-up meeting was held with Tribal technical staff in Fort Hall on October 2, 2003. A field trip to the Project Area was conducted on October 14, 2003 to show Tribal specialists the area for the proposed mining activity. A response letter was received from the Tribes dated October 17, 2003. Tribal concerns outlined in the letter included: Trust Assets/Treaty Resources; the cultural significance of the area to the tribes; change in the interpretation of the area as unoccupied federal lands; specific disturbances of proposed mine support facilities; unreclaimed acres within a Roadless Area; minimization of overburden in external dumps; lack of watershed baseline data; development of new roads; preservation of the quality, quantity, and integrity of the Deer Creek and Manning Creek ecosystem and environment; and the size of the cumulative impacts area.

Field meetings, presentations at Fort Hall Reservation for tribal technical staff and the tribal council, agency-tribal meetings, and verbal and written communication have been utilized to keep the Tribes informed and apprised of the Project. Consultation to date is summarized in the following table.

TABLE 3.14-1 SUMMARY OF CONSULTATION

CONSULTATION TYPE	PARTIES INVOLVED	DATE
Scoping Letter	To Shoshone-Bannock Tribes from BLM and FS	September 15, 2003
Meeting	Shoshone-Bannock Tribal Technical Staff, BLM, FS	October 2, 2003
Field Meeting	Shoshone-Bannock Tribal Technical Staff, BLM, FS	October 14, 2003
Field Meeting	Shoshone-Bannock Tribes, BLM, FS, Simplot	October 30, 2003
Field Meeting	Shoshone-Bannock Tribal Cultural Committee, BLM	July 29, 2004
Letter	To Shoshone- Bannock Tribes from BLM and FS	August 26, 2004
Technical Consultation Meeting	Shoshone-Bannock Tribal Technical Staff, BLM, FS	April 15, 2005
Meeting	Shoshone-Bannock Tribal Land Use Policy Commission, Simplot	May 11, 2005
Letter	To Shoshone-Bannock Tribes from BLM	June 13, 2005
Tribal Business Council Meeting	Shoshone-Bannock Tribes Business Council, BLM, FS	June 27, 2005
Technical Consultation Meeting	Shoshone-Bannock Tribal Technical Staff, BLM, and Third-party contractor	July 18, 2005

Consultation with the Tribes will be on-going throughout the EIS process.

3.15 Transportation

The Smoky Canyon Mine is most commonly accessed by FR 110 (the Smoky Canyon Road). Under a special use permit for the buried slurry line that runs down the Smoky Canyon/Timber Creek Road, Simplot conducts normal maintenance on this road including removal of debris, blading, and shaping of roadway surfaces and ditches, repair of any roadway structures, restoration of eroded fills or berms, removal of snow, and installation of safety signs as appropriate. Except for normal maintenance, there are no repairs or general upgrades planned for the Smoky Canyon Road under the existing operations. The section of this road within the CNF is under USFS jurisdiction, with primary maintenance assigned to Simplot through the special use agreement. The sections of this road below the Forest boundary are under county jurisdiction (Caribou County, Idaho and Lincoln County, Wyoming), and Simplot performs primary maintenance of parts of these sections.

During the winter months, this road provides the only access to the Mine property. Current use for the Smoky Canyon Road includes continued access to upper Smoky Creek and further west to Timber Creek and the Diamond Creek area (during late spring through early fall months only), although primary use of the road is for mine access traffic used by mine employees, commercial vendors, and suppliers. From Auburn, Wyoming to the Wyoming/Idaho State line and then continuing west and south nearly another 5.2 miles, FR 110 is about 24 feet wide with an asphalt surface. From that point, it is an improved surface, gravel, double-lane road to the intersection with the mine haul road. A five-strand barbed wire fence lines the road on each side, and there are numerous cattle guards. As Smoky Canyon Road turns west, it transitions into a single lane, native surface road which connects with the Diamond Creek Road.

In order to estimate the approximate use of the Smoky Canyon Mine Road by employees and vendors, surveys of mine personnel were conducted that inquired about car-pooling and the use of either a car or pick-up truck for modes of transportation. Of the 214 full time employees that work at the Smoky Canyon Mine, 141 employees completed the survey. Of these, approximately two-thirds of the employees car-pool to and from the mine. Mine traffic is present seven days a week, 365 days a year, although approximately one-fourth of the employees work a standard Monday-Friday week. The majority of employees work 14 days per month (rotating 12-hour shifts of 3 days/week then 4 days/week). Thus, assuming that two-thirds of the employees car-pool, it was estimated that approximately 36 vehicles per day travel to the mine between Monday and Friday and an additional 105 vehicles working 12-hour rotating shifts travel on FR 110 seven days a week. The busiest times on this road would occur around shift changes and normal arrival and departure times from work that occur between 5:00 to 7:00 am and 5:00 to 6:00 pm. Saturdays and Sundays would have the least amount of travel on FR 110 from mine related (employees and vendors) traffic, but likely these are the busiest travel days by recreational users.

In addition, an estimate on the approximate number of vendor vehicles/visits to the mine each day was estimated using the Smoky Canyon Mine security log/sign-in sheets for the months of May and June 2004 and 20 random day counts (two per month) from January through September 2004. Based upon this data, it is estimated that approximately 15 vehicles/day from vendors/visitors use FR 110 to access the Smoky Canyon Mine. Visitor numbers to the mine are highest during the late spring months when groups of teachers and students take tours.

Although no traffic counts have been taken on roads within the Study Area, data was reviewed from a traffic counter on Crow Creek Road (located just south of Whiskey Flat Road, FR 114), approximately 10 miles south of the Wells Canyon Road (FR 146). Crow Creek Road, which generally follows Crow Creek through this fairly, narrow valley, is designated as a Forest Highway (FR 111), and serves as one of the main routes of access to the Project Area. Traffic counts taken between July 26 and October 25, 2000 indicated that summer use of this road averages about 20 vehicles per day during the week and 60 vehicles per day (includes both directions) during the weekends. During hunting season in October, those averages triple during weekdays and nearly double during weekends. These counts provide an example of use near the Project Area; however, actual use north of the Wells Canyon intersection along Crow Creek Road is expected to be higher (Tate 2004).

Crow Creek Road is closed due to snow cover at least 6 months of the year; year-round access is maintained only to the boundary of Sections 20 and 21 in T.9S R.46E, near the confluence of Sage Creek and Crow Creek. This is outside, or east of, the Forest boundary. The unplowed portions of Crow Creek Road through the Forest, as well as Wells Canyon Road, are groomed snowmobile trails in the winter.

Diamond Creek Road, Georgetown Canyon Road, and Wells Canyon Road are also considered primary routes across the CNF and are used to access the Study Area.

Active mine areas are closed to public travel for safety reasons, although Smoky Canyon Road is open to public traffic and crosses the area of active mining. Where it crosses, there is a gated guard station to prevent collisions between mine traffic and Smoky Canyon Road users.

3.16 Social & Economic Resources

3.16.1 Introduction

Social and economic resources are addressed for a large geographic area, based upon current conditions with phosphate mining in the area. The area directly affected by the Smoky Canyon Mine is southeastern Idaho and southwestern Wyoming, primarily, Bannock, Caribou, and Power Counties, Idaho and Lincoln County, Wyoming (**Figure 3.16-1**). The mining operation and mill and slurry pipeline pumping facilities are located in Caribou County, Idaho, and a phosphate fertilizer plant is located just west of Pocatello, Idaho in Power County. The mine is about five miles from the Idaho-Wyoming border and the majority of the employees at the mine site live in the Star Valley area of Lincoln County, Wyoming. There is a pumping facility at Conda, north of Soda Springs, in Caribou County, Idaho. Slurried concentrate from the mine is pumped to the Simplot fertilizer plant near Pocatello (Don Plant).

Figure 3.16-1 Four-County Area Directly Affected by the Don Plant and Smoky Canyon Mine

This section describes the socio-economic environment of the four counties. This includes the economic history, land ownership, population, demographics, employment, wages and income, housing, government finance, agriculture, and the economics of the U.S. phosphate industry.

To determine indirect and induced employment as a result of the Smoky Canyon Mine and the Don Plant, the area examined was expanded to the 27-county area shown in **Figure 3.16-2**. The mine purchases heavy equipment parts and operating supplies from dealers in Pocatello, Idaho and engineering supplies from vendors in Salt Lake City, Utah. Natural gas is a major feedstock for anhydrous ammonia and sulfuric acid. These two feedstocks have significant impact upon the cost of phosphate fertilizer manufacturing at the Simplot plant. The area of eastern Utah, northwestern Colorado, and southwestern Wyoming is a significant producer of natural gas, and the area's natural gas industry is integrated by the Questar Pipeline system and the Clay Basin Storage Facility in Daggett County, Utah. The population, employment, and personal income of the 27-county area examined for indirect and induced employment are described in this section.

Figure 3.16-2 Area Analyzed to Determine the Indirect and Induced Employment due to the Don Plant and the Smoky Canyon Mine

3.16.2 Economic History

Bannock County, Idaho

The first permanent Anglo settlement in Bannock County was Fort Hall, a fur trading post established in 1834 by Nathaniel Wyeth. He later sold the fort to the Hudson's Bay Company, which eventually abandoned the site. The Treaty with the Eastern Shoshone signed with Chief Washakie at Fort Bridger, Wyoming and the Treaty of Box Elder of 1863 with Chief Pocatello established the Fort Hall Reservation, which included much of present day Bannock County and surrounding areas. The Union Pacific Railroad purchased the Utah and Northern narrow gage in 1878 and extended the line north to Butte, Montana in 1881. The Oregon Short Line was built west from Wyoming, through Idaho, to Oregon in 1881-1884, crossing the Utah and Northern at the site of Pocatello. The railroad gradually purchased more land from the Bannock-Shoshone tribes until the town site was opened to settlement in 1902. The Academy of Idaho, the predecessor to Idaho State University, was established in 1910. It became an independent four-year institution in 1947 (Conley 1982). With a current enrollment of 12,500, approximately 16 percent of the Bannock County population, the presence of Idaho State University has a significant influence on the economy and demographics of Bannock County. The Gay Mine, a phosphate mine, operated from 1946 to 1993 and was located on the Fort Hall Reservation. It was the first open pit mine in southeast Idaho to mine federally-owned phosphate.

Caribou County, Idaho

Members of the LDS Church, at the direction of Brigham Young, settled in Caribou County in 1870. The Oregon Short Line Railroad reached Soda Springs in 1882, and Soda Springs became a local center for shipping wool and livestock. The phosphate deposits were discovered in 1889 by prospectors hunting for gold, and the first commercial fertilizer mine opened in 1906. In 1919, Soda Springs became the county seat of Caribou County, the youngest county in Idaho. Several phosphate mines have been developed in the county including Dry Valley Mine, Smoky Canyon Mine, Lanes Creek Mine, Conda Mine, Rasmussen Ridge Mine, Mountain Fuel Mine, Champ Mine, North Maybe Mine, Enoch Valley Mine, Henry Mine, Ballard Mine, and Wooley Valley Mine. Monsanto operates an elemental phosphorous plant north of Soda Springs. Agrium operates a wet acid phosphate fertilizer plant five miles northeast of Soda Springs.

Power County, Idaho

American Falls, the first settlement in Power County, Idaho, was a favorite campsite for emigrants on the Oregon Trail. The City of American Falls gradually evolved at the campsite and was made a station on the Union Pacific Railroad when the railroad was constructed. Cattle ranches were established in the area of Rockland as early as 1876. Power County was legally established in 1913, from parts of Bingham, Blaine, and Oneida Counties and was named after hydroelectric development at the American Falls on the Snake River. The construction of the American Falls dam and reservoir during the 1920s marked a major change in the area. The reservoir also inundated the original American Falls town site; which necessitated moving the town one-half mile to the east. American Falls dam resulted in the area becoming a center of wheat farming, and agriculture is a major portion of the county's economy (Federal Writers Project 1937, 1938). The county economy is further supported by the Don Plant, the Simplot phosphate fertilizer operation.

Lincoln County, Wyoming

After the area had been explored by fur trappers and crossed by pioneers utilizing the Lander Cutoff of the Oregon Trail, the first permanent settlers arrived in the 1870's from Utah. In terms of geography, social life, and attitudes, the area more closely resembles southeastern Idaho and northern Utah than Wyoming. Star Valley is populated by small towns approximately five to ten miles apart and separated by grazing and crop land, similar to southeastern Idaho and northern Utah, in contrast to most areas of Wyoming, which are characterized by cities and towns separated by large open areas utilized for ranching and natural resource extraction (Burton 1991).

Residents of Caribou County, Idaho and Star Valley often travel to Pocatello, Idaho, Evanston, Wyoming, and Salt Lake City, Utah for goods and services that are not available locally. Over the past several decades, the western portion of Wyoming has seen an influx of affluent residents, property owners, and tourists centered around Jackson, Wyoming, as has the entire Greater Yellowstone area. Many of these affluent property owners are part-time residents of western Wyoming and maintain permanent residences elsewhere. Simultaneously, the area's economy has become more dependent upon investment income (dividends, interest, and rent) and government transfer payments and less dependent upon mining and manufacturing (Sonoran Institute 2003).

Natural resources are important parts of the residents' lifestyle, recreational activities, and the economy of the three counties. However, in recent years, local leaders have taken steps to diversify the economy and lessen the dependence upon natural resources and the worldwide commodities markets.

3.16.3 Land Ownership and Population

The four counties are contiguous, with Power County, Idaho being the farthest west and Lincoln County, Wyoming being the farthest east. The location of the four counties in relationship to surrounding areas in Idaho, Utah, and Wyoming is shown in **Figure 3.16-1**. Bannock and Power Counties, Idaho comprise the Pocatello, Idaho Metropolitan Area as defined by the Office of Management and Budget. The other two subject counties are not part of any metropolitan statistical area. Government is a significant landowner in each of the three counties (**Table 3.16-1**). Power County has the highest percentage of privately owned land of the four counties. Lincoln County is the largest of the three counties and is over three times as large as Bannock County, the smallest of the four.

TABLE 3.16-1 LAND OWNERSHIP

DESCRIPTION	BANNOCK COUNTY, ID	CARIBOU COUNTY, ID	POWER COUNTY, ID	LINCOLN COUNTY, WY
Acres	712,448	1,130,304	899,648	2,729,157
Federal	32.9%	41.6%	33.4%	71.6%
State	6.7%	9.9%	3.0%	7.6%
City and County	1.7%	0.2%	0.4%	0.0%
Private	58.8%	48.2%	63.2%	20.8%

Source: Idaho Dept. of Commerce, 2003a, 2003b, 2003c. Wyoming State Almanac 2002.

Population

The population of Bannock County, Idaho is concentrated in the city of Pocatello. Pocatello had a 2000 population of 51,466, or 68.1 percent of the Bannock County, Idaho population. Soda Springs is the largest city in Caribou County, Idaho, with a population of 3,381, 46.3 percent of the Caribou County, Idaho population.

American Falls is the largest city in Power County, Idaho, with a population of 4,111 or 54.5 percent of the Power County, Idaho population. Lincoln County, Wyoming has two centers of population. Kemmerer, in the southern part of the county, is the county seat. Kemmerer and surrounding communities account for about 30 percent of the population. Kemmerer had a 2000 population of 2,651, while the nearby towns of Diamondville and Opal had populations of 716 and 102, respectively. The other population center in Lincoln County, Wyoming is the Star Valley in the northwest portion of the county. The Afton Census County Division, essentially Star Valley, had a 2000 population of 9,359. Approximately 174 of the Smoky Canyon Mine's 214 employees reside in the Star Valley.

The total population of the 27-county area analyzed for indirect and induced employment is just under 2 million persons (**Table 3.16-2**). Only 5.3 percent of the total population resides in the four directly affected counties.

TABLE 3.16-2 POPULATION IN THE 27-COUNTY AREA ANALYZED FOR INDIRECT AND INDUCED EMPLOYMENT, 2002 ESTIMATES

COUNTY	POPULATION	PERCENT	COUNTY	POPULATION	PERCENT
Garfield County, CO	47,249	2.4	Daggett County, UT	886	<0.05
Moffat County, CO	13,370	0.7	Davis County, UT	249,224	12.5
Rio Blanco County, CO	6,042	0.3	Duchesne County, UT	14,844	0.7
Routt County, CO	20,405	1.0	Morgan County, UT	7,380	0.4
Bannock County, ID	75,804	3.8	Rich County, UT	1,966	0.1
Bear Lake County, ID	6,360	0.3	Salt Lake County, UT	919,308	46.0
Bingham County, ID	42,458	2.1	Summit County, UT	31,857	1.6
Bonneville County, ID	85,180	4.3	Uintah County, UT	26,155	1.3
Caribou County, ID	7,319	0.4	Weber County, UT	204,167	10.2
Franklin County, ID	11,699	0.6	Lincoln County, WY	14,890	0.7
Oneida County, ID	4,131	0.2	Sublette County, WY	6,240	0.3
Power County, ID	7,379	0.4	Sweetwater County, WY	37,194	1.9
Box Elder County, UT	44,032	2.2	Uinta County, WY	19,793	1.0
Cache County, UT	93,695	4.7	Area Total	1,999,027	100.0

Source: U.S. Census Bureau, 2004a.

Demographics

The four subject counties are relatively uniform demographically. The average demographics for the four counties are highly influenced by Bannock County, Idaho, due to it containing 71.7 percent of the population of the four counties. The presence of Idaho State University in Bannock County, Idaho also influences the demographics. Bannock County, Idaho is 91.3 percent white, while Caribou County, Idaho, Power County, Idaho, and Lincoln County, Wyoming are 96.1percent, 83.8 percent, and 97.1 percent white, respectively. Hispanic is the most populous minority in each of the four counties. The largest Native American populations in the four subject counties are in Bannock and Power Counties, which include portions of the Fort Hall Indian Reservation. Native Americans represent 2.9 and 3.3 percent of these counties populations, respectively.

3.16.4 Employment

Unemployment in the four subject counties has trended downward during the 1990's, with an increase in the past several years (**Table 3.16-3**). Total employment in Bannock County increased from 29,228 to 36,882 from 1992 to 2002, respectively, while the unemployment rate dropped from 7.5 percent to 6.4 percent. Over the same time period, the unemployment rate in Caribou County dropped from 6.6 percent in 1992 to 5.8 percent in 2001 before increasing to 7.6 percent in 2002. The unemployment rate in Power County dropped from 7.4 percent in 1992 to 7.2 percent in 2001, before rising to 9.2 percent in 2002. The unemployment rate in Lincoln County dropped from 8.1 percent in 1992 to 5.4 percent in 2001, and increased to 6.2 percent in 2002.

TABLE 3.16-3 LABOR FORCE AND UNEMPLOYMENT

DESCRIPTION	1992	1999	2000	2001	2002
BANNOCK COUNTY, IDAHO					
Civilian Labor Force	31,601	39,192	39,502	40,751	39,383
Employment	29,228	37,123	37,533	38,818	36,882
Unemployment	2,373	2,069	1,969	1,932	2,501
Unemployment Rate	7.5%	5.3%	5.0%	4.7%	6.4%
CARIBOU COUNTY, IDAHO					
Civilian Labor Force	3,335	3,099	3,083	3,396	3,272
Employment	3,114	2,911	2,897	3,199	3,025
Unemployment	221	188	186	197	248
Unemployment Rate	6.6%	6.1%	6.0%	5.8%	7.6%
POWER COUNTY, IDAHO					
Civilian Labor Force	3,354	3,460	3,543	3,446	3,183
Employment	3,106	3,209	3,297	3,199	2,890
Unemployment	249	254	247	247	293
Unemployment Rate	7.4%	7.2%	7.0%	7.2%	9.2%
LINCOLN COUNTY, WYOMING					
Civilian Labor Force	6,328	6,615	6,596	6,798	6,695
Employment	5,814	6,209	6,253	6,433	6,283
Unemployment	514	406	343	365	412
Unemployment Rate	8.1%	6.1%	5.2%	5.4%	6.2%
NATIONWIDE					
Unemployment Rate	7.5%	4.2%	4.0%	4.7%	5.8%

Source: Idaho Department of Labor 2004a, 2004b, 2004c. Wyoming Department of Employment 2004a. Bureau of Labor Statistics, U.S. Dept. of Labor, Current Population Survey.

Changes in employment by industry for the four counties over the past several decades indicate that the economic structure of the area is changing (**Table 3.16-4**). While employment rose by over 85 percent from 1970 to 2000, not all industrial sectors participated equally. Mining employment peaked at 4.9 percent of total employment in 1980 and has since dropped to 1.5 percent. Much of the peak “mining” employment was due to oil and gas extraction in Lincoln County and is unrelated to the phosphate mining industry. The manufacturing industry, which includes the phosphate fertilizer and elemental phosphorus plants, added employment from 1970 to 2000, but the industry’s share of total employment dropped from 11.2 percent to 10.0 percent. By contrast, the services sector added jobs on both a relative and absolute basis from 1970 to 2000. Employment in the services sector increased by 174 percent from 1970 to 2000, while the sector’s share of total employment in the four counties increased from 16.0 percent to 23.5 percent.

Government is a major source of 2002 employment in each of the four counties (**Table 3.16-5**). Government accounts for 21.4 percent of employment in Bannock County, Idaho, 18.6 percent of employment in Lincoln County, Wyoming, 15.3 percent of Power County, Idaho, and 14.8 percent of employment in Caribou County, Idaho.

Other industrial sectors accounting for significant portions of employment in Bannock County, Idaho are retail trade (13.5 percent), health care (9.5 percent), accommodation and food services (7.4 percent), and manufacturing (6.2 percent).

Important industrial sectors in Caribou County, Idaho are manufacturing, farm employment, and construction. Mining, the sector that includes the phosphate mines accounts for 7.7 percent of

Caribou County employment. The phosphate processing plants are included under the manufacturing sector, which in 2001 accounted for 17.1 percent of employment in Caribou County, while construction accounted for 10.6 percent of employment (manufacturing and construction employment are not disclosed for Caribou County for 2002 to avoid disclosure of individual company data).

The largest industrial sector in Power County in terms of employment is manufacturing, which was responsible for 23.4 percent of employment in 2002. Of the four counties, Power County is also the most dependent upon farm employment, accounting for 20.1 percent of total employment.

Industrial sectors accounting for significant portions of employment in Lincoln County, Wyoming are construction (13.3 percent) and retail trade (11.5 percent). Although a large majority of the employees at the Smoky Canyon Mine live in Lincoln County, Wyoming, the employment is reported under Caribou County, Idaho, since that is where the actual employment occurs.

TABLE 3.16-4 EMPLOYMENT BY INDUSTRIAL SECTOR STANDARD INDUSTRIAL CLASSIFICATION (SIC) BASIS IN THE FOUR COUNTIES, 1970-2000

EMPLOYMENT BY INDUSTRY				
	1970	**1980**	**1990**	**2000**
Total full-time and part-time employment	32,800	47,073	46,592	61,086
Proprietor's employment	5,651	7,567	9,470	12,891
Mining	546[1]	2,294[1]	1,217[1]	923[1,2]
Construction	1,993	2,584	2,143	4,120
Manufacturing	3,663	6,443	5,128	6,096
Transportation and Public Utilities	3,457	4,175	3,343	3,176
Wholesale Trade	1,269[3]	1,734[3]	1,744[3]	2,070
Retail Trade	5,179	7,610	8,399	10,945
Finance, Insurance and Real Estate	1,892	3,420	3,010	3,523[4]
Services	5,238	7,037	8,906	14,330
Government	5,313	7,447	8,194	10,477
EMPLOYMENT BY INDUSTRY, PERCENT				
	1970	**1980**	**1990**	**2000**
Total full-time and part-time employment	100.0	100.0	100.0	100.0
Proprietor's employment	17.2	16.1	20.3	21.1
Mining	1.7[1]	4.9[1]	2.6[1]	1.5[1,2]
Construction	6.1	5.5	4.6	6.7
Manufacturing	11.2	13.7	11.0	10.0
Transportation and Public Utilities	10.5	8.9	7.2	5.2
Wholesale Trade	3.9[3]	3.7[3]	3.7[3]	3.4
Retail Trade	15.8	16.2	18.0	17.9
Finance, Insurance and Real Estate	5.8	7.3	6.5	5.8[4]
Services	16.0	14.9	19.1	23.5
Government	16.2	15.8	17.6	17.2

[1]Does not include Power County, Id. Mining Employment for Power County is not disclosed prior to 1995 and listed as less than 10 jobs in 1995 and afterward.
[2] Does not include Bannock County, Id. Mining Employment for Bannock County is not disclosed after 1997. In 1997, Mining Employment for Bannock County was 23.
[3] Does not include Power County, Id. Wholesale Trade Employment of Power County is not disclosed prior to 1994. Wholesale Trade Employment for Power County was 186 in 1994 and 196 in 2000.
[4] Does not include Power County, Id. Finance, Insurance and Real Estate Employment in Power County is not disclosed after 1998. In 1998 Finance, Insurance and Real Estate Employment in Power County was 138.
Note: May not sum to the total due to exclusion of several minor categories.
Source: Bureau of Economic Analysis 2004a.

TABLE 3.16-5 EMPLOYMENT BY INDUSTRIAL SECTOR, 2002 NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS) BASIS

INDUSTRY	BANNOCK COUNTY, ID	CARIBOU COUNTY, ID	POWER COUNTY, ID	LINCOLN COUNTY, WY
Total employment	42,506	4,752	4,760	8,377
Farm Employment	807	681	957	676
Forestry, fishing, and other	D	D	D	78
Mining	D	367	12	478
Utilities	D	34	D	D
Construction	2,589	D	254	1,114
Manufacturing	2,654	D	1113	341
Wholesale Trade	1,193	78	D	D
Retail Trade	5,721	493	308	960
Transportation and Warehousing	D	96	323	221
Information	808	45	D	146
Finance and Insurance	1,819	85	109	238
Real Estate and Rental and Leasing	1,272	103	46	326
Professional, Scientific, and Technical Services	1,936	101	D	314
Management of Companies and Enterprises	220	0	D	D
Administrative and Waste Services	2,624	202	137	D
Educational Services	313	20	L	22
Health Care and Social Assistance	4,035	149	D	D
Arts, Entertainment, and Recreation	735	D	44	127
Accommodation and Food Services	3,130	D	128	559
Other Service, Except Public Administration	2,080	188	1527	372
Government	9,091	705	731	1,560

D: Not disclosed to avoid revealing individual company data. L: Less than 10 jobs, but the estimates for this item are included in the totals.
Source: Bureau of Economic Analysis 2004b.
Note: May not necessarily agree with data reported by state employment agencies.

Major employers in Bannock County, Idaho are AMI Semiconductor, Inc., Ballard-Kimberly Clark Medical Products, Convergys Customer Management, Farm Bureau Insurance, Farmers Insurance Group, Idaho State University, Pine Ridge Mall, Portneuf Medical Center, Qwest Communications, and Union Pacific Railroad (IDL 2004a).

Major employers in Caribou County, Idaho are Agrium U.S. Inc., Caribou Memorial Hospital, Caribou County, Dravo Corporation, Heritage Safe Company, Monsanto Company, and Washington Group International (IDL 2004b).

Major employers in Power County, Idaho are American Falls School District, Direct Communications, Double L Manufacturing, Harms Memorial Hospital, J. R. Simplot Company, Lamb Weston, and Power County (IDL 2004c).

Major employers in the Star Valley are Lincoln County School District #2, Lincoln County Government, Lower Valley Energy, the Simplot Smoky Canyon Mine, Aviat, Star Valley Cheese, Freedom Arms, and Maverick Corporation (Lincoln County Profile 1998).

The 27-county area analyzed for indirect and induced employment has a total civilian labor force of just over 1 million persons (**Table 3.16-6**). The unemployment rate averaged 5.8 percent over the area in 2002, with a low of 2.3 percent in Rio Blanco County, Colorado to a high of 9.2 percent in Power County, Idaho.

TABLE 3.16-6 LABOR FORCE AND EMPLOYMENT IN THE 27-COUNTY AREA ANALYZED FOR INDIRECT AND INDUCED EMPLOYMENT, 2002

COUNTY	CIVILIAN LABOR FORCE	EMPLOYED	UNEMPLOYED	UNEMPLOYMENT RATE, PERCENT
Garfield County, CO	25,813	24,816	997	3.9
Moffat County, CO	6,408	6,037	371	5.8
Rio Blanco County, CO	3,372	3,295	77	2.3
Routt County, CO	12,387	12,007	380	3.1
Bannock County, ID	39,383	36,882	2,501	6.4
Bear Lake County, ID	2,832	2,677	155	5.5
Bingham County, ID	22,424	21,422	1,002	4.5
Bonneville County, ID	48,764	47,013	1,751	3.6
Caribou County, ID	3,272	3,025	248	7.6
Franklin County, ID	5,094	4,877	217	4.3
Oneida County, ID	1,697	1,624	74	4.3
Power County, ID	3,183	2,890	293	9.2
Box Elder County, UT	18,472	17,224	1,248	6.8
Cache County, UT	47,915	45,866	2,049	4.3
Daggett County, UT	467	445	22	4.7
Davis County, UT	124,391	117,947	6,444	5.2
Duchesne County, UT	6,544	5,991	553	8.5
Morgan County, UT	3,850	3,656	194	5.0
Rich County, UT	1,088	1,032	56	5.1
Salt Lake County, UT	514,614	482,260	32,354	6.3
Summit County, UT	16,647	15,186	1,461	8.8
Uintah County, UT	12,563	11,714	849	6.8
Weber County, UT	108,169	101,170	6,999	6.5
Lincoln County, WY	6,695	6,283	412	6.2
Sublette County, WY	3,501	3,411	90	2.6
Sweetwater County, WY	19,790	18,851	939	4.7
Uinta County, WY	11,345	10,695	650	5.7
Area Total	1,070,680	1,008,296	62,384	5.8

Source: Colorado Department of Labor and Employment 2004. Idaho Department of Labor 2004a, 2004b, 2004c, 2004d, 2004e, 2004f, 2004g, 2004h. Utah Department of Workforce Services 2004, Wyoming Department of Employment 2004a.

3.16.5 Income

Caribou County, Idaho has the highest average annual wage of the four counties. From 1980 to 2002, Caribou County's average annual, nonagricultural wage increased at an annual rate of 3.4 percent. The average annual wage in Bannock, Power, and Lincoln Counties increased at 3.0 percent, 2.8 percent and 2.6 percent, respectively. Lincoln County, Wyoming's average wage peaked at $22,140 in 1985, dropped to $20,150 in 1990 and has since recovered to $26,621. As with employment, the peak in the average wage in Lincoln County was due to the oil boom during the 1980s.

Lincoln County has the highest median household income, followed closely by Caribou County. Similarly, Lincoln County has the fewest number of household in the lower income brackets, and Power County has the highest number of households in the lower income brackets. The Afton Census County Division (CCD) has a median household income of $39,648, higher than any of the three Idaho counties, but lower than the average for Lincoln County.

Within Star Valley, Turnerville has the highest household income of $52,857, followed by Star Valley Ranch ($47,981), Alpine ($45,313), Etna ($42,917), Bedford ($40,469), Afton ($37,292), Fairview ($35,568), Auburn ($33,125), Grover ($32,500), Smoot ($32,273), and Thayne

($31,875) (Decennial Census 2000e). Within Star Valley, the highest household incomes occur in communities in the northern part of the valley that have been influenced greatest by persons moving to Star Valley for recreational and similar reasons. Communities in the southern portion of Star Valley, which rely more on the traditional industries of agriculture and natural resource extraction, tend to have lower household incomes.

The structural change in the four counties' economy over the past several decades is further shown by the changes in sources of personal income (**Table 3.16-7**). Investments have been rising as a source of personal income in the four counties, with Dividends, Interest, and Rent rising from 11.3 to 17.7 percent of total personal income. Similarly, the Services sector rose from 10.0 percent of workplace earnings to 16.4 percent. The Mining sector peaked at 9.6 percent of workplace earnings in 1980 and has since declined to 3.4 percent of workplace earnings. Manufacturing peaked at 19.6 percent of workplace earnings in 1980, with the 2000 share 11.6 percent.

TABLE 3.16-7 PERSONAL INCOME BY SOURCE (SIC BASIS) IN THE FOUR COUNTIES, 1970-2000

TOTAL PERSONAL INCOME BY SOURCE, $1,000				
	1970	**1980**	**1990**	**2000**
Total Personal Income	259,058	845,156	1,349,920	2,209,166
Dividends, Interest, and Rent	29,132	113,377	217,889	388,222
Transfer Payments	21,563	86,835	175,155	318,351
Mining	8,063[1]	66,457[1]	44,878[1]	49,926[2]
Construction	19,190	48,542	49,604	115,956
Manufacturing	29,986	134,013	159,816	257,252
Transportation and Public Utilities	34,069	104,235	133,449	146,577
Wholesale Trade	10,170[3]	29,616[3]	38,892[3]	65,161
Retail Trade	25,198	65,378	91,757	142,094
Finance, Insurance and Real Estate	9,574	29,968	42,101	69,403[4]
Services	22,356	74,965	126,982	268,545
Government	34,063	103,659	208,137	370,233
TOTAL PERSONAL INCOME BY SOURCE, PERCENT				
	1970	**1980**	**1990**	**2000**
Total Personal Income	100.0	100.0	100.0	100.0
Dividends, Interest, and Rent	11.2	13.4	16.1	17.6
Transfer Payments	8.3	10.3	13.0	14.4
Mining	3.1[1]	7.9[1]	3.3[1]	2.3[2]
Construction	7.4	5.7	3.7	5.2
Manufacturing	11.6	15.9	11.8	11.6
Transportation and Public Utilities	13.2	12.3	9.9	6.6
Wholesale Trade	3.9[3]	3.5[3]	2.9[3]	2.9
Retail Trade	9.7	7.7	6.8	6.4
Finance, Insurance and Real Estate	3.7	3.5	3.1	3.1[4]
Services	8.6	8.9	9.4	12.2
Government	13.1	12.3	15.4	16.8

[1] Does not include Power County, Id. Mining Income is not disclosed for Power County prior to 1994. Mining Income in Power County was $621,000 in 1994 and $693,000 in 2000.
[2] Does not include Bannock County, Id. Mining Income is not disclosed for Bannock County after 1997. Mining Income in Bannock County was $687,000 in 1997.
[3] Does not include Power County, Id. Wholesale Trade Income is not disclosed for Power County prior to 1994. Wholesale Trade Income for Power County was $14,960,000 in 1994 and $6,704,000 in 2000.
[4] Does not include Finance, Insurance, and Real Estate for Power County, Id. Finance, Insurance, and Real Estate Income is not disclosed for Power County after 1999. Finance, Insurance, and Real Estate Income for Power County was $2,161,000 in 1999.
Note: May not sum to the total due to exclusion of several minor categories.
Source: Bureau of Economic Analysis 2004c.

Personal income in the four-county area is concentrated in Bannock County, with 71.5 percent of the personal income (**Table 3.16-8**). This is in line with the population distribution between the four counties, with Bannock County containing 71.9 percent of the population.

Bannock County has the most diversified sources of earnings of the four counties. Government employment is responsible for 28.3 percent of earnings in Bannock County, followed by Health Care (10.5 percent) and Manufacturing (10.5 percent). In determining Personal Income for Bannock County, there is a positive adjustment for residence of $122 million, indicating a net commuting outside of the county for employment.

Caribou County's sources of earnings are more concentrated, indicating a less diversified economy. Manufacturing, which includes the phosphate processing plants, was responsible for 37.5 percent of earnings in the county in 2001. In 2002, manufacturing earnings for Caribou County were not disclosed to avoid disclosure of individual company data. In determining Personal Income for Caribou County, there is a negative adjustment for residence of $36 million, indicating a net commuting into the county for employment.

Power County has the least diversified economy of the four counties; only two industries account for over half of the earnings in Power County. Manufacturing accounts for 31.5 percent of earnings while farm earnings account for an additional 25.1 percent. In determining Personal Income, there is a negative adjustment for residence of $32 million, indicating a net commuting into the county for employment.

In Lincoln County, government is responsible for 23.4 percent of earnings, while mining accounts for an additional 14.4 percent. For Lincoln County, there is a positive adjustment for residence of $29 million in determining total personal income, indicating a net commuting outside of the county for employment. Dividends, interest, and rents are responsible for a quarter (25.2 percent) of personal income in Lincoln County.

The average annual wage in the 27-county area analyzed for indirect and induced employment was $31,014 in 2002 (**Table 3.16-9**). The average annual wage varied from a low of $18,176 in Oneida County, Idaho to a high of $33,345 in Salt Lake County, Utah. The average per capita personal income for the 27-county area was $26,632 in 2002. Daggett County, Utah had the lowest per capita personal income of the 27 counties, with $17,330. The county with the highest per capital personal income was Summit County, Utah with $45,121.

3.16.6 Travel-related Employment and Wages

Most employees at the Smoky Canyon Mine reside in the Star Valley where, in addition to the traditional mining and agriculture industrial sectors, tourism is playing an increasingly important role in the local economy. Between 1990 and 2000, the number of housing units in the Afton CCD held for seasonal, recreational, or occasional use increased from 520 to 843, while the total number of housing units in the Star Valley increased from 2,889 to 4,365. A study conducted by Dean Runyan Associates in 2003 for the Wyoming State Office of Travel and Tourism and the Wyoming Business Council determined there were approximately 600 jobs in Lincoln County that are directly attributable to spending by travelers (Dean Runyan Associates, 2003). An update for 2003 placed the number at 690 jobs in Lincoln County directly attributable to traveler spending. With approximately 6,000 total jobs in Lincoln County, travel-related jobs account from about 11 to 12 percent of total employment (**Table 3.16-10**).

TABLE 3.16-8 PERSONAL INCOME BY SOURCE, 2002 (NAICS BASIS)

PERSONAL INCOME AND EARNINGS	BANNOCK COUNTY, ID		CARIBOU COUNTY, ID		POWER COUNTY, ID		LINCOLN COUNTY, WY	
	INCOME/ EARNINGS, $1,000	% OF TOTAL	INCOME/ EARNINGS, $1,000	% OF TOTAL	INCOME/ EARNINGS, $1,000	% OF TOTAL	INCOME/ EARNINGS, $1,000	PERCENT OF TOTAL
INCOME BY PLACE OF RESIDENCE								
Personal income	1,726,039	100.0[a]	157,683	100.0[a]	159,599	100.0[a]	371,943	100.0[a]
Derivation of Personal Income:								
Earnings by place of work	1,193,427	100.0[b]	156,429	100.0[b]	153,981	100.0[b]	223,333	100.0[b]
less: Contributions for government social insurance	148,733	12.5[b]	18,745	12.0[b]	15,079	9.8[b]	24,859	11.1[b]
plus: Adjustment for residence	122,390	10.3[b]	-36,124	-23.1[b]	-31,830	-20.7[b]	28,552	12.8[b]
equals: Net earnings by place of residence	1,167,084	67.6[a]	101,560	64.4[a]	107,072	67.1[a]	227,026	61.0[a]
plus: Dividends, interest, and rent	255,827	14.8[a]	31,886	20.2[a]	25,465	16.0[a]	93,661	25.2[a]
Plus: Personal current transfer receipts	303,128	17.6[a]	24,237	15.4[a]	27,062	17.0[a]	51,256	13.8[a]
EARNINGS BY PLACE OF WORK BY TYPE								
Wage and salary disbursements	862,168	72.2[b]	112,975	72.2[b]	99,765	64.8[b]	155,813	69.8[b]
Supplements to wages and salaries	210,664	17.7[b]	28,408	18.2[b]	23,352	15.2[b]	34,193	15.3[b]
Proprietors' income	120,595	10.1[b]	15,046	9.6[b]	30,864	20.0[b]	33,327	14.9[b]
Farm proprietors' income	5,944	0.5[b]	5,766	3.7[b]	23,877	15.5[b]	-1,582	-0.7[b]
Nonfarm proprietors' income	114,651	9.6[b]	9,280	5.9[b]	6,987	4.5[b]	34,909	15.6[b]
EARNINGS BY PLACE OF WORK BY INDUSTRY								
Farm earnings	8,152	0.7[b]	10,713	6.8[b]	38,656	25.1[b]	1,262	0.6[b]
Nonfarm earnings	1,185,275	99.3[b]	145,716	93.2[b]	115,325	74.9[b]	222,071	99.4[b]
Forestry, fishing, related activities, and other	(D)	(D)[b]	(D)	(D)[b]	(D)	(D)[b]	1,441	0.6[b]
Mining	(D)	(D)[b]	20,834	13.3[b]	499	0.3[b]	32,114	14.4[b]
Utilities	(D)	(D)[b]	1,824	1.2[b]	(D)	(D)[b]	(D)	(D)[b]
Construction	72,376	6.1[b]	(D)	(D)[b]	7,563	4.9[b]	34,806	15.6[b]
Manufacturing	124,979	10.5[b]	(D)	(D)[b]	48,577	31.5[b]	8,909	4.0[b]
Wholesale trade	47,364	4.0[b]	2,799	1.8[b]	(D)	(D)[b]	(D)	(D)[b]
Retail trade	108,009	9.1[b]	7,773	5.0[b]	4,359	2.8[b]	14,690	6.6[b]
Transportation and warehousing	(D)	(D)[b]	3,463	2.2[b]	8,805	5.7[b]	11,543	5.2[b]
Information	25,568	2.1[b]	922	0.6[b]	(D)	(D)[b]	3,831	1.7[b]
Finance and insurance	54,050	4.5[b]	1,640	1.0[b]	2,060	1.3[b]	6,198	2.8[b]
Real estate and rental and leasing	15,762	1.3[b]	562	0.4[b]	405	0.3[b]	4,598	2.1[b]
Professional and technical services	56,357	4.7[b]	2,536	1.6[b]	(D)	(D)[b]	8,700	3.9[b]
Management of companies and enterprises	11,446	1.0[b]	0	0.0[b]	(D)	(D)[b]	(D)	(D)[b]
Administrative and waste services	34,208	2.9[b]	3,743	2.4[b]	3,505	2.3[b]	(D)	(D)[b]
Educational services	3,983	0.3[b]	(L)	(L)[b]	61	0.0[b]	(L)	(L)[b]
Health care and social assistance	125,675	10.5[b]	2,663	1.7[b]	(D)	(D)[b]	(D)	(D)[b]
Arts, entertainment, and recreation	6,591	0.6[b]	(D)	(D)[b]	341	0.2[b]	2,672	1.2[b]
Accommodation and food services	34,474	2.9[b]	(D)	(D)[b]	885	0.6[b]	5,107	2.3[b]
Other services, except public administration	34,548	2.9[b]	2,323	1.5[b]	2,238	1.5[b]	5,345	2.4[b]
Government and government enterprises	337,552	28.3[b]	22,713	14.5[b]	22,894	14.9[b]	52,181	23.4[b]

[a] Income components of percent of total personal income. [b] Earnings components as percent of total earnings. (D) Not shown to avoid disclosure of individual company information. (L) Less than $50,000. Data included in totals. Source: Bureau of Economic Analysis 2004d.

TABLE 3.16-9 PERSONAL INCOME IN THE 27-COUNTY AREA ANALYZED FOR INDIRECT AND INDUCED EMPLOYMENT, 2002

COUNTY	AVERAGE ANNUAL WAGE ($)	NONAGRICULTURAL PAYROLL ($1,000)	TOTAL PERSONAL INCOME($1,000)	PER CAPITA PERSONAL INCOME ($)
Garfield County, CO	30,899	900,745	1,273,080	27,121
Moffat County, CO	30,205	208,259	323,884	24,136
Rio Blanco County, CO	29,388	131,325	164,498	27,439
Routt County, CO	30,406	588,076	753,228	36,976
Bannock County, ID	25,190	1,161,125	1,726,039	22,754
Bear Lake County, ID	19,023	44,711	121,388	19,320
Bingham County, ID	23,977	460,840	883,126	20,839
Bonneville County, ID	28,107	1,628,462	2,197,906	25,815
Caribou County, ID	33,005	149,483	157,683	21,749
Franklin County, ID	20,611	75,952	230,732	19,610
Oneida County, ID	18,176	25,477	72,682	17,620
Power County, ID	25,987	147,391	159,599	21,512
Box Elder County, UT	32,635	789,479	948,070	21,563
Cache County, UT	23,670	1,291,595	1,867,795	19,792
Daggett County, UT	23,829	14,124	15,476	17,330
Davis County, UT	30,441	3,955,306	6,471,276	25,947
Duchesne County, UT	26,093	188,366	309,876	20,854
Morgan County, UT	26,019	70,191	166,904	22,397
Rich County, UT	19,150	14,978	44,823	22,963
Salt Lake County, UT	33,345	24,835,467	26,184,005	28,539
Summit County, UT	27,133	699,045	1,439,132	45,121
Uintah County, UT	26,323	375,353	480,620	18,341
Weber County, UT	27,790	3,285,935	4,948,880	24,315
Lincoln County, WY	26,621	216,750	371,943	24,948
Sublette County, WY	27,807	103,100	193,972	31,331
Sweetwater County, WY	32,322	972,476	1,131,418	30,400
Uinta County, WY	28,299	352,937	547,651	27,725
Area Total	31,014	42,686,948	53,185,686	26,632

Source: Bureau of Economic Analysis, 2004e.

TABLE 3.16-10 TOTAL AND TRAVEL-RELATED EMPLOYMENT IN LINCOLN COUNTY, WYOMING

	1999	2000	2001	2002	2003
Total Employment	5,083	5,006	5,224	5,234	6,078
Travel-related Employment	600	600	590	630	690
Travel-related Employment, percent of Total	11.8	12.0	11.3	12.0	11.4

Source: Dean Runyan Associates, 2003. Wyoming Business Council, 2004. Wyoming Department of Employment, 2004a.

Travel-related employment is not nearly as important to the three Idaho counties as it is in Lincoln County, Wyoming. Travel-related employment accounted for 1,130 jobs in Bannock County, 124 jobs in Caribou County, and 266 jobs in Power County, Idaho in 1997 (Dean Runyan Associates, 1999). Total employment in the three Idaho counties was 36,607, 3,118, and 3,267 for Bannock, Caribou, and Power Counties, respectively in 1997. Therefore, travel-related employment was responsible for 3.1 percent, 4.0 percent, and 8.1 percent of total employment in Bannock, Caribou, and Power Counties.

Mining employment has higher annual wages than does industrial sectors commonly associated with travel-related spending. The average annual wage for mining in Caribou County, Idaho (site of the Smoky Canyon Mine) was $44,657 (Bureau of Labor Statistics 2004). By comparison, the average annual wage in Lincoln County, Wyoming for six industrial sectors commonly identified with travel-related employment was under $20,000 (**Table 3.16-11**). For this comparison it is necessary to compare mining wages in Caribou County, Idaho to wage for the travel-related industrial codes in Lincoln County, Wyoming because most of the employees at the Smoky Canyon Mine (which is in Caribou County) live in Lincoln County, and most other employment opportunities for the mine's employees would be in Lincoln County.

TABLE 3.16-11 EMPLOYMENT AND AVERAGE WAGE FOR MINING AND TRAVEL-RELATED INDUSTRIAL SECTORS, LINCOLN COUNTY, WYOMING 2003

	AVERAGE ANNUAL EMPLOYMENT	AVERAGE ANNUAL WAGE, $
Mining (NAICS 21)	376	44,657
Retail Trade (NAICS 44-45)	682	15,488
Real Estate (NAICS 53)	37	8,873
Administrative (NAICS 56)	55	19,687
Arts, Entertainment & Recreation (NAICS 71)	29	13,569
Accommodations & Food Services (NAICS 72)	469	7,447
Other Services (NAICS 81)	89	18,564

Note: Mining data is for Caribou County, Idaho. Other Data is for Lincoln County, Wyoming. Average Annual Wage for the travel-related industrial sectors was calculated by the preparer using data from the Wyoming Department of Employment.
Source: Bureau of Labor Statistics, 2004, Wyoming Department of Employment, 2004b.

3.16.7 Local Government Finances

Local government finances for the four counties are summarized in **Table 3.16-12**. These data include all local governments - not only county governments, but also any municipalities, school districts, and special districts within the counties. Bannock County had the highest general revenue, and lowest per capita taxes. Caribou County had the lowest general revenue, and Lincoln County had the highest per capita taxes. Each county spent the largest percentage of its budget on education, with health and hospitals, and highways following. Lincoln County had the highest outstanding debt per capita, followed by Caribou, Power, and Bannock Counties.

TABLE 3.16-12 LOCAL GOVERNMENT FINANCES

DESCRIPTION	BANNOCK COUNTY, ID	CARIBOU COUNTY, ID	POWER COUNTY, ID	LINCOLN COUNTY, WY
General Revenue (million $)	177.4	24.7	25.3	59.3
Intergovernmental Transfers (million $)	69.3	11.5	10.0	23.0
Total Taxes (million $)	39.1	6.9	8.3	18.4
Per Capita Taxes ($)	530	934	999	1,324
Per Capita Property Taxes ($)	505	864	990	1,187
Direct General Expenditures (million $)	171.1	26.3	26.0	63.7
Per Capita Direct General Expenditures ($)	2,317	3,568	3,130	5,492
Education	40.7%	47.7%	41.8%	50.6%
Health and Hospitals	26.7%	14.4%	16.7%	8.4%
Police	5.0%	5.3%	3.8%	3.3%
Public Welfare	0.7%	0.6%	0.6%	0.2%
Highways	4.2%	11.5%	10.1%	3.6%
Total Outstanding Debt (million $)	43.1	10.1	13.7	147.9
Per Capita Outstanding Debt ($)	584	1,375	1,657	10,666

Source: Gaquin and DeBrant 2002.

Crow Creek Valley, within Caribou County, Idaho is the location of seven housing census units (**Table 3.16-13**). There is one housing census unit in Census Block 1155, which is the area south and east of the Crow Creek Road. The other six housing census units in Crow Creek Valley are in Census Block 1161, which is west of Crow Creek Road and south of the Wells Canyon Road. Field visits to this area indicate that there are five houses/ranches north of the Wells Canyon Road and one ranch (Crow Creek Ranch), approximately one mile south of the Wells Canyon Road (see **Figures 2.6-11a and 2.6-11b**). In Lincoln County, Wyoming there are an additional five housing units between the Idaho/Wyoming State Line and the Crow Creek Road/Loch Avenue intersection that is located at the mouth of the Crow Creek drainage as it enters into Star Valley.

TABLE 3.16-13 HOUSING UNITS IN THE CROW CREEK VALLEY BY CENSUS BLOCK

CENSUS BLOCK	HOUSING UNITS	OCCUPIED HOUSING UNITS	SEASONAL, RECREATIONAL, OR OCCASIONAL USE
1155	1	0	1
1156	0	0	0
1157	0	0	0
1158	0	0	0
1159	0	0	0
1160	0	0	0
1161	6	0	6
1230	0	0	0
1231	0	0	0

Source: U.S. Census Bureau 2000a

Note: Census Blocks correspond to those shown in Figure 3.16-3 for Census Tract 9602, Block Group 1 in Caribou County, Idaho.

3.16.8 Agriculture

Agriculture plays a significant role in the economies of each of the four counties (**Table 3.16-14**). Power County is the most significant of the four counties in agricultural production, producing nearly $121 million worth of agricultural products in 1997. The value of production is dominated by crops in Bannock, Caribou, and Power Counties, while livestock accounts for the majority of production in Lincoln County. While crops dominate the value in the three Idaho Counties, cattle are also significant. Cattle accounts for 27.4 percent of the total value of production in Bannock County, 21.9 percent in Caribou County, and 25.8 percent in Power County. Potatoes, wheat, and barley are significant crops in the three Idaho counties, while dairy and sheep are important components of agriculture in Lincoln County (National Agricultural Statistics Service 1997a, 1997b, 1997c, 1997d).

TABLE 3.16-14 AGRICULTURAL PRODUCTION

DESCRIPTION	BANNOCK COUNTY, ID		CARIBOU COUNTY, ID		POWER COUNTY, ID		LINCOLN COUNTY, WY	
Value of Production ($)	25,032,000		42,918,000		120,975,000		22,969,000	
Crops	62%		69%		72%		13%	
Livestock	38%		31%		28%		87%	
Major Commodities (% of total value)	Cattle	27.4%	Barley	27.9%	Potatoes	48.5%	Cattle	56.5%
	Potatoes	22.6%	Cattle	21.9%	Cattle	25.8%	Dairy	18.2%
	Wheat	22.6%	Potatoes	(D)	Wheat	20.6%	Sheep	10.6%
	Hay	9.4%	Wheat	16.0%	Dairy	1.2%	Hay	8.5%percent
	Dairy	7.1%	Dairy	5.5%	Nursery	(D)	Barley	4.1%

Source: National Agricultural Statistics Service 1997a, 1997b, 1997c, 1997d
(D) Not shown to avoid disclosure of individual company information.

Power County, Idaho has the largest and most profitable farms of the four counties (**Table 3.16-15**). The average farm in Power County returned $52,777 in 1997. The farms in the other three counties are not as profitable as those in Power County. For comparison, the average farm in Lincoln County, Wyoming, returned only $12,244.

Collectively, the four counties contained 1,918 farms in 1997 (defined as those with sales of agricultural products of $1,000 or more). The average sales per farm was $110,477, although 49.5 percent of the farms had sales of less than $10,000, and the average return after expenses was $21,021. Nearly half of those engaged in farming (49.3 percent) had a principal occupation other than farming, while 56.0 percent worked at least one day during the year off the farm, and 36.5 percent worked more than 200 days off the farm (National Agricultural Statistics Service 1997e, 1997f, 1997g, 1997h). While agriculture plays a large role in the identity and social life of the area, outside employment is usually necessary in addition to farming.

TABLE 3.16-15 AGRICULTURAL ECONOMICS

	BANNOCK COUNTY, ID	CARIBOU COUNTY, ID	POWER COUNTY, ID	LINCOLN COUNTY, WY	FOUR-COUNTY AREA
Number of Farms	664	427	323	504	1,918
Average Size (acres)	446	1,099	1,313	810	840
Average Return ($)	$7,756	$27,989	$52,777	$12,244	$21,021
Sales less than $10,000 (%)	64.3%	40.5%	32.2%	48.6%	49.5%
Operators Principal Occupation is other than Farming (%)	59.5%	42.2%	34.4%	51.6%	49.3%
Operators Work off the Farm (%)	63.0%	48.2%	45.2%	60.5%	56.0%
Operators Work more than 200 days off the Farm (%)	46.1%	27.4%	26.3%	38.3%	36.5%

Source: National Agricultural Statistics Service 1997e, 1997f, 1997g, 1997h.

3.16.9 Phosphate Mining and Processing Industry

Phosphate is an essential component of the nitrogen-phosphorus-potassium fertilizers that are consumed by the world's agricultural industry. Phosphate rock minerals are the only significant global source of phosphorus. The United States is the world's leading producer and consumer of phosphate rock, which is used to produce fertilizers and industrial products.

Since phosphate mining began in southeastern Idaho, there have been a total of 31 phosphate mines in the area (USGS 2001c). Of these, 12 were small underground mines, all of which produced small quantities of ore and have been closed for years. There have been 20 surface mining operations of which those with significant production and surface area include: Waterloo, Conda, Gay, Ballard, Maybe Canyon, Georgetown Canyon, Mountain Fuel, Henry, Little Long Valley, Lanes Creek, Champ, Smoky Canyon, Enoch Valley, Rasmussen Ridge, and Dry Valley. More than 90 percent of phosphate rock mined in 2002 was used to produce fertilizers and animal feed supplements. The major fertilizer products are super phosphoric acid (SPA), diammonium phosphate (DAP), monoammonium phosphate (MAP), granular triple super phosphate (TSP), and wet process phosphoric acid (WPPA). The WPPA is a feedstock for DAP, MAP, and TSP.

Major feedstocks other than phosphate rock required for the production of ammonium phosphate fertilizers are anhydrous ammonia and sulfuric acid. Most ammonia is manufactured by the Haber process, where nitrogen gas and hydrogen gas are reacted at high temperature and pressure in the presence of a metallic iron catalyst. The nitrogen is obtained from air, and the hydrogen is usually obtained by reforming hydrocarbons with steam to form hydrogen gas and carbon dioxide. Natural gas is commonly the hydrocarbon used to manufacture hydrogen gas (Kroschwitz 1993a).

Sulfuric acid is manufactured by burning sulfur to sulfur dioxide, then reacting the sulfur dioxide with oxygen and water to form sulfuric acid. Over 90 percent of sulfur produced in the United States and Canada is currently recovered from sulfur-containing natural gas and crude oil, with the remaining recovered as sulfuric acid as a byproduct of roasting and smelting sulfide metal ores (Chemical Market Reporter 2003a, 2003b; USGS 2004d). With the natural gas industry supplying two of the major feedstocks for manufacturing ammonium phosphate fertilizers, the fertilizer industry is very sensitive to changing economics in the natural gas industry.

The sulfuric acid is reacted with phosphate rock to produce WPPA and gypsum. The WPPA is then reacted with anhydrous ammonia in the presence of steam and water to produce ammonium phosphate fertilizer. By altering the operating conditions and ratio of the feed material, either DAP or MAP can be manufactured.

Most large ammonium phosphate fertilizer plants are vertically integrated, with onsite sulfuric acid and ammonia manufacturing facilities, although ammonia manufacturing at the Don Plant has been discontinued, and Simplot is purchasing anhydrous ammonia on the open market. Fertilizer manufacturing accounts for 70 percent of sulfuric acid consumption in the United States. Additionally, the fertilizer industry accounts for 89 percent of ammonia consumption in the United States. About 20 percent of ammonia is directly applied as anhydrous ammonia, while 69 percent is used a feedstock for manufacturing various fertilizer materials including urea, ammonium nitrate, ammonium phosphate, ammonium sulfate, and nitric acid (Chemical Market Reporter 2002).

Triple superphosphate (TSP) is manufactured by reacting phosphate rock with WPPA. The WPPA and the sulfuric acid necessary to manufacture TSP are usually made at the TSP plant. Since the late 1960s, TSP has been overshadowed by DAP and MAP, but production is expected to be sustainable for two reasons. First, the production of TSP at an ammonium phosphate plant is a convenient way to use sludge WPPA that is too impure for MAP or DAP production. Second, the absence of nitrogen in TSP makes it the preferred source of phosphorus for the no-nitrogen bulk-blend fertilizers that are often used for leguminous crops such as soybeans, alfalfa, and clover (Kroschwitz 1993b)

Although the United States is a net importer of phosphate rock, with over 99 percent of imports coming from Morocco, domestic mines still account for over ninety percent of the nation's supply (**Table 3.16-16**). Three phosphoric acid producers along the Gulf of Mexico: Agrifos, Mississippi Phosphates, and PCS Nitrogen, are the primary importers of phosphate rock.

TABLE 3.16-16 UNITED STATES SUPPLY OF PHOSPHATE ROCK, THOUSAND TONS

	1998	1999	2000	2001	2002
Marketable Production	48,700	44,800	42,500	35,200	39,800
Exports	417	300	330	10	43
Imports	1,940	2,390	2,130	2,760	2,980

Source: U.S. Geological Survey 2002a.

While the United States is a net importer of phosphate rock, the U.S. is a major exporter of ammonium phosphate fertilizers (**Table 3.16-17**). In fact, the U.S. exports approximately twice the quantity of ammonium phosphate fertilizer (measured in terms of contained P_2O_5) as is consumed domestically. A major portion of production in the southeast is shipped overseas from ports along the Gulf of Mexico. The United States is the world's largest exporter of phosphate fertilizers, accounting for 54 percent of world DAP exports and 37 percent of total world P_2O_5 exports during 2002.

TABLE 3.16-17 UNITED STATES SUPPLY OF AMMONIUM PHOSPHATE FERTILIZERS, THOUSAND TONS P_2O_5

	1997	1998	1999	2000	2001
Production	9,223	6,405	8,780	7,440	7,884
Consumption	2,441	2,264	2,334	2,348	2,569
Exports	5,648	5,913	5,678	4,443	5,231
Imports	96	58	147	171	216

Source: United Nations Food and Agriculture Organization 2004. May not exactly agree with U.S. Census Bureau and USGS Data.

DAP is the predominant phosphate fertilizer produced in the United States, accounting for nearly two-thirds of total production (**Table 3.16-18**). MAP accounts for about one-quarter of phosphate fertilizer produced domestically. The remainder is primarily TSP.

TABLE 3.16-18 PHOSPHATE FERTILIZER PRODUCTION IN THE U.S., TONS P_2O_5

	1998	1999	2000	2001	2002
DAP	6,832,250	6,832,250	5,734,081	5,078,207	5,414,862
Percent	66.6	80.0	64.4	62.6	63.4
MAP	2,017,501	1,656,214	2,336,828	2,232,618	2,291,562
Percent	19.7	19.4	26.3	27.5	26.8
Other	1,409,869	55,350	828,088	798,393	838,315
Percent	13.7	0.6	9.3	9.8	9.8
Total	10,259,620	8,543,814	8,898,997	8,109,218	8,544,739

DAP: Diammonium Phosphate; MAP: Monoammonium Phosphate.
Source: U.S. Census Bureau 2000b, 2000c, 2001, 2002, 2003.

China is the largest consumer for United States diammonium phosphate exports, accounting for over 60 percent of U.S. exports in 2002 (**Table 3.16-19**). Shipments to India have dropped dramatically in recent years. Although the drop in shipments to India was partially offset by increased shipments to some Latin American Countries, a return to export levels seen during the late 1990s is unlikely (USGS 2004e).

There have been several noticeable mine expansions worldwide during the past several years. During 2002, the Coprebras Ouvidor Mine in Brazil completed a 450,000 ton expansion and the El Nasr Sebaya Mine in Egypt completed a 200,000 ton expansion. Several projects at existing mines in Africa are anticipated to increase worldwide phosphate rock production by 5.3 million tons per year by the end of 2004, with the largest increase occurring in Algeria, Morocco, and Tunisia. During 2003, the new owners of the Hahotoe and Kpogame Mines in Togo announced an expansion to double the capacity from 1.3 million ton annually to 2.6 million tons and WMC Resources Ltd. was expected to complete a 220,000 ton expansion at the Duchess Mine in Australia to bring total annual capacity to 2.4 million tons (USGS 2004b).

TABLE 3.16-19 UNITED STATES TRADE IN DIAMMONIUM PHOSPHATE, THOUSAND TONS

	1998	1999	2000	2001	2002
IMPORTS					
	49	40	136	147	172
EXPORTS					
Argentina	249	184	246	276	116
Australia	690	473	455	345	236
Brazil	80	18	132	46	47
Canada	125	112	120	120	263
China	5,710	5,049	4,475	3,153	4,641
Colombia	NA	86	107	114	144
Ecuador	52	68	46	86	54
India	1,400	2,579	380	542	222
Japan	388	368	392	371	341
Kenya	43	126	108	137	85
Mexico	277	282	325	304	474
Pakistan	709	391	325	409	164
Peru	NA	NA	NA	120	73
Thailand	333	263	225	236	108
Other	765	868	636	805	545
Total Exports	10,880	10,869	7,981	7,066	7,518

Source: U.S. Geological Survey 2004e, 2003c, 2002a, 2001c.

The drop in production and export of phosphate fertilizer is typical of the whole agricultural chemicals industry of the past several years (**Figure 3.16-3**). The Industrial Production Index for Pesticide, Fertilizer, and Other Agricultural Chemicals (NAICS 3253) is currently at about the same level it was at in the later part of 1987. The index peaked at 106.059 in July 1998, hit a low of 77.242 in April 2002 and stood at 82.968 at March 2004. While the index has recovered from the low point, it remains at 78 percent of the high reached during 1998. The March 2004 value of 82.968 is about the same level the index stood at during the last part of 1987. In November 1987, the index was 83.237 (Federal Reserve Board 2004).

In 2002, there were 14 operating phosphate mines in the United States, the majority of which were located in Florida and North Carolina. The eastern mines accounted for 86 percent of U.S. production, while four mines in Idaho and one in Utah accounted for the remainder. All of the eastern production was used for manufacturing fertilizer while the western production was used to manufacture both fertilizer and elemental phosphorus. In addition to Florida and North Carolina, there are ammonium phosphate fertilizer manufacturing plants in Louisiana, Mississippi, and Texas. The plants in Louisiana, Mississippi, and Texas use phosphate rock from Florida transported via rail and barge or imported rock from Morocco.

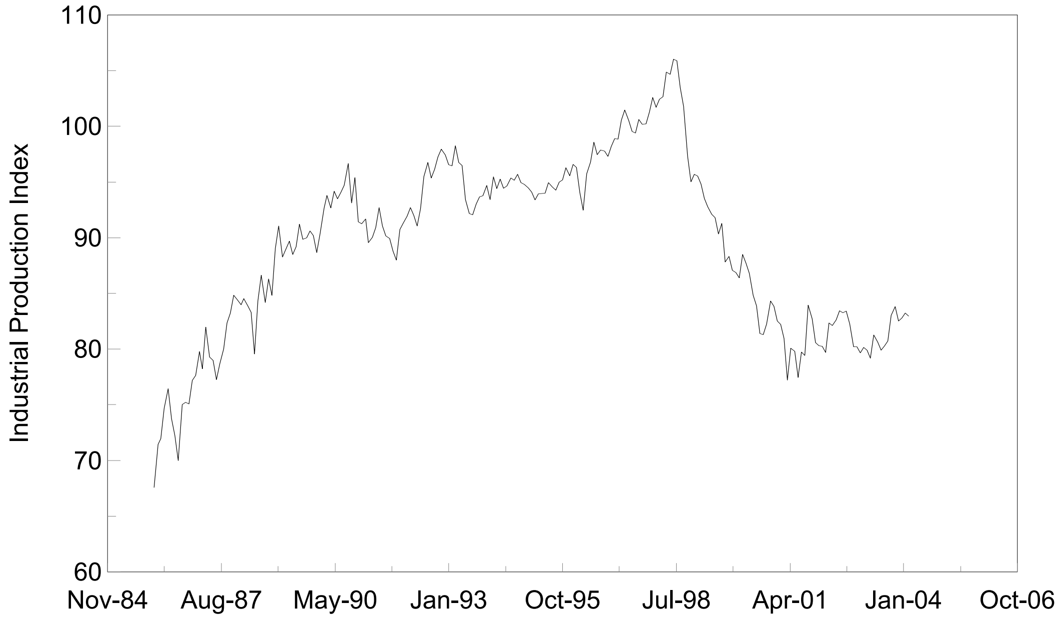


Figure 3.16-3 Industrial Production Index for the Agricultural Chemical Industry
(NAICS 3253 - Pesticide, Fertilizer, and Other Agricultural Chemical Manufacturing)
Source: Federal Reserve Board, 2004.

Southeastern Idaho is currently home to three large phosphate mining operations. These mines are operated by Simplot, Agrium, Inc., and Monsanto, Inc. Astaris LLC closed the Dry Valley mine in January 2003, although the mine may be reopened in the future by Agrium, Inc. The phosphate rock is converted into either phosphate fertilizer or elemental phosphorus at processing plants near Soda Springs, Idaho and Pocatello, Idaho. Ore from the Simplot Smoky Canyon Mine is transported via an 86-mile slurry pipeline to the company's WPPA plant in Pocatello. Agrium operates the Rasmussen Ridge Mine which, in the past, fed its Conda WPPA plant. However, Agrium has moved their stockpile to their Plant outside of Soda Springs. They are currently mining in the C Panel of their Dry Valley Mine. Agrium's North Rasmussen Mine is idle and is scheduled to remain idle until the Dry Valley deposit is mined out. Monsanto operates the Enoch Valley Mine, which supplies its elemental phosphorus plant in Soda Springs.

Astaris closed its elemental phosphorus plant in Pocatello in December 2001 and opened a 80,000 ton per year purified phosphoric acid plant in Soda Springs in May 2001 as a joint venture with Agrium. Astaris announced a restructuring program during October 2003 that included closing the PPA opened in 2001. The WPPA plant's closure was made necessary by the closure of the Astaris Green River, Wyoming sodium tripolyphosphate plant, which was supplied exclusively by the Soda Springs PPA plant. Astaris also closed its Dry Valley Mine on January 1, 2003, stating the need to reduce inventory. Agrium acquired 100 percent of the Astaris facility, and will produce phosphoric acid for fertilizer production but will not produce PPA. Agrium will use phosphate rock from its Rasmussen Ridge Mine to supply the plant once the Dry Valley deposit is mined out (USGS 2004e).

Monsanto Co., operates the Enoch Valley Mine, which supplies its elemental phosphorus plant in Soda Springs, Idaho. Elemental phosphorus is used as a feedstock for industrial chemicals. About 58 percent of the elemental phosphorus is used to produce thermal process phosphoric acid, which is used in industrial applications including detergent and food additives, water- and metal-treatment chemicals, vitamins, soft drinks, toothpaste, photographic film, light bulbs, bone china, optical glass and other consumer goods. The remaining elemental phosphorus is used to produce phosphorus trichloride, pentasulfide, and other compounds which are used in herbicides, insecticides, flame-retardant chemicals, and plasticizers (USGS 2004e).

The phosphate mining industry pays royalties to the federal government for ore mined from federal leases on public lands at the rate of five percent of the value of phosphate mined. Since the phosphate mines and fertilizer plants are vertically integrated, and no open market for phosphate rock exists in the western United States, the Minerals Management Service uses an index adjusted annually to determine the value of phosphate rock mined on federal lands. The index is adjusted according to changes in the Bureau of Labor Statistics (BLS) Chemical and Fertilizer Minerals Mining Producer Price Index (PPI) (50 percent weighting), the BLS Phosphate Fertilizer PPI (25 percent weighting) and the USGS Phosphate Rock Price Index as published annually in the Minerals Yearbook (Federal Register 1999).

The Idaho phosphate industry typically pays between four and five million dollars annually in royalties to the federal government for phosphate ore mined from federal land (**Table 3.16-20**). Phosphate royalties account for over 90 percent of mineral lease payments in Idaho. Fifty percent of federal mineral lease payments are returned to the states. Idaho returns 10 percent of the federal mineral royalties it receives from the federal government to the impacted counties, in this case, Caribou County, Idaho. Phosphate rock represents about 30 percent of the value of nonfuel minerals produced in Idaho.

The Smoky Canyon Mine provides royalty payments to the Minerals Management Service that annually ranges from 1.6 to 2.0 million dollars.

TABLE 3.16-20 IDAHO PHOSPHATE SALES AND ROYALTIES FOR OPERATIONS ON FEDERAL LAND

DESCRIPTION	1999	2000	2001	2002	2003
Sales Volume (tons)	5,796,900	6,095,292	4,990,345	5,274,021	4,730,171
Sales Value ($)	97,845,060	96,583,348	81,746,031	78,269,056	72,131,964
Royalties ($)	4,892,253	4,826,139	4,060,302	3,915,022	3,606,598

Source: Minerals Management Service 2004a, 2004b, 2004c.

The Simplot Smoky Canyon Mine produced approximately 2 million tons of ore in 2002 (USGS 2004d), about 2.3 percent of the national production of phosphate rock and 61 percent of western United States production.

In 1997, the Idaho phosphate mining industry, which includes the actual mining operations but not the fertilizer and elemental phosphorus plants, employed 561 workers and had an annual payroll of $27.4 million. The value added by mining was $74.5 million, while the value of shipments and receipts was $111.5 million (U.S. Census Bureau 1997).

The phosphate mining and processing industry is responsible for a significant portion of property taxes paid in Caribou County, Idaho. In 2003, total property taxes levied in Caribou County were $7.9 million. Of this, about 41 percent was paid by the phosphate mining and processing industry. These taxes included property taxes on mining equipment, the processing plants near Soda Springs and a net profits tax on the mines, which is considered a property tax by the Idaho State Tax Commission, in lieu of taxes on ore bodies (Dornfest 2004).

Approximately 3.4 percent of the nonagricultural employment in Bannock, Caribou, and Power Counties, Idaho is due to the phosphate operations (**Table 3.16-21**). No employment is reported for the phosphate industry in Lincoln County, Wyoming since all of the actual operations are in Idaho, although a majority of the employees at the Smoky Canyon Mine actually reside in Lincoln County, Wyoming.

TABLE 3.16-21 IDAHO PHOSPHATE INDUSTRY EMPLOYMENT, BANNOCK, CARIBOU, AND POWER COUNTIES

DESCRIPTION	2002	2003
Mining	350	376
Fertilizer Manufacturing	910	827
Total Phosphate Industry	1,260	1,203
Total Employment	37,002	37,681
Phosphate Employment, percent of Total	3.4	3.2

Date for 2003 are preliminary and subject to revision.
NAICS Codes: 212 - Mining, 3253 - Pesticide, Fertilizer and Other Agricultural Chemical Manufacturing.
Source: Idaho Department of Labor, 2004i.

The phosphate industry provides some of the highest paying jobs in southeastern Idaho. In 2002, mining in the three Idaho counties paid an annual average wage of $43,555, while fertilizer manufacturing paid an annual average wage of $43,149 (Idaho Department of Labor 2004i). For comparison, the average annual wage for Bannock County was $25,190, $33,005 for Caribou County, $25,987 for Power County, and $26,621 for Lincoln County in 2002.

Past closures of phosphate facilities in southeastern Idaho have resulted in noticeable changes in the local economy. The closure of the Astaris LLC elemental phosphorus plant in Pocatello, Idaho and the layoff of 400 employees during December 2001 resulted in the unemployment rate in the three Idaho counties (Bannock, Caribou, and Power) jumping from 5.75 percent in December 2001 to 6.84 percent in January 2002. The unemployment rate continued to rise, until it peaked at 7.32 percent in April 2002 (**Figure 3.16-4**). The Dry Valley Mine closure in January 2003 resulted in only a slight increase in unemployment, from 5.83 to 5.94 in February 2003 as a generally improving economy masked part of the effect. The closure of the Astaris PPA plant on October 2003 had little effect on unemployment in the area, as the economy was generally improving, and only a few dozen employees were affected.

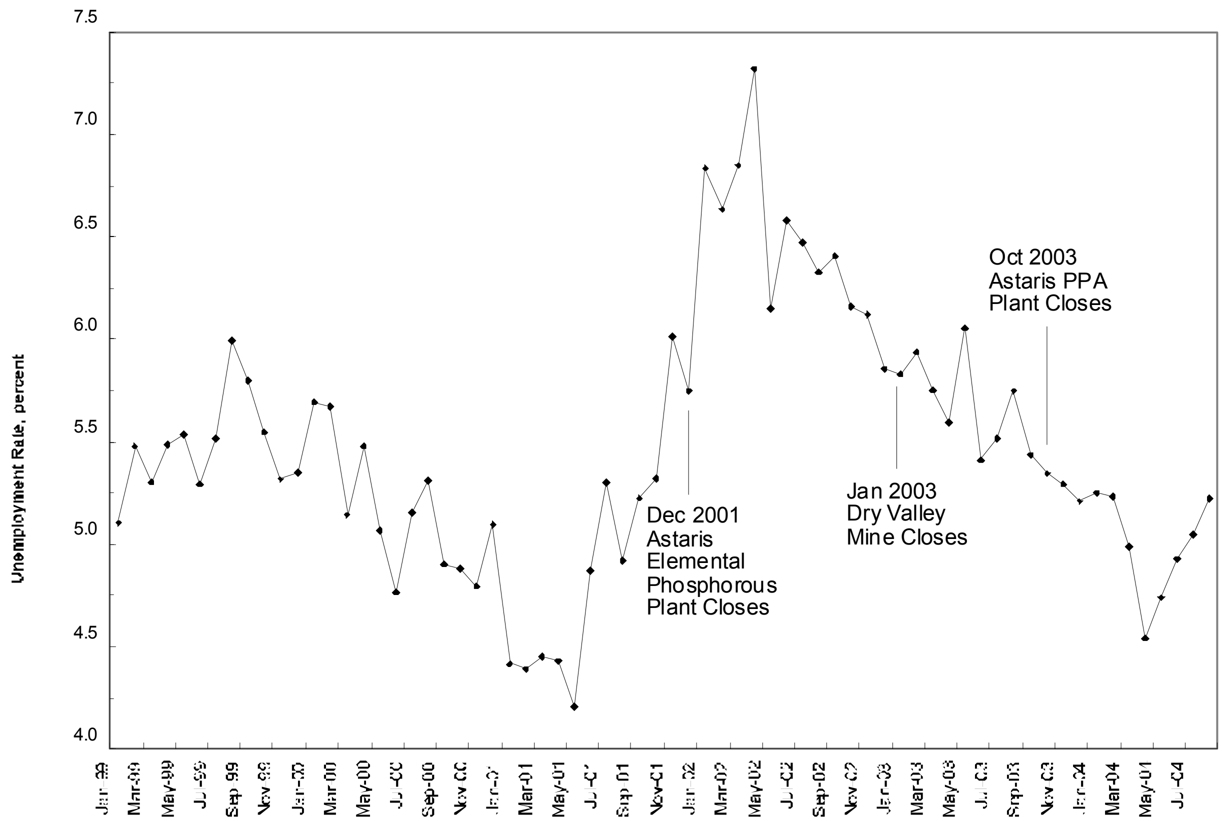


Figure 3.16-4 Unemployment Rate for Bannock, Caribou, and Power Counties, Idaho
Source: Idaho Department of Commerce and Labor, 2004.

The local economic conditions resulted in a population decrease in the three Idaho Counties from 2002 to 2003, with a population decline of 371 persons. The natural increase in population of 815 persons was overshadowed by a net out migration of 1,197 persons. The combined population of the three counties decreased by 0.4 percent, while the Idaho state population increased by 1.7 percent (U.S. Census Bureau 2004b).

3.16.10 Local Environment & Smoky Canyon Mine

The local environment in the Study Area is forested, rural, and agricultural lands, with small communities located outside the Forest boundary in Idaho and Wyoming. The Crow Creek Valley is the residential area closest to Panels F and G with large parcels of privately-owned land, and is approximately two miles southeast of Panel G. The Crow Creek Valley is the site of several ranches and vacation homes. Although a sizable portion of the Crow Creek Valley is privately-owned, the surrounding area is public land administered by the CNTF. Recreation and land use in the area is described in **Section 3.10**.

Property Values

During the public scoping period for this EIS, several commentors were concerned with what potential effects of approving the mine expansion would have on property values in the Crow Creek area. In subsequent discussions, Simplot employees expressed concern with what potential effects of not approving the mine expansion would have on property values in the Afton area, where the majority of Simplot employees live.

Because the government is not purchasing, transferring, or patenting any land for this Project, no official land appraisal is required. Property values throughout the area of interest have generally been increasing steadily over the last decade or more.

Characteristics/amenities that influence property values are subjective, since they ultimately rely on the personal preference of the purchaser and the seller; these may include: noise (**Section 3.2**), air quality (**Section 3.2**), water resources (**Section 3.3**), scenic values (**Section 3.12**), and access and traffic (**Section 3.15**). Proximity to commerce and industry also reflect on the perceived quality of life and therefore influence property value. Actions that diminish the desired characteristics/amenities such as added noise, traffic, visual impacts, and air/water pollution can have a negative effect on property values. Actions that increase characteristics/amenities, such as providing jobs and improving accessibility, can have a positive effect on property values.

Characteristics/amenities that are generally considered to make the Crow Creek area desirable include scenic values, peace and quiet (rural atmosphere), Crow Creek frontage, access to the CNF, and outdoor recreational opportunities (hiking, hunting, fishing, etc). Factors that may have a subjective effect on Crow Creek property values include: noise and visual impacts from nearby mining activities (Alternatives 2 and 3), direct and indirect effects of added traffic on the Crow Creek road (Alternative 7), potential effects of water pollution on fisheries in Crow Creek and its tributaries, and changes to current non-motorized access from the Crow Creek area into the CNF (primarily Panel F and Alternatives 2, 3, and 6). These effects are described in **Section 4.16**.

Heritage Values

Heritage resources include archaeological and historic sites and properties as well as historic livestock trailing and ranching. These are described in **Sections 3.9**, **3.13,** and **3.14**.

3.17 Environmental Justice

Environmental Justice is the pursuit of equal justice and equal protection for all people under the environmental statutes and regulations. It includes an assurance that some communities are not unjustly exposed to high and adverse environmental impacts. The requirements of Executive Order (EO) 12898 direct agencies to "analyze the environmental effects, including human health, economic and social effects of federal actions, including effects on minority communities and low income communities, when such analysis is required by NEPA". The definition of Minority communities includes American Indians.

EO 12898 directs agencies to consider patterns of subsistence hunting or fishing when a federal action may affect fish, vegetation, or wildlife, since that action may then also affect subsistence patterns of consumption and indicate the potential for disproportionately high and adverse human health or environmental affects on low-income populations, minority populations, or Indian tribes. Risks associated with the consumption of water, fish, wildlife, and other natural resources possibly impacted by the Project must be analyzed to determine human health or environmental affects.

The communities in closest proximity to the Smoky Canyon Mine include Afton and Fairview, Wyoming, and a loose community of ranchers along Crow Creek Road. In general, the area is rural. USFS (2003b) notes: "few minorities reside within the Study Area, and no communities are considered low income. While there are individual households that are either minority or low-income, the communities as a whole are not." Also, see Social and Economic Resources, **Section 3.16**.

Members of the Shoshone-Bannock Tribe, based in Fort Hall, Idaho, have Treaty Rights (Fort Bridger Treaty of 1868) to utilize federal lands in the Study Area for hunting, fishing, and gathering, subject to provisions of the Endangered Species Act. The Shoshone-Bannock Tribes represent both a population (readily identifiable collection of persons) and a community (readily identifiable social group who reside in a specific locality, share government, and have a common cultural and historical heritage) that could be affected under Environmental Justice. Consultation with the Shoshone-Bannock Tribal Council is being conducted for this Project (See **Section 3.14**). According to the Shoshone-Bannock, the Tribes currently utilize the Project Area on a regular basis to exercise their Treaty Rights including hunting, fishing, gathering, and ceremonial or traditional activities.

Smoky Canyon Mine
Panels F & G Draft EIS

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Chapter 4
Environmental Consequences

This chapter discusses anticipated direct and indirect impacts of the Proposed Action, alternate mining and transportation alternatives, and the No Action Alternative. This chapter also describes the Irreversible and Irretrievable Commitment of Resources and the Residual Impacts from the Proposed Action and alternatives.

Impacts are described in terms of context (site-specific, local, or regional effects), duration (short- or long-term), and intensity (negligible, minor, moderate, or major). The thresholds of change for the intensity of an impact are defined as follows.

Negligible - the impact is at the lowest levels of detection
Minor - the impact is slight, but detectable
Moderate - the impact is readily apparent
Major - the impact is a severe or adverse impact or of exceptional benefit

4.1 Geology, Minerals, and Topography

Issue:
Scoping did not identify any issues related to geology, minerals or topography.

4.1.1 Direct and Indirect Impacts

The primary indicators for geology, minerals, and paleontology are the total bank cubic yards of ore and overburden mined. The primary indicators for topography are acres of original topography disturbed and lengths and heights of highwalls and road cuts remaining after reclamation is completed.

4.1.1.1 Proposed Action

Geology and Mineral Resources
<u>Panel F, Including Lease Modifications</u>
Under the Proposed Action, geology and mineral resources for Panel F would be directly affected by the removal of phosphate ore and overburden. This would be a long-term, major, local impact on these resources. All of the ore would be concentrated at the existing Smoky Canyon mill facilities before being transported by existing pipeline to Pocatello, Idaho for fertilizer production. The phosphate resources produced under the Proposed Action would be available to meet regional and national requirements for this commodity.

Operational practices have been developed to address pit wall and road cut stability. The Smoky Canyon Mine has over 20 years of experience with constructing stable cut and fill slopes. Reclamation of inactive overburden fills to stable slopes would be performed concurrently with mining. Pit backfilling would bury most of the excavated pit highwalls, eliminating the stability issue for these cuts. The remaining exposed highwalls are generally expected to remain in a stable condition, and localized instability of these cuts would be a minor problem.

Effects to paleontological resources could occur from the disturbance of the ore and overburden during the mining of Panels F and G and the construction of the haul/access roads. Rock units disturbed would be in the Dinwoody formation, various members of the Phosphoria formation, Wells formation, and alluvial or colluvial material. Invertebrate fossils in the geologic units that would be disturbed are not restricted only to the Smoky Canyon area and are likely to be found throughout the outcrop area of these formations in southeastern Idaho. Any vertebrate fossils encountered would be managed as described in **Section 2.5**. This is expected to present a negligible impact.

Weathering of overburden shales could lead to increased mobility of certain COPCs that are contained in the overburden rock. As described in **Section 3.1**, Acid Base Accounting data for both Panels F and G were similar and indicated that overburden would not present a significant risk of Acid Rock Drainage. COPCs that are flushed from the overburden during weathering are available to be transported from the overburden by surface runoff water and/or infiltration. The environmental effects from this flushing of the overburden are described in **Section 4.3**.

<u>Panel F Haul/Access Road</u>

The Panel F haul/access road would encounter some phosphate ore in its southern end within the mine panel. This, plus the elevation of the road where it enters the proposed mine panel, would enable the removal of ore and overburden from the lower portions of Pit 1 in Panel F that would not be available if access to the pit were from a higher elevation. This would enable increased mineral resource recovery from Panel F.

As the volume of rock affected by road cuts along the haul road would be minimized by the design and are relatively insignificant compared to the volume of rock disturbed by the open pit mining, impacts to paleontological resources are considered to be negligible.

<u>Panel G</u>

Under the Proposed Action, geology and mineral resources for Panel G would be directly affected by the removal of phosphate ore and overburden. This ore removed from the federal phosphate lease would be made available for conversion to fertilizer products that meet the regional and national demands. This would be a long-term, major, local impact on these resources.

As in Panel F, with the environmental protection measures incorporated in the Proposed Action, the impact to paleontological resources from this mining is considered to be negligible.

<u>Panel G West Haul Access Road</u>

The Panel G West Haul/Access road would encounter very small amounts of phosphate ore during its construction. Accommodations for the value of this ore would be made between Simplot and the underlying lease holders where this ore is removed during road construction.

For the same reasons as the Panel F Haul/Access Road, impacts to paleontological resources from this haul/access are considered to be negligible.

<u>Power line Between Panels F and G</u>

The Panel F to G power line construction would only disturb three acres of ground surface outside of the mine panel disturbance areas. This construction would have a negligible effect on ore and paleontological resources.

Topography

Existing topography would be affected under the Proposed Action by the removal of the ore and relocation of the overburden. **Figure 2.4-1** shows the proposed mine plan, including pits and overburden disposal facilities. **Table 2.4-5** identifies the acreage that would be disturbed and reclaimed as part of the Proposed Action. A total of 1,340 acres of existing topography would be modified by the disturbance required to mine Panels F and G, including the haul/access roads and topsoil stockpiles. Approximately 89 percent of the overburden would be placed as pit backfill in Panels F and G, reducing the topographic impacts of the open pits. Final reclamation topography for the Proposed Action is shown in **Figures 2.4-3** and **2.4-4**. Final reclaimed configurations for Panels F and G would mimic the pre-mining landforms and slope aspects.

<u>Panel F, Including Lease Modifications</u>

Developing the Panel F open pits and the external overburden fill would result in modifying 473 acres of existing topography (not including the roads and other categories in **Table 2.4-5**). A 29-acre open pit in Panel E, currently permitted to be left as a permanent open pit disturbance, would also be backfilled with Panel F overburden to a configuration that would blend with the surrounding reclamation contours (**Figure 2.4-3**).

Panel F would be backfilled to slopes ranging from 8h:1v to 2.5h:1v that blend with adjacent natural terrain except for a 38-acre portion of Pit 4 that would be left as an open pit (**Figure 2.4-4**). This open pit would contain a footwall sloping west at about 2.3h:1v and two exposed highwalls up to 250 feet high and up to 2,600 feet long. The remaining highwalls would have overall slopes of approximately 49 degrees. Impacts to topography from Panel F are considered to be major for the mining period and moderate where reclamation would blend with adjacent terrain. The remaining open Pit 4 would be a permanent, major impact on local topography. The backfilling and recontouring of the 29-acre Pit E-0 would be a major beneficial effect on the local topography.

<u>Panel F Haul/Access Road</u>

A typical cross section of the Proposed Action, haul/access roads is shown in **Figure 2.4-2**. Cut slopes would be up to 1h:1v, depending on the material type exposed in the slope. More resistant rock like sandstone and limestone would have steeper slopes than shale or alluvium. Fill slopes would be at the angle of repose for earth material, 1.5h:1v.

During reclamation activities, the road fills would be pulled up with excavation equipment and piled against the cut slopes to achieve approximate pre-mining topography. In areas with extremely steep natural slopes, the height of the cut slopes would be more than what can be fully backfilled, leaving exposed cuts above the reclaimed slopes in certain areas. There is no way to practically and safely reduce the remaining cuts, so they would be left unreclaimed. Impacts to topography would be moderate during operations and minor when reclamation results in slopes that blend with adjacent natural terrain. Remaining road cuts would be a moderate, permanent impact to topography.

The total topographic disturbance along the Panel F Haul/Access Road is 66.5 acres, of which approximately 4 acres would not be reclaimed (**Figure 2.4-4**). The maximum road corridor width of about 750 feet would occur near the end of the road where it would split into two levels as it entered the north end of Panel F.

Panel G

Developing the Panel G open pit and the external overburden fills would result in modifying 466 acres of existing topography. These Panel G disturbances would be reclaimed to slopes of 3h:1v that blend with adjacent natural terrain except for a 8-acre highwall 2,600 feet long and up to 250 feet high along the west margin of the Panel G pit (**Figure 2.4-4**). The remaining highwall would have an overall slope of approximately 49 degrees. Impacts to topography from the Panel G are considered to be major for the mining period and moderate when reclamation would blend most of the regraded area with the adjacent terrain.

Panel G West Haul/Access Road

The total topographic disturbance along the Panel G West Haul/Access Road is 217 acres. The portion of the road corridor that would be built through the South Fork Deer Creek canyon would have road cuts up to 230 feet high and a disturbed corridor width of up to 350 feet. The balance of the road would have much lower road cuts and corridor widths from about 200 to 350 feet. Reclamation of this road would be affected by its conversion to a future Forest Service (FS) road, which would replace the existing FS road in South Fork Deer Creek Canyon (FR 146) and from the west mouth of this canyon to the summit between Deer Creek and Diamond Creek (FR 1102) (**Figure 2.4-4**). The existing FS road in these areas would be abandoned and reclaimed. The amount of the haul/access road that would not be reclaimed would be approximately 21 acres, much of which is due to the conversion of about 4 miles of the road to FS public access. Assuming the existing FS road corridor that would be abandoned and reclaimed is approximately 12 feet wide; approximately 5.8 acres of this existing disturbance would be reclaimed. Impacts to topography from the Panel G West Haul/Access Road would be moderate during operations and minor when reclamation is completed. Remaining road cuts would be a moderate, permanent impact to topography.

Power line Between Panels F and G

The Panel F to G power line construction would only disturb three acres of ground surface outside of the mine panel disturbance areas. This construction would have a negligible effect on topographic resources.

4.1.1.2 Mining Alternatives

Alternative A incorporates a reduction in the area available to be mined. Alternatives B through F involve mitigation measures designed to decrease the overall environmental impacts of the mining Project. They were formulated, based on public and agency concerns, to either decrease the area of disturbance of the Project or to decrease the exposure of seleniferous material to the natural post-mining leaching-release processes. Alternatives B through F all involve extra implementation costs to the proponent. In most cases, these costs are significant. Typically, mine pit design – size and shape – is a function of the recovered value of a unit of ore versus the cost to mine that unit of ore. In the case of a dipping, strataform orebody such as a phosphate deposit, the depth of a pit is determined by the amount of overburden a company can economically remove. The removal of overburden is a cost. As phosphate is mined deeper, the cost to mine a unit of ore increases incrementally.

If the Agencies choose an alternative to the Proposed Action that increases costs to mine, it is likely that Simplot would mine a shallower, smaller pit to compensate for the increase in costs. They would remove less overburden, to decrease the cost, and thus remove less ore. This action by Simplot would result in less ore recovery. An economic analysis for this EIS by the

Agencies and their contractor has estimated the potential reduction in recovery of ore for each mining alternative. Those potential reductions in recovery will be discussed here as they pertain to geologic impacts and will be discussed again in the Socioeconomic section (**Section 4.16**).

The amount that pit size would be decreased is uncertain. For this reason, for resources other than Geology and Socioeconomics, the maximum pit sizes will be used in the impact analysis.

Alternative A – No South and/or North Panel F Lease Modifications

<u>No Panel F South Lease Modification</u>

Not mining the South Lease Modification would reduce the ore recovery for the entire Proposed Action by about 10.7 percent and would reduce the individual Panel F ore recovery by 22 percent. The reduction in ore recovery that could result from disallowing the South Lease Modification could shorten the mine life of Panel F by about 1.8 years. Thus, mining in Panel G would need to be moved up from its original schedule. After completion of mining and reclamation of the remaining portion of Panel F, it is unlikely that the tons of phosphate ore not mined from the lease modification area would be economically recovered in the future. At the end of the mine life and reclamation there would be no local mining infrastructure remaining. The unleased phosphate ore within the South Lease Modification would be too small to capitalize a stand-alone, future mining operation. It would result in a loss to the public of the resource in the lease modification area.

Potential impacts to paleontological resources would be slightly less for this portion of Alternative A than the Proposed Action because of the smaller volume of rock being mined. The net impacts would still be negligible.

Alternative A would result in a total Panel F pit and overburden fill disturbance area of about 333 acres, approximately 140 acres less than the Panel F pit and overburden fill disturbance in the Proposed Action (**Figure 2.6-1**). The final backfilled topography for this alternative is shown in **Figure 2.6-2**. Final contours would generally mimic pre-mining landforms and slope aspects with final slopes that blend with adjacent terrain.

If the South Lease Modification were not approved, there would be no disturbance to the Deer Creek topographic drainage area from Panel F under this alternative, which would eliminate the 138-acre expansion of Pit 3 extending approximately 3,000 feet southwest down the slope into the Deer Creek drainage area that is included in the Proposed Action, South Lease Modification.

All portions of the Panel F footwall would be backfilled under this alternative. The remaining 9-acre highwall would be approximately 2,400 feet long and up to 300 feet high and would be located approximately 1,900 feet north of the remaining Proposed Action highwall. The unreclaimed Panel F pit disturbance under this alternative would be reduced from 38 acres in the Proposed Action to 9 acres under this alternative, a reduction of 29 acres. Impacts to topography from Panel F under this alternative are considered to be major for the mining period and moderate when reclamation would blend most of the regraded area with adjacent terrain.

The topographic impacts from Panel F Haul/Access Road would be the same in this alternative as the Proposed Action.

The topographic impacts from Panel G and the Panel G West Haul/Access Road would be the same in this alternative as for the Proposed Action.

No Panel F North Lease Modification

Not mining the North Lease Modification would result in leaving approximately 3 percent of the mineral resource for the entire Proposed Action in place and 6 percent of the mineral resource for Panel F itself. After completion of mining and reclamation of the remaining portion of Panel F, it is unlikely that the tons of phosphate ore left in the lease modification would be economically recovered in the future.

The reduction in ore recovery that could result from disallowing the North Lease Modification could shorten the mine life of Panel F by about 0.5 years. Thus, mining in Panel G would need to be moved up from its original schedule.

Potential impacts to paleontological resources would be slightly less for this portion of Alternative A than the Proposed Action because of the smaller volume of rock being mined. The net impacts would still be negligible.

If the North Lease Modification were not approved, the topographic disturbance from the north end of Panel F would be approximately 2 acres less and not extend as far down the south slope of South Fork Sage Creek Canyon as the Proposed Action. Impacts to topography from Panel F under this alternative are considered to be major for the mining period and moderate when reclamation would blend most of the regraded area with adjacent terrain.

The topographic impacts from Panel G and the Panel G West Haul/Access Road would be the same in this alternative as the Proposed Action.

Alternative B – No External Seleniferous Overburden Fills

This alternative would incorporate all the components of the Proposed Action but would require Simplot to replace all seleniferous shale and mudstone overburden as backfill into the mine pits. There would be no seleniferous overburden permanently left in the Panel F External Overburden Fill (38 acres) and the Panel G East External Overburden Fill (64 acres). Overburden would be selectively handled and placed as needed in the external fills during mining, but the seleniferous overburden, 4.7 MM BCY, would be rehandled at the end of mining and placed back in the pits. This would reduce the potential area of seleniferous overburden fills (pits and external) from 819 to 725 acres.

If this alternative were selected, the cost for mining the panels would be increased by the double handling of a large amount of overburden. Because mine costs would be greater than in the Proposed Action, Simplot could potentially decide to redesign the mine pits to reduce stripping ratios and decrease mining costs to offset the additional cost. This would reduce the size of the open pits and have the effect of reducing the amount of phosphate ore extracted from the mining operations, shortening the life of the mine. Simplot may also need to begin mining operations at another location in southeastern Idaho earlier than planned, with a higher disturbance area to replace the reserves lost under this alternative. The detailed mine planning for the redesigned mine pits at Panels F and G, as well as the design for the potential new mine at another location, is beyond the scope of this EIS. The reduction in ore recovery that could result from this alternative is estimated to be 19.3 percent of the total mining reserves in the Proposed Action mine plans for both panels, which could shorten the overall mine life by about 3.2 years.

The potential impact on paleontological resources would be negligible.

The initial total disturbed area of native topography would remain the same for this alternative as the Proposed Action because all the external overburden fill areas would still be required for temporary storage of seleniferous overburden. The Panel F surface disturbance footprint would stay the same as the Proposed Action under this alternative. The final Panel G reclamation configuration would be different than the Proposed Action (**Figure 2.6-3**). The east external overburden fill would be reduced in height during reclamation, and the 11-acre extension of the reclaimed overburden fill east of the lease boundary would be eliminated.

The top and bottom of the Panel G pit backfill would receive more overburden, which would eliminate the remaining highwall along the west side of the pit area compared to the Proposed Action. Impacts to topography from the mining under this alternative are considered to be major for the mining period and moderate when reclamation would blend most of the regraded areas with adjacent terrain.

Alternative C – No External Overburden Fills at All

This alternative would incorporate all the components of the Proposed Action but would require Simplot to replace all overburden as backfill in the mine pits with no remaining external overburden fills following reclamation. Some overburden would be placed in the external fills during mining, but all 10 MM LCY of this would have to be rehandled at the end of mining and placed back in the pit areas. This would reduce the total area of seleniferous overburden from 819 to 763 acres.

The concern described in Alternative B for loss of phosphate mining reserves at Panels F and G, shortening the mine life, and opening up another phosphate mine sooner than planned would be exacerbated with this alternative. The reduction in ore recovery that could result from this alternative is estimated to be 46 percent of the total mining reserves in the Proposed Action mine plans for both panels, which could shorten the overall mine life by about 7.7 years.

Panel G would be affected more than Panel F in this regard. The reduction in ore reserves for Panel G would be approximately 75 percent under this alternative. Such a drastic reduction in reserves and mine life for that panel could potentially prevent it from being mined.

The potential impact on paleontological resources would be negligible.

The initial total disturbed area of native topography would remain the same for this alternative as the Proposed Action and Alternative B because all the external overburden fill areas would still be required for temporary storage of seleniferous overburden. The final topography and remaining open pit and associated highwalls in Panel F would be different under this alternative compared to the Proposed Action or Alternative B (**Figure 2.6-4**). The area that contained the 38-acre external overburden fill in the northern portion of Panel F would be restored to approximate original configuration during final reclamation. The portion of Pit 4 with its associated highwalls that would be left unreclaimed under the Proposed Action and Alternative B would be completely backfilled under this alternative. The final Panel G reclamation configuration would also be different than the Proposed Action or Alternative B. The east and south external overburden fills would be eliminated during reclamation, and the top and bottom of the pit backfill would receive more overburden than under Alternative B. Like in Alternative B, there would be no remaining highwall in Panel G after reclamation. Impacts to topography under this alternative are considered to be major for the mining period and minor when reclamation would blend most of the regraded areas with adjacent terrain.

Alternative D – Infiltration Barriers on Overburden Fills
This alternative would involve mining Dinwoody formation to provide construction material for an infiltration barrier that would be constructed over all areas of seleniferous overburden in pit backfills and external overburden fills.

The concern described in Alternatives A, B, and C for loss of phosphate mining reserves at Panels F and G, shortening the mine life, and opening up another phosphate mine sooner than planned would also be relevant to this alternative. If this alternative were selected by the Agencies, Simplot might decide to redesign the mine pits to reduce overburden stripping ratios and decrease mining costs to offset the additional cost of constructing an infiltration barrier over all seleniferous overburden fills. This would reduce the size of the open pits and have the effect of reducing the amount of phosphate ore extracted from the mining operations, shortening the life of the mine. Decreasing the size of the pits would also reduce the area requiring the infiltration barrier. The detailed mine planning for the redesigned mine pits at Panels F and G, as well as the design for the new mine at another location, is beyond the scope of this EIS. The reduction in ore recovery that could result from this alternative is estimated to be 22 percent of the total mining reserves in the Proposed Action mine plans for both panels, which could shorten the overall mine life by about 3.7 years.

The potential impact on paleontological resources would be negligible.

The initial total area of disturbed topography under this alternative for Panel F would be as much as 104 acres more than the Proposed Action. The disturbance area for Panel G would be as much as 33 acres more than the Proposed Action. All disturbances related to obtaining the Dinwoody material would be reclaimed. Impacts to topography from the mine panels under this alternative are considered to be major for the mining period and moderate when reclamation would blend most of the regraded area with adjacent terrain.

Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road
This alternative would have the same impact as the Proposed Action haul/access roads on the geology, minerals, paleontology, or topography of the Project Area.

Alternative F – Electrical Generators at Panel G
The concern described in Alternatives A, B, C and D for loss of phosphate mining reserves at Panels F and G, shortening the mine life, and opening up another phosphate mine sooner than planned would also be relevant to this alternative. This is because although the capital cost of the generators is similar to a power line, the operating costs are much higher. If this alternative were selected by the Agencies, Simplot might decide to redesign the mine pits to reduce overburden stripping ratios and decrease mining costs to offset the additional cost of operating the generators. This would reduce the size of the open pits and have the effect of reducing the amount of phosphate ore extracted from the mining operations and shortening the life of the mine. The detailed mine planning for the redesigned mine pits at Panels F and G, as well as the design for the new mine at another location, is beyond the scope of this EIS. The reduction in ore recovery that could result from this alternative is estimated to be 38 percent of the total mining reserves in the Proposed Action mine plans for both panels, which could shorten the overall mine life by about 6.5 years.

The impacts to geology, topography, and paleontology from this alternative would be the same as the Proposed Action.

4.1.1.3 Transportation Alternatives

The various transportation alternatives would have negligible impacts on mineral resources and little incremental effect on the geology or paleontological resources of the Project Area because they would disturb relatively small volumes of earth material compared to the volumes of mined material (**Figure 2.6-8a**).

Each of the transportation alternatives would have their own effects on topography due to cuts and fills imposed on the natural terrain along each road corridor. A typical cross section of these access haul roads is shown in **Figure 2.4-2**. Cut slopes would be up to 1h:1v, depending on the material type exposed in the slope. More resistant rock, like sandstone and limestone, could have steeper slopes than soil or shale. Fill slopes would be at the angle of repose for earth material, approximately 1.5h:1v.

The disturbance corridors for the various Proposed Action and alternative roads would have different initial disturbance widths, fill heights, and cut heights. The maximum values for these dimensions are summarized in **Table 4.1-1**.

TABLE 4.1-1 TRANSPORTATION ALTERNATIVES APPROXIMATE CROSS SECTION DIMENSIONS

#	ALTERNATIVE	MAX CORRIDOR WIDTH (FT)	MAX FILL HEIGHT (FT)	MAX CUT HEIGHT (FT)
	Proposed Action Panel F Haul/Access Road	750	130	130
	Proposed Action Panel G Haul/Access Road	350	150	230
1	Alternate Panel F Haul/Access Road	300	80	200
2	East Haul/Access Road	600	220	140
3	Modified East Haul/Access Road	600	220	250
4	Middle Haul/Access Road	550	200	370
5	Alternate Panel G West Haul/Access Road	350	150	260
6	Conveyor from Panel G to Mill	300	130	50
7	Crow Creek/Wells Canyon Access Road	200	45	60
8	Middle Access Road	450	160	130

During reclamation activities, the road fills would be pulled up with excavation equipment and piled against the cut slopes to achieve approximate pre-mining topography. In areas with extremely steep natural slopes, the height of the cut slopes would be more than can be fully backfilled, leaving exposed cuts above the reclaimed slopes in certain areas. In some areas of steep natural slopes, the lengths of the fill slopes would preclude reaching the bottoms of the slopes to pull the material up. The remaining toes of the fill slopes would be seeded but not regraded and topsoiled before seeding. These haul/access road cut and fill slopes that would not be regraded are delineated on **Figure 2.6-8b**. The height of the cut slopes that would remain after reclamation range from about 20 to slightly over 200 feet high. The relative acres of the different haul/access road alternatives are shown in **Table 4.1-2**. Impacts to topography from the alternative transportation corridors would be moderate during operations and minor when reclamation results in slopes that blend with adjacent natural terrain. Remaining road cuts would be a moderate, permanent impact to topography.

TABLE 4.1-2 TRANSPORTATION ALTERNATIVES INITIAL AND FINAL TOPOGRAPHIC DISTURBANCE AREAS

#	ALTERNATIVE	TOTAL DISTURBANCE (ACRES)	AREA NOT REGRADED (ACRES)
	Proposed Action Panel F Haul/Access Road	67	4
	Proposed Action Panel G Haul/Access Road	217	21
1	Alternate Panel F Haul/Access Road	46	5
2	East Haul/Access Road	216	7
3	Modified East Haul/Access Road	276	21
4	Middle Haul/Access Road	192	34
5	Alternate Panel G West Haul/Access Road	226	28
6	Conveyor from Panel G to Mill	61	0
7	Crow Creek/Wells Canyon Access Road	114	55
8	Middle Access Road	99	0

The following narrative utilizes and discusses the values presented in the two preceding tables.

Alternative 1 – Alternate Panel F Haul/Access Road
The Alternate Panel F Haul/Access Road would disturb approximately 21 acres less than the Proposed Action Panel F Haul/Access Road. Its maximum disturbance corridor width would be less than the Proposed Action road, and the location of this disturbance would be further from South Fork Sage Creek than the Proposed Action. The maximum height of the remaining road cuts for this alternative would be less than the Proposed Action (**Figure 2.6.8b**).

Alternative 2 – East Haul/Access Road
The East Haul/Access Road would initially disturb approximately the same acreage as the Proposed Action Panel G West Haul/Access Road, but the maximum cut heights would be less than the Proposed Action Panel G West Haul/Access Road, which would result in a lower percentage of unreclaimed area compared to the Proposed Action. There would be one road fill along the East Haul/Access Road in the upper Quakie Hollow drainage that would have a bottom width of 600 feet, while the majority of the road disturbance would be 200 to 300 feet wide for this alternative.

Alternative 3 – Modified East Haul/Access Road
The Modified East Haul/Access Road essentially follows the same corridor as the East Haul/Access Road except for about three miles where the modified road would be built further up Deer Creek Canyon. It would disturb 59 acres more than the Proposed Action Panel G West Haul/Access Road. This section in Deer Creek Canyon would have road fills up to 170 feet wide and would incorporate about 1.6 miles of road cuts in rock with maximum initial cut heights of 250 feet, which would triple the unreclaimed acreage compared to the East Haul/Access Road.

Alternative 4 – Middle Haul/Access Road
The Middle Haul/Access Road would be built through steep, mountainous terrain resulting in a maximum corridor disturbance of about 550 feet and extensive reaches of corridor widths of 300 feet or more. It would disturb 25 fewer acres than the Proposed Action Panel G West Haul/Access Road. The road cuts in the Deer Creek Canyon area would be up to 370 feet high.

Almost all the road cuts in the main stem of Deer Creek drainage would be reclaimed with some exposed cut showing. Approximately 1.2 miles of road length in the North Fork Deer Creek drainage would be reclaimed with exposed road cuts showing.

Alternative 5 – Alternate Panel G West Haul/Access Road

The Alternate Panel G West Haul/Access Road would follow the same alignment as the Proposed Action Panel G West Haul/Access Road until a point south of Sage Meadows where the road would veer south about 0.4 mile to connect with the same alignment as the Middle Haul/Access Road. It would disturb 9 more acres than the Proposed Action Panel G West Haul/Access Road. The 0.4 mile connection portion of the road would have ¼ mile of road cuts that would not be reclaimed. The rest of this road alignment would have the same topographic effects as the Proposed Action Panel G West Haul/Access Road west and south from the connection road to Panel G. It would have the same topographic effects as the Middle Haul/Access Road from the connection road east and north to Panel F.

Alternative 6 – Conveyor from Panel G to Mill

The combined conveyor and maintenance road would be about 50 feet wide throughout the conveyor corridor length. It would disturb 156 fewer acres than the Proposed Action Panel G West Haul/Access Road. The operating characteristics of the conveyor allow it to conform closely to the native topography with minimal cuts and fills except where crossing some ephemeral drainages where most fills would be less than 200 feet wide, and there would be one 300-foot wide fill immediately northeast of Panel G. There would be no unreclaimed acreage for this alternative and no exposed cuts following reclamation.

Alternative 7 – Crow Creek/Wells Canyon Access Road

The Crow Creek Road would be rebuilt to a travel width of 30 feet, which would require building some new road cuts and fill slopes. Most of these road fills and cuts would be less than 20 feet high with one short road cut 60 feet high. All of these slopes would be reseeded upon completion of the road construction. The maximum road corridor disturbance width for this alternative would be approximately 200 feet located in the Wells Canyon section. Maximum cut and fill heights along the Wells Canyon access road would be approximately 60 feet. Again, all road cuts and fills would be reseeded upon completion of construction of this road. Both the Crow Creek and new Wells Canyon roads would remain following cessation of mining operations in Panel G. The existing Wells Canyon road is built close to or within the Wells Canyon stream channel, and this road would be abandoned and reclaimed, and the new Wells Canyon Road would be reclaimed back to a 20-24 foot width. Assuming an average road corridor width of about 12 feet for the existing 2-mile long Wells Canyon Road to be abandoned, the total acreage of existing disturbance that would be reclaimed is about 3 acres.

Alternative 8 – Middle Access Road

The Middle Access Road would follow the same alignment as the Middle Haul/Access Road for most of its length, and building this road would face the same topographic challenges. The maximum road corridor disturbance width would be about 450 feet where the road would cross Deer Creek. The maximum road fill height (160 feet) for this road would also occur at this stream crossing. The maximum road cut for this road would be about 130 feet, which would occur in the upper North Fork Deer Creek drainage. The smaller road width would allow all road cuts and fills to ultimately be reclaimed.

4.1.1.4 No Action Alternative

Under the No Action Alternative, Simplot would not be allowed to proceed with mining of ore in Panels F and G until mining and reclamation plans acceptable to the BLM and USFS were developed and approved. Under the No Action Alternative, there would be no direct impacts to geologic, mineral, and topographic resources of the Project Area, because the phosphate ore and overburden that were proposed for removal would not be mined. This ore would be available for mining in the future.

The No Action Alternative would not result in any alteration to topography or paleontological resources at Panels F and G until a mining and reclamation plan is approved. It would result in the 29-acre open pit in Panel E being left open, which is currently approved as part of the Panel E mine plan.

4.1.2 Mitigation Measures

Project design features, BMPs, and the proposed Reclamation Plan are elements of the Proposed Action designed to reduce environmental impacts to topography. Additional mitigation measures are not deemed necessary.

4.1.3 Unavoidable (Residual) Adverse Impacts

Unreclaimed pit highwalls and road cuts and reclaimed overburden fills would present localized, permanent modifications of topography.

4.1.4 Relationship of Short-term Uses and Long-term Productivity

The local short-term use of the mineral resources and topography for phosphate mining would result in ongoing employment and other economic benefits to the local and regional economies affected by the Smoky Canyon Mine and the Don Plant in Pocatello. It would also provide fertilizer for the agricultural areas supplied by the Don Plant. Backfilling the mine pits with overburden would decrease the potential for future open pit production of the remaining, local phosphate mineral resource, but this is also limited by the lease boundaries.

4.1.5 Irreversible and Irretrievable Commitment of Resources

Phosphate ore would be removed from the Smoky Canyon ore reserves, and this would be an irreversible and irretrievable commitment of mineral resources. This would be a relatively minor loss compared to total phosphate reserves available for future use in southeast Idaho.

Impacts to the local natural topographic conditions under the Proposed Action and the Alternatives would be irreversible and irretrievable. Reclamation activities would restore disturbed sites to topographic contours that mimic pre-mining conditions and permanently reduce the impacts to local topography. Disturbed areas that are not regraded during reclamation would have permanent impacts to topography.

Any loss of paleontological resources that occurred under the Proposed Action or mining alternatives would be negligible and would be considered irreversible and irretrievable. Any paleontological resources discovered and properly documented by the Agencies during mining would not be lost.

4.2 Air Resources and Noise

Issue (air):
The Project emissions may cause air quality effects that are different from existing operations due to relocation of mining emissions and from increased traffic on haul roads and possibly offsite access roads.

Indicators (air):
Exhaust and dust emissions generated from haul trucks and other mining equipment may impact the air quality in this area;

Change in air quality from Project emissions at Class I Areas in the vicinity of the operations with emphasis on compliance with National Ambient Air Quality Standards (NAAQS).

Issue (noise):
Noise from mine operations, mine traffic on haul roads, and traffic on access roads may affect Project Area residents.

Indicators (noise):
Estimated noise levels from mining operations; haul truck traffic related to mining, and access road traffic.

4.2.1 Air Resources – Direct and Indirect Impacts

Air emissions from the Proposed Action and alternatives are regulated by the Idaho Department of Environmental Quality (IDEQ) and U.S. EPA regulations. Smoky Canyon mine operates under an IDEQ permit issued July 6, 1983 (State of Idaho 1983). This permit addresses the mill boiler, fugitive dust control measures, haul truck speed limits, blasting and drilling dust suppression, and other air pollution control requirements.

All Federal Class I Areas are greater than 100 kilometers from the Proposed Action. Therefore, the air quality impacts to these Class I Areas do not require evaluation for regional haze, visibility and air impacts.

The majority of emissions are from fugitive (dust) and mobile equipment (tailpipe) sources. Emissions from these types of operations are controlled by fugitive dust control plans and, for vehicles, manufacturer's emission standards. Fugitive dust emission standards are based on the State Implementation Plan (SIP), adherence to IDAPA 01.01.650, and are regulated based on opacity standards.

Processing the ore at the mill produces very little particulate matter. The ore usually has moisture content greater than 15 percent and enters the wet process through a below-grade grizzly. The mill operates at an annual rate of 2.7 million tons per year. Annual emissions from the mill would remain essentially constant for the Proposed Action and alternatives, except for the No Action Alternative, where the life of the mill is potentially reduced.

Mining emissions from the ore/overburden extraction and handling would peak under the Proposed Action when both panels would be undergoing active mining.

4.2.1.1 Proposed Action

The air emissions from in-pit and transportation activities are assessed in this section. In-pit activities include drilling, excavation, loading, blasting, and grading. Transportation and dumping of overburden within the pit and external overburden fills are also included in fugitive emissions. The transportation emission assessment included emissions from tailpipes and fugitive dust along the haul/access roads and conveyor. These emission estimates were calculated assuming Simplot's adherence to the State of Idaho's IDAPA 58.01.01.651 and 799.02 for fugitive dust controls. The majority of emissions from these operations are in the form of particulate matter (PM). Emission estimates for particulate matter less than 10 microns in size (PM-10) are reported because this subset of PM is a criteria pollutant. Pollutants from the combustion of fossil fuel from mobile equipment, vehicles, and generators were also estimated. A measurable amount of criteria pollutants, such as nitrogen oxides (NOx), sulfur dioxide (SO_2), carbon monoxide (CO), and volatile organic compounds (VOCs) would be emitted during operations. The estimates of controlled emissions (including application of BMPs and state-required emission controls) presented in the following sections were prepared with standard emission factors (EPA 2003c and USAF, Report No. IERA-RS-BR-SR-2001-0010).

The air emissions would occur only during active operations and would be completely dispersed or deposited at the conclusion of operations. A large percentage of the fugitive particulate emissions generated from mining and transportation activities would settle out quickly near their point of generation. The intensity of the air emission impacts would be minor (see page 4-1 for definition) at the site-specific perspective and negligible at the local and regional perspective. This general description of the context and intensity of air emission impacts would be applicable to the Proposed Action and all action alternatives.

<u>Panel F, Including Lease Modifications</u>
Table 4.2-1 shows the air emissions estimates for Panels F and G of the Proposed Action. These emissions are totals for the entire duration of the Proposed Action. Tailpipe emissions from mining equipment operating in the pit boundaries and emissions from blasting are considered fugitive.

TABLE 4.2-1 TOTAL PROPOSED ACTION AIR EMISSIONS (TONS)

POLLUTANT	PANEL F	PANEL F HAUL/ACCESS	PANEL G	PANEL G WEST HAUL/ACCESS	TOTAL
PM-10	969	314	1,626	467	3,376
NOx	1,631	418	1,814	491	4,354
SO_2	152	38	169	45	404
CO	809	392	948	449	2,598
VOC	144	45	160	52	401
Total	3,705	1,207	4,717	1,504	11,133

These estimates of air emissions are comparable to those estimated for the current mining operations at Smoky Canyon Mine in the Final SEIS (FSEIS) for Panels B and C (BLM and USFS 2002). The EPA-approved Industrial Source Complex Short Term, Version 3 (ISCST3) model was used in 2002 to determine the ambient air impacts from mining activities at Smoky

Canyon Mine. These mining activities would be relocated further south in the Proposed Action and Alternatives. Thus, the local ambient air impacts and associated effects to air quality would be approximately the same as for the existing Smoky Canyon mining operations, only relocated further south.

Air quality impact modeling conducted for the Smoky Canyon Mine Panels B and C FSEIS indicated that particulate matter effects at 5-mile radius receptors from the operations were approximately 6 percent of the NAAQS at those locations. With the annual emission estimates being similar in annual quantity for PM, it is unlikely that the NAAQS thresholds would be approached. The same modeling indicated that Class I PSD increments were not exceeded for the annual and 24-hour averaging periods at the nearest Class I Area (Bridger Wilderness Area). Due to the proximity of the Proposed Action operations to the existing Smoky Canyon Mine operations that were evaluated in the FSEIS and the similarity in emission rates between the two, the modeling results for the FSEIS are considered applicable to the proposed Panels F and G mining operations.

<u>Panel F Haul/Access Road</u>
The Panel F Haul/Access Road emissions include emissions from the combustion of fuel from vehicles and mining equipment on the haul/access road. The dust generated from the roadways as a result of mining traffic on the haul/access road is also estimated in mobile emissions. The emissions shown in **Table 4.2-1** are for the entire duration of the Proposed Action and are based on the average distances from the middle of the active pit to the end of the new haul road. Overburden hauled to Panel E is included in these mobile emissions.

<u>Panel G</u>
Panel G mining air emissions were estimated in the same manner as for Panel F. The results of these estimates are shown in **Table 4.2-1**.

<u>Panel G West Haul/Access Road</u>
Panel G West Haul/Access Road emissions were estimated in the same manner as for the Panel F Haul/Access Road. Total emissions for the Proposed Action Panel G West Haul/Access Road are shown in **Table 4.2-1**.

<u>Power Line Between Panels F and G</u>
Air emissions from construction of the power line would consist of vehicle exhaust emissions from operation of line-bed trucks to drill the power pole holes and erect the pole structures. Small amounts of dust might be caused during drilling of the power pole holes. Helicopter engine exhaust would be produced during construction of the power line in Deer Creek Canyon. All these emissions are considered to be negligible, localized, and short-term.

4.2.1.2 Mining Alternatives

Mining Alternative A - No South and/or North Panel F Lease Modifications
Recoverable phosphate ore would be reduced by 13.7 percent, and the active disturbance area would be reduced by 140 acres for open pits and potentially another 21 acres if the Alternative Panel F Haul/Access Road were selected. These decreases affect total emissions for transfers, hauling, disturbance areas, and mobile equipment. The life of mine is estimated to be 2.3 years shorter with this alternative. Alternative A's total emission estimates from mining and implementation of the Alternative Panel F Haul/Access Road would be 8.4 percent or 931 tons less than the Proposed Action. Associated with the reduced transportation and equipment

operation duration, there would be proportional reductions in combustion emissions. This alternative would result in slightly lower air pollutant concentrations compared to the Proposed Action. **Table 4.2-2** shows the estimated emissions from Panels F and G and associated transportation components under Alternative A.

TABLE 4.2-2 ALTERNATIVE A AIR EMISSIONS (TONS)

POLLUTANT	PANEL F	ALT. PANEL F HAUL/ACCESS	PANEL G	PANEL G WEST HAUL/ACCESS	TOTAL
PM-10	725	242	1,626	467	3,060
NOx	1,369	332	1,814	491	4,006
SO_2	128	30	169	45	372
CO	679	319	948	449	2,395
VOC	121	36	160	52	369

<u>No Panel F North Lease Modification</u>
The reduction in total emissions from not mining the North Lease Modification would be 9.4 tons.

<u>No Panel F South Lease Modification</u>
The reduction in total emissions from not mining the South Lease Modification would be 922 tons.

Mining Alternative B - No External Seleniferous Overburden Fills
Alternative B would have an increase in particulate emissions due to the double handling of 4.7 MM LCY of overburden and a 6.5-month increase in reclamation time. Total emissions would increase by 1.1 percent or 124 tons over the Proposed Action during the life of mine. This would produce a negligible increase in air pollutant concentrations compared to the Proposed Action. Mobile combustion emissions increase less than a percent, collectively. **Table 4.2-3** shows the estimated emissions from both panels and associated haul/access roads under Alternative B.

TABLE 4.2-3 ALTERNATIVE B AIR EMISSIONS (TONS)

POLLUTANT	PANEL F	PANEL F HAUL/ACCESS	PANEL G	PANEL G WEST HAUL/ACCESS	TOTAL (TONS)
PM-10	980	355	1,647	479	3,461
NOx	1,634	445	1,812	491	4,382
SO_2	152	41	169	45	407
CO	810	406	948	440	2,604
VOC	145	47	159	52	403

Mining Alternative C – No External Overburden Fills at All
Alternative C would involve double handling of 10.1 MM BCY of overburden, while maintaining the same area of disturbance. Reclamation activities would extend an additional 12.5-months. Loading, unloading, and transportation of the overburden would increase the amount of PM-10 and tailpipe emissions. Total emissions would increase by 2.5 percent or 273 tons over the Proposed Action. This would produce a slight increase in air pollutant concentrations compared to the Proposed Action. **Table 4.2-4** shows the estimated emissions for both panels and associated transportation components under Alternative C.

TABLE 4.2-4 ALTERNATIVE C AIR EMISSIONS (TONS)

POLLUTANT	PANEL F	PANEL F HAUL/ACCESS	PANEL G	PANEL G WEST HAUL/ACCESS	TOTAL (TONS)
PM-10	994	389	1,661	503	3,547
NOx	1,638	471	1,819	491	4,419
SO_2	153	43	170	45	411
CO	812	418	950	440	2,620
VOC	146	50	161	52	409

Mining Alternative D – Infiltration Barriers on Overburden Fills

The significant change in Alternative D would be the mining and hauling of the Dinwoody shale to be used for the infiltration barriers. The extension of the disturbance area of Panel F and Panel G, plus the excavation, hauling, and unloading of the shale would increase fugitive and tailpipe emissions for this alternative. Total emissions would increase by 1.7 percent or 191 tons over the Proposed Action for the life of the mine. This would produce a negligible increase in air pollutant concentrations compared to the Proposed Action. **Table 4.2-5** shows the estimated emissions for both panels, all the Dinwoody borrow pits, and associated haul/access roads under Alternative D.

TABLE 4.2-5 ALTERNATIVE D AIR EMISSIONS (TONS)

POLLUTANT	PANEL F	PANEL F HAUL/ACCESS	PANEL G	PANEL G WEST HAUL/ACCESS	TOTAL (TONS)
PM-10	994	345	1,716	478	3,531
NOx	1,635	418	1,814	520	4,382
SO_2	152	38	169	48	407
CO	811	392	949	469	2,601
VOC	145	45	160	55	403

Mining Alternative E- Power Line Connection from Panel F to Panel G Along Haul/Access Road

The air emissions from building the power line along the haul/access roads would result from drilling the power pole holes along the existing haul road. The change in emissions from the Proposed Action would be negligible.

Mining Alternative F- Electrical Generators at Panel G

Electrical generators located at Panel G would be considered stationary sources of air emissions and would initiate a permit modification to the existing Smoky Canyon Mine Air Quality Permit. Emissions were estimated based on one generator operating full time for the life of Panel G mining operations. The annual NOx estimate for a single generator is 119 tons. Major source threshold levels are set at 100 tons per year; PSD permitting has a threshold of 250 tons per year. All stationary sources co-located at the facility are considered when determining major source threshold values. A reduction in active disturbance was accounted for because the 25kV power line between Panel F and Panel G would not be necessary with this alternative. **Table 4.2-6** shows the estimated emissions from Panels F and G, including the generator operation at Panel G. The total emissions would change from just fugitive and mobile to a mixture of stationary, fugitive, and mobile sources. The total emissions for this alternative would increase by 12.2 percent or 1,364 tons over the Proposed Action. The additional annual, stationary emissions for the generator operations would be: 21 tons of PM-10; 955 tons of NOx; 175 tons of SO_2; 254 tons of CO; and 25 tons of VOCs. This would produce an increase in air pollutant concentrations compared to the Proposed Action.

TABLE 4.2-6 ALTERNATIVE F AIR EMISSIONS (TONS)

POLLUTANT	PANEL F	PANEL F HAUL/ACCESS	PANEL G	PANEL G WEST HAUL/ACCESS	TOTAL
PM-10	968	263	1,647	452	3,330
NOx	1,631	418	2,769	491	5,309
SO_2	152	38	344	45	579
CO	809	393	1,202	449	2,853
VOC	144	45	185	52	426

4.2.1.3 Transportation Alternatives

Emissions estimates for transportation of ore for the Proposed Action include the combined fugitive and tailpipe emissions for both the Panel F Haul/Access Road and the Panel G West Haul/Access Road (**Table 4.2-7**). Emission estimates for the transportation alternatives also include transportation-related emissions from both mine panels (**Table 4.2-8**). Length of travel (fugitive dust and tailpipe emissions) and area of disturbance (fugitive dust) were the main factors used to estimate the effects from these alternatives. Emissions from in-pit activities are not included in these estimates. Direct comparisons can be made between the transportation alternatives in **Table 4.2-8** and the Proposed Action haul/access roads in **Table 4.2-7**.

TABLE 4.2-7 PROPOSED ACTION AIR EMISSIONS-ROADS (TONS)

POLLUTANT	PANEL F HAUL/ACCESS	PANEL G WEST HAUL/ACCESS	TOTAL
PM-10	314	467	781
NOx	418	491	909
SO_2	38	45	83
CO	392	449	841
VOC	45	52	97
Total			2,711

Alternative 1 – Alternate Panel F Haul/Access Road

The Alternate Panel F Haul/Access Road would have a slight decrease (0.3 miles) in distance traveled, 21 acres less disturbance and 1.2 MM tons less of recoverable ore (North Lease Modification). These decreases would result in a 9.1 percent (247 ton) decrease in emissions compared to the Proposed Action Panel F Haul/Access Road. This would produce a minor decrease in air pollutant concentrations compared to the Proposed Action.

TABLE 4.2-8 TRANSPORTATION ALTERNATIVE EMISSIONS (TONS)

POLLUTANT	ALT.1	ALT.2	ALT.3	ALT.4	ALT.5	ALT.6	ALT.7 (ACCESS ROAD)	ALT.8 (ACCESS ROAD)
PM-10	710	765	807	723	790	452	24	9
NOx	823	901	918	885	911	565	7	3
SO_2	75	82	84	81	83	52	0.3	0.1
CO	768	823	863	782	847	584	274	106
VOC	88	96	99	94	98	62	9	4
Total	2,464	2,667	2,771	2,565	2,729	1,716	315	123

Alternative 2 – East Haul/Access Road
The East Haul/Access Road would be less in distance (0.4 miles) than the Panel G West Haul/Access Road. Total disturbance outside the pit area is estimated to be 216 acres compared to 217 acres for the Proposed Action Panel G West Haul/Access Road. The small decrease in active disturbance and decrease in travel distance would result in a 1.6 percent (44 tons) decrease in emissions compared to the Proposed Action (see **Table 4.2-8**). This would produce a negligible decrease in air pollutant concentrations compared to the Proposed Action. Because this road is closer to Crow Creek than the other transportation alternatives, air emission effects to the Crow Creek area would be greater than for the Proposed Action and other transportation alternatives.

Alternative 3 – Modified East Haul/Access Road
The Modified East Haul/Access Road would result in a 0.6-mile increase in road length compared to Proposed Action West Haul/Access Road. An increase in disturbance area of approximately 60 acres would also increase the amount of airborne PM-10. An increase of 2.2 percent (60 tons) in total emissions over the Proposed Action is estimated (see **Table 4.2-8**). Fugitive dust impacts from the Modified East Haul/Access Road to residents along Crow Creek Road would be similar to Alternative 2. Combustion emissions would increase by less than 1 percent. This alternative would result in approximately the same air pollutant concentrations as the Proposed Action.

Alternative 4 – Middle Haul/Access Road
The Middle Haul/Access Road would be 6.4 miles long compared to 7.8 miles for the Proposed Action Panel G West Haul/Access Road. The total acres disturbed are estimated to be 192 compared to 217 for the Panel G West Haul/Access Road. This alternative would have 5.4 percent (146 tons) less air emissions compared to the Proposed Action. This would produce a minor decrease in air pollutant concentrations compared to the Proposed Action.

Alternative 5 – Alternate Panel G West Haul/Access Road
Alternative 5 would have a slight increase in total haul distance (0.2 miles) and 9 acres more active disturbance over the Proposed Action Panel G West Haul/Access Road. The increase in total emissions over the Proposed Action for this alternative is negligible (18 tons). This would produce a negligible increase in air pollutant concentrations compared to the Proposed Action.

Alternative 6 – Conveyor from Panel G to Mill

A reduction in air pollutants for moving ore from Panel G to the mill would occur if a conveyor system were used to transport G Panel ore to the mill. Haul road traffic from Panel G to the mill would be eliminated; however, particulate emissions from the conveyor operations would occur, as would haul truck emissions for the Panel F ore haulage. The operation of a conveyor could warrant having a crusher at Panel G to process the ore prior to loading it onto the conveyor. To conservatively estimate the emissions, the conveyor was assumed to have four-drop points. The emission factor used is applicable for a controlled (water sprays or enclosures) transfer point and crusher for high moisture ore. An air permit modification would be likely for transportation Alternative 6. Overall, there would be a 31 percent (843 tons) reduction of total ore transportation-related emissions using this alternative. This would produce a moderate decrease in air pollutant concentrations compared to the Proposed Action. However, this alternative must be combined with either alternative 6 or 7 to add the separate access road air emissions and arrive at total air emissions for the chosen scenario.

Alternative 7 – Crow Creek/Wells Canyon Access Road

This alternative would include upgrading the Crow Creek and Wells Canyon roads, which would be used for access to the Panel G mining operations. Traffic on this road under this alternative would consist of an average of 105 light vehicle and 15-vendor truck round trips per day. This traffic operating on the gravel-surfaced roads would contribute to the local air emissions for the access road traffic only as listed in **Table 4.2-8**. Total emissions for this access road would be 315 tons.

The location of this access road would result in the greatest air emission effects to houses and inhabitants along Crow Creek compared to any of the other transportation or mining alternatives. Fugitive dust and combustion emissions would be similar to a light-use secondary highway. When combined with the total air emissions from the conveyor alternative (Alternative 6), total Project transportation emissions including this alternative would be 2,031 tons, approximately 25 percent (680 tons) less than the Proposed Action Transportation emissions (**Table 4.2-7**).

Alternative 8 – Middle Access Road

Alternative 8 would reduce the travel distance for access to Panel G from 15.1 miles for the Crow Creek/Wells Canyon roads to 5.9 miles, and total road acres disturbed from 114 to 99 acres. This would result in a reduction of access road emissions compared to Alternative 7 (**Table 4.2-8**). When combined with the total air emissions from the conveyor alternative (Alternative 6), total Project transportation emissions including this alternative would be 1,839 tons, approximately 32 percent (872 tons) less than the Proposed Action Transportation emissions (**Table 4.2-7**).

4.2.1.4 No Action Alternative

If the No Action Alternative were selected, the air emissions from the Proposed Action would not occur, and the existing air emissions at the Smoky Canyon Mine would continue until the mine shut down and reclamation activities ceased. Simplot would possibly open other phosphate mining operations elsewhere in Southeast Idaho, shifting the long-term air emissions to that location.

4.2.2 Noise – Direct and Indirect Impacts

Sound travels out uniformly from sources unless it is blocked by a solid surface or until it is attenuated (decreased) by passage through geometric divergence, atmospheric absorption, or ground and vegetation absorption between the source and receptor.

Determining whether or not noise from an activity is causing undesirable impact at a receptor location must compare the existing background sound levels at the receptor to the sound level at the receptor due to the activity. If the sound levels of the noise at the receptor are similar to the background sound level, the noise does not affect the receptor. If the noise exceeds the background sound level, the degree of impact depends on the amount of the exceedance.

The typical person generally cannot detect a sound level increase of 1 dBA. Although noise differences of 2 to 3 dBA can be detected with instruments, they are difficult for people to discern in an active outdoor environment. Most people, under normal listening conditions, can perceive an increase in noise of 5 dBA.

Because sound level measurements (decibels) are logarithmic values, they cannot be combined using normal addition. For example, adding two 50 dBA sources results in a combined sound level of 53 dBA not 100 dBA.

EPA has identified outdoor limits of 55 dBA Leq as desirable to protect against interference with speech or disturbance of sleep in residential areas. Outdoor sites are generally acceptable to people if they are exposed to noise levels of 65 dBA Leq or less, potentially unacceptable if they are exposed to sound levels of 65-75 dBA Leq, and unacceptable if exposed to sound levels of 75 dBA or greater (EPA 1981).

Neither Caribou County, Idaho nor Lincoln County, Wyoming have direct regulations or ordinances in regard to noise from this Project.

Sound pressure levels at different distances from stationary sources of noise decrease approximately by 6 dBA for every doubling of distance from the source. The accuracy of this estimation approach depends on intervening vegetation, topography, atmospheric conditions and noise barriers. For line sources, such as roads, sound pressure levels decrease by 3 dBA per doubling of the perpendicular distance from the road (King County, WA 2003).

To predict noise levels associated with the proposed mining activities, noise level measurements were made at the existing Smoky Canyon Mine and at the potential human receptor areas along the Crow Creek Valley. These measurements are described in **Section 3.2.3**. In addition to these sources, noise measurements were made of a 72-inch conveyor belt traveling 900 feet per minute that is comparable to the proposed conveyor belt for Alternative 6. The noise levels attributed to the potential sources for the Proposed Action and Alternatives are shown in **Table 4.2-9**.

TABLE 4.2-9 MEASURED SOUND LEVELS FOR APPLICABLE NOISE SOURCES

SOURCE	LEQ* (DBA)	LMAX (DBA)	DESCRIPTION
Access Road Traffic	47.4	66.6	120 feet from edge of road
Open Pit Mining	81.7	85.9	130 feet from drill
Haul Truck Traffic	70.4	87.5	120 feet from haul truck
Blasting	NA	74.4	3,200 feet from blast
Conveyor	70.0	71.1	40 feet from conveyor

*15-minute timeframe

Mining operations would occur 24 hours per day, 7 days per week. Hauling ore from the mine panels to the mill would occur on the same schedule as mining. Blasting would occur only during daylight, typically every 2 to 3 days. However, blasting could occur any day of the week except Sundays and typically around noon or early afternoon.

Shift changes for the current mine crew, mill crew, and admin/engineering staff occur at different times during the day. Shift change for the mine crew occurs at 5:30 AM and 3:30 PM, 7 days per week. Hours for the admin/engineering staff are approximately 7 AM to 4 PM, Monday through Friday. Each of these shift changes would be accompanied by personal vehicle traffic along the access roads to the mining operations. Vendor and visitor vehicles can arrive at the operations at any time but mostly during daylight hours Monday through Friday. These access traffic schedules would apply to the Proposed Action and Alternatives.

The noise impacts at specific locations along Crow Creek from the Proposed Action and Alternatives were estimated in general accordance with procedures of the International Organization for Standardization (ISO) Standard 9613-2. Noise impacts on residences in Crow Creek Valley were determined for specific locations that were closest to the noise sources.

4.2.2.1 Proposed Action

<u>Panel F, Including Lease Modifications</u>

The closest approach of the east border of the Panel F pit to the Crow Creek Road is 1.9 miles. Intervening ridges screen all of the Panel F mining area from straight-line mining noise exposure to current residences along Crow Creek. In addition, most of the mining operations would be conducted within a below-grade open pit that itself would provide topographic screening between the mining activities and Crow Creek Valley. Consequently, mining equipment noise from Panel F to residents along Crow Creek would typically be negligible. If mining noise did carry from the mine to the Crow Creek area during initial mine development when topographic screening of noise would be the least, or due to isolated gaps in topographic screening or other reasons, the effects of distance, geometric diversion, and atmospheric/ground absorption would reduce this noise to an estimated 52.4 dBA outdoors at the Osprey Ranch. Vegetation or foliage attenuation was not taken into consideration in this estimate and would be expected to further reduce this value. This noise exposure would be a localized, short-term, minor to moderate (see page 4-1 for definitions) increase in noise to residences along Crow Creek. This noise level is less than EPA's recommendation of 55 dBA as desirable to protect against interference with outdoor activities or disturbance of sleep in residential areas. Once the mine pit was deep enough such that all mining activity was occurring below original grade, noise exposure from mining equipment noise to Crow Creek residents would consistently be negligible.

Episodic blasting noise from the Panel F area at the Osprey Ranch house is estimated to be 52.1 dBA.

<u>Panel F, Haul/Access Road</u>

The closest approach of the Panel F Haul/Access Road to the Crow Creek Road is 1.4 miles. There is an intervening topographic ridgeline between the Crow Creek Valley and Sage Valley, but there is a potential straight-line exposure between the canyon mouth for Sage Creek and the eastern limit of the haul/access road that could allow noise from this section of the proposed road to enter the Crow Creek Valley. A small intervening hill immediately southeast of the haul/access road may help to attenuate traffic noise from the road.

The maximum estimated noise from the proposed road operations to the residence northeast of the mouth of Sage Creek Valley is 52.4 dBA. This considers natural attenuation from divergence and absorbance factors, but excludes foliage attenuation. A factor for noise screening due to the road berm (5 feet) was included in the calculation. Noise impacts from Panel F Haul/Access Road traffic on residents along Crow Creek would be negligible to minor, local, and short-term.

Panel G

The closest approach of the east border of the Panel G mining area to the Crow Creek Road is 1.3 miles. Intervening ridges screen all of the Panel G mining area from straight-line mining noise exposure to current residences along Crow Creek. In addition, most of the mining operations would be conducted within a below-grade open pit that would itself provide topographic screening between the mining activities and Crow Creek Valley. At the early stages of mining when activities are occurring at the top of the hill, there could be straight-line noise exposure to persons along Crow Creek Road. The maximum estimated noise level from the Panel G mining activity at the mouth of Nate Canyon is 50.2 dBA. Geometric divergence, atmospheric and ground absorption, a 20-foot high screen (ridge topography) and noise reflection were taken into account in this calculation. Vegetation or foliage attenuation was not included and would be expected to reduce the noise impact.

Episodic noise from blasting from the Panel G area at the mouth of Nate Canyon is estimated to be no more than 51.6 dBA and would be less once the mining operations are fully contained with the depth of the pit. Noise impacts from mining operations in Panel G on residents along Crow Creek would be negligible to minor, local, and short-term.

Panel G West Haul/Access Road

The closest approach of the Proposed Action Panel G West Haul/Access Road to the Crow Creek Road is 2.3 miles. Intervening ridgelines and mountains separate the entire haul/access road from residents along Crow Creek. There would be no noticeable increase in sound levels along the Crow Creek road from traffic noise along this haul/access road.

Power Line between Panel F and Panel G

During construction, power poles in Deer Creek Canyon would be set with helicopter assistance. This would occur over a period of a few days during the overall power line construction period and only during daylight hours. This helicopter noise would be noticeable at residences along Crow Creek, and its sound level would depend greatly on flight patterns used by the helicopter and the wind direction during the few days a helicopter would be used for construction. This construction-related noise impact would be minor to moderate, local, and short-term.

4.2.2.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications

No Panel F North Lease Modification

The north lease modification area is 2.3 miles from the closest portion of Crow Creek Road. The actual mining area in this north lease modification is well down within South Fork Sage Creek Canyon and is topographically screened from all current residences along Crow Creek. There should, therefore, be no noticeable change in sound levels at residences along Crow Creek from a change in mining activities in the north lease modification area.

No Panel F South Lease Modification

The eastern edge of the actual mining area in the south lease modification is 1.9 miles from the closest portion of Crow Creek Road. Intervening ridges screen all of the Panel F mining area, including the portion of the mining in the South Lease Modification area, from straight-line mining noise exposure to current residences along Crow Creek. Under Alternative A there should be a negligible change in noise at the Osprey Ranch from Panel F mining equipment noise. The duration of Panel F noise would be reduced by 2.3 years compared to the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills

This alternative would not modify the mining configuration for Panel F, so the noise impacts from that panel on residences along Crow Creek would be the same as the Proposed Action. The east overburden fill for Panel G would be reduced in size under this alternative, but it is already screened from straight-line noise exposure to residences along Crow Creek Valley. The potential for noticeable decrease in sound levels at residences along Crow Creek from mining activities for Panel G under this alternative would be negligible.

Mining Alternative C – No External Overburden Fills At All

The noise effects on residences along Crow Creek from this alternative would essentially be the same as for the Proposed Action for the same reasons described for Alternative B.

Mining Alternative D – Infiltration Barriers on Overburden Fills

The construction of the infiltration barrier on the overburden fills as part of the overburden cap would not introduce any increased noise to the Panels F and G mines areas compared to the Proposed Action.

Mining Dinwoody Shale along the highwall of Panel F would be part of the overall mining plan for that panel, and the noise impacts would be the same as for the Proposed Action. For Panel G, the Dinwoody Shale would be obtained from the mine overburden or areas around the Panel G South Overburden Fill, so the noise effects from this mine panel on residents in Crow Creek would be the same as the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

Under this alternative, power poles would be installed along the selected haul/access road with utility-type line trucks that are commonly used in residential areas. The noise from these trucks would be temporary and is much less intense compared to mining equipment operating along the haul/access roads. The noise effects of this construction to residences along Crow Creek Valley are expected to be negligible. The noise from helicopter-assisted power line construction would be eliminated under this alternative.

Mining Alternative F – Electrical Generators at Panel G

Under this alternative, two 1,100-KW generators would provide the electric power at Panel G. One generator would be operating at all times with the other one on standby status. These generators would be diesel-powered and located at the Panel G hot starts area. Noise from these generators would be controlled with enclosures around the generators and motor exhaust mufflers. The location of the generators would be separated from all residences along Crow Creek by intervening topography. There would be no noticeable increase in sound levels at current residences along Crow Creek from generator noise at Panel G.

4.2.2.3 Transportation Alternatives

Noise generated by the transportation of ore, access traffic and service vehicles would continue along the Proposed Action and/or alternative routes at various degrees of intensity, frequency and power. The majority of overburden would stay in the pit areas or in nearby external overburden pits, thus not being hauled along the haul routes. Transportation noise evaluation takes into account geometrical divergence, atmospheric absorption, ground effect and screening. Attenuation due to indigenous foliage was not considered when predicting noise impacts and would be expected to reduce the noise impacts.

Alternative 1 – Alternate Panel F Haul/Access Road

The noise associated with this alternative would be essentially the same as for the Proposed Action Panel F Haul/Access Road. Noise effects to residences along Crow Creek would also be the same as for the Proposed Action Panel F Haul/Access Road.

Alternative 2 – East Haul/Access Road

The closest approach of this haul/access road to the Crow Creek Road is less than 0.1 mile. The portion of this road from about halfway down Nate Canyon to a point about 0.8 mile north of the Deer Creek crossing would have a straight line exposure to the Crow Creek Road with distances ranging from 0.1 to about 0.8 mile. The grade from the Deer Creek crossing to both the above-described points is up hill, so haul trucks would be pulling up these grades on their trips in and out of Panel G. The closest residences to this portion of the haul/access road are the Stewart Ranch, Osprey Ranch, and the Riede house. The Stewart Ranch residence is 2.2 miles from this reach of the haul road and is located behind a topographic ridge, completely shielding it from the haul road noise. The Riede house is located 0.4 mile from this portion of the haul/access road and has some straight-line exposure to the haul road in this area.

There is a topographic ridge between the Osprey Ranch and the haul road in Nate and Deer Creek Canyons so there is no straight-line noise exposure to the ranch from these sections of the proposed haul/access road. A 0.25-mile long portion of the haul/access road where it crosses upper Quakie Hollow has straight-line exposure to the Osprey Ranch house. The road at this point is 0.9 mile from the ranch house. Peak sound levels at these residences from haul truck traffic along the haul/access road are estimated to be 61.7 dBA for Riede's house and 57.9 dBA for Osprey Ranch. These would produce moderate to major noise impacts outdoors at these residences. These impacts would be short-term and would occur when haul trucks pass this stretch of the haul road. Noise levels impacting Crow Creek Road at the mouth of Deer Creek Canyon, the closest straight-line distance, are estimated to be 71.5 dBA.

Alternative 3 – Modified East Haul/Access Road

The Modified East Haul/Access Road follows the same general alignment as the East Haul/Access Road except in lower Deer Creek Canyon. The haul road there has a switchback from lower Nate Canyon leading up Deer Creek to a stream crossing that is 0.9 mile upstream of where the East Haul/Access Road would cross the stream. The modified haul road alignment then stays on the north slope of Deer Creek Canyon to where it meets the alignment for the East Haul/Access Road about 0.8 mile uphill of the Deer Creek crossing. The modified alignment would reduce the length of exposure of the road noise to the Riede house, compared to Alternative 2, but the sound pressure at the house for the modified road alignment would be approximately the same as for the East Haul/Access Road. Exposure of the Stewart Ranch and the Osprey Ranch house to the noise from the modified haul road alignment would be the same as for the East Haul/Access Road (Alternative 2).

Alternative 4 – Middle Haul/Access Road

The closest approach of the Middle Haul/Access Road to the Crow Creek Road is 2.2 miles. The entire haul/access road is topographically separated from current residences by intervening ridgelines and mountains. A portion of the haul/access road is directly aligned with lower Deer Creek Canyon, so there is the potential for haul traffic noise to be transmitted to the mouth of the canyon. The estimated maximum noise level from the Middle Haul/Access Road at the Crow Creek Road in front of the canyon mouth is 50.6 dBA. There would be no noticeable increase in sound levels at residences along the Crow Creek road from traffic noise along the haul/access road.

Alternative 5 – Alternate Panel G West Haul/Access Road

The closest approach of the Alternate Panel G West Haul/Access Road to the Crow Creek Road is 2.2 miles. Intervening ridgelines and mountains topographically separate the entire alternate haul/access road from current residences along Crow Creek. There would be no noticeable increase in sound levels along the Crow Creek road from traffic noise along this haul/access road.

Alternative 6 – Conveyor from Panel G to Mill

The closest approach of the conveyor to the Crow Creek Road is 1.7 miles. Intervening ridgelines and mountains topographically separate the entire conveyor from all residences along Crow Creek. A portion of the conveyor is directly aligned with lower Deer Creek Canyon, so there is the potential for conveyor noise to be transmitted the 2.1-mile distance to the Crow Creek Road at the mouth of the canyon. The estimated noise level from the conveyor at the Crow Creek Road in this location is 40 dBA. There would be no noticeable noise effects at current residences along the Crow Creek Road from conveyor noise.

Alternative 7 – Crow Creek/Wells Canyon Access Road

Under this alternative, the conveyor would be built to move the ore from Panel G to the mill, and employee/vendor access to Panel G would occur via the upgraded Crow Creek and Wells Canyon roads. There are a number of residences along the Crow Creek Road. The distance between the edge of the road and these residences varies. The noise from traffic on this road to the residences would vary with the distance, topography, and intervening vegetation or other barriers to sound. Approximate road noise levels at different distances from the road have been estimated and are listed below in **Table 4.2-10**.

TABLE 4.2-10 SOUND LEVELS FOR ACCESS ROAD

DISTANCE	LEQ (DBA)	LMAX (DBA)
60 ft from roadside	48.8	70.5
120 ft	47.4	66.6
200 ft	39.9	57.1
300 ft	Background	53.9
500 ft	Background	50.9

Based on the estimated sound levels shown in **Table 4.2-10**, the episodic road noise at the Riede house would be a maximum of approximately 70 dBA; at the Osprey Ranch it would be a maximum of approximately 42 dBA. Road noise at other houses along the Crow Creek Road would vary with their distance from the road and intervening noise attenuation conditions. These increases in noise would be most prevalent during shift changes. The noise impacts would be minor to moderate, local, and short-term.

Alternative 8 – Middle Access Road
The closest approach of the Middle Access Road to the Crow Creek Road is 2.2 miles. The entire access road is topographically separated by intervening ridgelines and mountains from all residences along Crow Creek. A portion of the access road is directly aligned with lower Deer Creek Canyon, so there is the potential for access traffic noise to be transmitted to the Crow Creek Road at the mouth of the canyon. The estimated noise level from the access road at the Crow Creek Road is negligible. There would be no noticeable increase in sound levels at current residences along the Crow Creek Road from traffic noise along the haul/access road.

4.2.2.4 No Action Alternative

Under the No Action Alternative, impacts from mining noise on the Project Area would not increase beyond current levels.

4.2.3 Mitigation Measures

Air
Under Mining Alternative F, IDEQ would require Simplot to use low-nitrogen oxide generators or ‘ignition timing retard” practices to reduce the NOx emissions.

Mitigation to be applied to Transportation Alternative 7 for dust abatement includes providing bus service for Panel G mine employees once per shift.

For all mining and transportation alternatives, dust would be controlled on roads and mining areas with applications of water and/or magnesium chloride.

Noise
For either Transportation Alternative 2 or 3 (East Haul/Access Road and Modified East/Haul Access Road), noise mitigation measures that Simplot would implement include: maintaining equipment exhaust systems and engine sound controls to manufacturers' specifications; and preserving forest vegetation noise buffers to the extent possible.

For Transportation Alternative 7 (Crow Creek/Wells Canyon Access Road), noise mitigation would include utilizing a bus service once per shift for Panel G mine employees.

For all mining alternatives, Simplot would not conduct blasting operations during typical sleeping hours.

4.2.4 Unavoidable (Residual) Adverse Impacts

Air
All the emissions estimates included in this analysis assumed typical control practices and BMPs would be employed. Dust emissions for Alternative 7 could potentially be reduced if bus service was provided. Following cessation of operations, air pollutant levels would promptly drop and return the local air quality to background conditions by dispersion of air pollutants or settling of the particulate matter.

Noise
Effects of noise mitigation measures listed above have not been modeled but would be expected to result in reductions in noise levels estimated in the previous sections. Noise levels at receptor locations would be reduced by the mitigative measures.

When mining activity ceases, mining noise in the Project Area would be reduced to low levels associated with reclamation work and then cease altogether. There would be no long-term residual adverse impacts on the environment from noise generated during the Proposed Action and Alternatives.

4.2.5 Relationship of Short-Term Uses and Long-Term Productivity

The local short-term use of the mineral resources for phosphate mining would result in ongoing employment and other economic benefits to the local and regional economies. Air emissions during Project operations would not affect long-term productivity of the other resources of the affected area. When mining ceases, air quality would return to natural conditions. Long-term productivity of the land in the Project Area would not be affected by the mining air emissions.

Mining noise would affect the area immediately adjacent to the mine operations and have a lesser effect on residents along Crow Creek. When the mining is completed, the mining noise would cease. Long-term productivity of the land in the Project Area would not be affected by the mining noise.

4.2.6 Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable commitments of resources due to air emissions or noise generated from the Project.

4.3 Water Resources

Issue:
The mining operations and related transportation activities may cause changes to the quantity and quality of surface water or groundwater in the Project Area and within the Crow Creek watershed area.

Indicators:
Changes in the volume and timing in surface runoff water caused by the operations;

Increases in suspended sediment, turbidity, and contaminants of concern in downgradient streams, ponds and other surface waters, with regards to applicable surface water quality standards;

Reduction in available groundwater to supply existing baseline flow of streams and springs in the Project Area from pumping the Panel G water supply well;

Increases in concentrations of contaminants of concern in groundwater under and downgradient of pit backfills and overburden fills, with regards to applicable groundwater quality standards;

Length of roads that occur on the Meade Peak Shale member outcrop and could contribute selenium in runoff to nearby streams.

4.3.1 Groundwater – Direct and Indirect Impacts

Groundwater Flow to Open Pits

As described in **Section 3.3.5**, exploration drilling and groundwater monitoring wells in the Panels F and G area have indicated that the bottom of the proposed mine panels would be from about 100 to 800 vertical feet above the Wells formation aquifer in this area, so groundwater from the regional aquifer would not flow into the open pits.

Drilling records also indicate that measurable groundwater was typically not encountered while drilling in the vicinity of the proposed pits. Several monitoring wells that intercepted fault zones in the Meade Peak shale encountered groundwater within the Meade Peak shale and the Rex Chert members (**Figures 3.3-4 to 3.3-7**). The relatively low hydraulic conductivity and the perched water table elevations measured in the monitoring wells indicate that some minor perched groundwater flow could occur from the hanging walls of the proposed Panels F and G. This would be observed as small seeps along the highwalls that would drain fractures and perched saturated zones near the highwalls.

The Smoky Canyon Mine has continuously conducted open pit mining operations in the same formations and similar hydrogeologic conditions since 1985, excavating over 5.6 linear miles of highwall in the process, and has not encountered any sustained, measurable groundwater inflow to the open pits from the highwalls. This is expected to also be the case for Panels F and G.

Groundwater Recharge

The areas of the proposed Panels F and G are within the existing outcrop area of the Phoshoria formation. As described in **Section 3.3**, the Meade Peak member is considered to be an aquitard that covers the underlying Wells formation and Brazer Limestone and essentially limits recharge from areas overlying the base of the Meade Peak. Limited amounts of groundwater in the Meade Peak member are known to occur within fractures in the shale, but these yield little groundwater to wells or mine pits (Ralston et al. 1977 and Ralston 1979). This means that very little to no recharge to the Wells formation aquifer is currently occurring within the footprints of the proposed open pits, and only small amounts of groundwater flow to the open pits from the Meade Peak member are expected.

Removal of Phosphoria formation rocks in the footprint areas of the proposed pits would remove the aquitard formed by these rocks. This would allow groundwater recharge of the Wells formation to occur in the proposed open pit area (763 acres) where recharge naturally did not occur. This would be a 7 percent increase in the local recharge area (10,536 acres) of the Wells formation and Brazer Limestone. Recharge in these pit backfills, and any external overburden disposal areas to the east of the pits, would enter Wells formation rocks and eventually enter the aquifer contained in the Wells formation.

As discussed in **Section 3.3**, the Rex Chert member and the overlying Dinwoody formation can contain aquifers of local importance. These rocks in the Project Area are contained within the Webster syncline, and groundwater recharged at the outcrops of these units is contained within the folded rocks of the syncline. Groundwater movement is likely controlled by elevation and bedding of the rocks within this area, so groundwater recharged at the Panels F and G locations would move westward toward the center of the syncline and then northward due to the northward plunge of the syncline. Because the proposed open pits are located at the eastern edge of the Rex Chert outcrop, all the Rex Chert overlying the open pits would be removed during mining. This would eliminate the potential for groundwater in the Rex Chert to flow into the open pits from the east. Because the Rex Chert directly south of Panel F and Panel G has been removed naturally during formation of the Deer Creek and Wells canyons respectively, Rex Chert groundwater flow into the pits from the south is also not expected.

Groundwater recharged in the Rex Chert outcrop of the Panel F area would move toward the center of the syncline where it is isolated from the surface environment by the overlying Dinwoody. A decrease in recharge of this unit in the Panel F area would produce no effects to springs or surface streams. Groundwater recharged in the Rex Chert of the Panel G area likely supports a number of small springs in the area identified in **Section 3.3.9**. Potential effects of reduced recharge to these springs is discussed in the following specific impacts analysis for Panel G.

<u>Infiltration Through Reclaimed Mine Panels</u>
The natural recharge rate at any location depends on many factors including ground elevation, vegetation cover, soil characteristics, topographic aspect and slope, climate, latitude, and geology. Recharge rates have not been directly measured in the Webster Range but have been estimated to range from about 11 to 18 percent of average annual precipitation (JBR 2005a). A site-specific estimate of recharge for the final topography of the reclaimed Panels F and G was prepared using the EPA HELP3 model, a quasi-two-dimensional water balance model of water movement through layers of materials (Hydrologic Evaluation of Landfill Performance, Schroeder et al. 1994). The model has been used on previous phosphate mine EISs by the BLM and was used in this case to estimate recharge rates through the proposed Panels F and G pit backfills and external overburden fills (Knight Piésold 2004). HELP3 model runs were used to estimate runoff, soil infiltration, evapotranspiration, soil moisture storage, lateral subsurface drainage, and vertical percolation through layers of materials with specific material properties.

The proposed topography of the reclaimed Panel F was divided into 12 subareas based on slope and aspect to separately determine runoff, evapotranspiration, and percolation for each subarea. The same approach was taken for Panel G, which was divided into 13 subareas. The cap design used for the Proposed Action was previously shown in **Figure 2.5-1** with approximately 1 to 2 feet of topsoil over 4 feet of chert placed over all areas of run-of-mine overburden. Runoff from upland watersheds was assumed to be minimal due to installation of permanent runoff collection and diversion ditches along the upper (west) edge of the Panel F pits during mining (see **Section 2.5.5**). Material properties for the rock layers were established through testing samples of the same overburden materials at the Smoky Canyon Mine (Appendix 4C, BLM and USFS 2002). Soil characteristics were established through materials testing of the soil resources existing at the Panels F and G areas (Maxim 2004f). Vegetation cover was matched to the prescribed reclamation species of primarily grasses, forbs and some shrubs and varied from no cover density on bare, unvegetated surfaces, through increased cover density on south, east, and west-facing slopes to a maximum cover on north-facing slopes. The range of results of the infiltration modeling are shown in **Table 4.3-1**.

TABLE 4.3-1 RESULTS OF INFILTRATION MODELING FOR PROPOSED ACTION (INCH/YEAR)

SUBAREA	PERCOLATION RATE	WTD AVG PERCOLATION
Panel F Pit 4 Open Pit	21.5	21.5
All Other 11 Panel F Areas	1.98 – 3.05	3.0
Panel G Highwall Vertical Drain	362.8	362.8
All Other 12 Panel G Areas	1.94 – 2.97	2.8

The results of the HELPS modeling determined that the individual percolation rates through the cap and into the top of the run of mine overburden varied from slightly less than 2 inches per year for south-facing slopes to about 3 inches per year for north-facing slopes. Weighted averages for each mine panel were determined by weighting percolation rates by the acreage of each subarea. The Panel F Pit 4 would not be reclaimed at the end of mining (see **Figure 2.4-4**), so there would be little potential for soil moisture storage and evapotranspiration of water. Subsequently, the estimated percolation rate is over 21 inches per year over the unreclaimed pit floor. Where runoff from the reclaimed Panel G slope would collect at the base of the remaining highwall, it would be routed to a vertical drain built of chert and allowed to percolate to the Wells formation underlying the Panel G (see **Section 2.5.8**). The percolation rate through this chert drain was estimated to be over 360 inches per year.

<u>Predicted Infiltration Chemistry</u>

Overburden is exposed to surface weathering conditions when it is removed from the pit, transported, and placed in an overburden disposal site. The exposure to these conditions can start oxidation of minerals in the overburden that can mobilize soluble forms of various elements contained in the rock. Infiltrating water provides a pathway for the transportation of soluble constituents within the mass of the overburden. Metals, selenium and other constituents that may be mobilized from the overburden through the action of infiltrating water are transported by the water movement to other locations within the overburden deposit and, potentially, to the environment beneath the overburden. Along this pathway, the concentrations of dissolved constituents may subsequently be changed by dissolution, sorption, or precipitation reactions as chemical conditions change along the flow path. The effects of these reactions are difficult to accurately estimate for any overburden fill.

The infiltration rate of water through an overburden fill is quite variable and controlled by the material properties of the overburden fill. The infiltrating water is likely to follow preferential flow paths through the material, accelerating the leaching of overburden along these flow paths while other material is more slowly leached. The result of this would be an unpredictable pattern of different seepage rates and chemistries across the entire area of overburden.

It is difficult to estimate the final chemistry of water discharged from the bottom of an overburden pile because of the variability and uncertainty in predicting these causal factors. A key consideration in this chemistry is the concentration of soluble COPCs that may be contained in leachate produced in phosphate mine overburden.

Leach column testing was conducted on representative samples of overburden rocks to obtain leachate chemistry information on the COPCs (Maxim 2004l). Twelve columns were constructed: 11 columns of drill cuttings from Panel F and G drill holes representing each of the major lithologic units, and one control. Efforts were made to ensure that the selection of rock samples to be used in each column were representative of that lithology for the entire mine panel. Laboratory water was applied to the tops of the columns and allowed to percolate down through the rock samples to the bottoms of the columns, where the leachate water was collected for laboratory analyses. The effluent from each column was collected in a closed container until a volume of water roughly equal to the column porosity (a pore volume) was accumulated. Samples were collected for pore volumes 1, 2, 3, 5, 7, 9, and 10. The pore volume samples were analyzed for specific parameters selected from those shown in **Table 4.3-2**. These parameters were selected to help understand the chemical interactions between the overburden and the leachate and to be consistent with COPC information from previous studies.

TABLE 4.3-2 COLUMN LEACHATE ANALYTICAL PARAMETERS

GENERAL
pH, Eh, Alkalinity, Sodium, Potassium, Calcium, Magnesium, Chloride, Sulfate, Fluoride, Phosphate, Total Organic Carbon, Turbidity, Sulfide, Nitrate+Nitrite
METALS
Aluminum, Arsenic, Antimony, Barium, Chromium, Cadmium, Copper, Iron, Manganese, Mercury, Nickel, Zinc
SELENIUM
Dissolved and Total Selenium, Selenite, Selenate

Chemical analyses of pore volumes were examined to determine concentrations of COPCs from pore volume 1 (PV1) through pore volume 10 (PV10) for all columns. Some columns were run up to 20 pore volumes. Concentrations of dissolved constituents were always highest in PV1 and typically decreased until about PV2 or PV3 after which they stayed relatively low through PV10 and beyond.

Analytical data from the leachate testing were compared to applicable surface water and groundwater regulatory standards to identify analytical parameters that should be modeled in the groundwater impact assessment. **Table 4.3-3** shows the number of pore volume analytical results that exceeded a surface water standard or a primary (health-based) groundwater standard.

TABLE 4.3-3 NUMBER OF SAMPLE RESULTS EXCEEDING REGULATORY STANDARDS

PARAMETER	PANEL F SW/GW	PANEL G SW/GW	SW/GW STANDARD*
pH	0 / 0	0 / 0	6.5-9.0
Arsenic	0 / 0	1 / 1	0.05 / 0.05
Antimony	0 / 1	0 / 0	4.3 / 0.006
Barium	0 / 0	0 / 0	NS / 2.0
Chromium	8 / 0	6 / 0	0.01 / 0.1
Cadmium	9 / 2	7 / 5	0.001 / 0.005
Copper	0 / 0	0 / 0	0.011 / 1.0
Manganese	0 / 15	0 / 14	NS / 0.05s
Mercury	0 / 0	0 / 0	1.2E-5 / 0.002
Nickel	2 / 0	3 / 0	0.160 / NS
Selenium	30 / 11	24 / 11	0.005 / 0.05
Sulfate	0 / 4	0 / 8	NS / 250s
Zinc	22 / 0	12 / 0	0.105 / 5.0s

SW=Surface Water, GW=Groundwater *The SW standard is the lowest concentration for cold water biota for Criteria Maximum Concentration, Criteria Continuous Concentration, or Criteria Human Consumption or organisms. SW standards for chromium is for chromium VI. SW standards for cadmium, chromium, copper, nickel, and zinc are expressed as a function of hardness at 100 mg/L and water effect ratio of 1.0. GW standards followed by an “s” are secondary and not health-based.

The single Panel G column test leachate exceedance of the surface water and groundwater standards for arsenic (**Table 4.3-3**, 0.065 mg/L) was not considered problematic because it was only slightly above the standards (0.05 mg/L), and initial dilution in the groundwater immediately under the overburden fills would reduce this concentration to well under the applicable standards. The single groundwater standard exceedance for antimony in Panel F (0.008 mg/L) was also not considered problematic because initial dilution in the groundwater would reduce this concentration to below the applicable groundwater standard (0.006 mg/L). The nickel concentrations that exceeded the surface water standard (0.16 mg/L) ranged from 0.17 to 0.81 mg/L. The nickel concentrations were not considered problematic because there is no groundwater standard for nickel and dilution in the groundwater flow pathway between the source and potential points of groundwater discharge to the surface environment would reduce these concentrations to below the applicable surface water standard.

The leach column pore volume results for cadmium, chromium, manganese, selenium, sulfate, and zinc were considered potentially problematic because of the number of samples that were significantly above an applicable surface water and/or groundwater standard. These COPCs were therefore selected for further impact analysis.

The column tests were conducted on drill cuttings, which are ground up during the drilling process to particle sizes that were generally much finer than the particle sizes expected for the actual overburden from the mine panels, based on experience at the Smoky Canyon Mine. It is well known that leaching of rock is strongly affected by the particle size of the material being leached with greater leaching efficiency occurring with finer particle size. USGS studies conducted on samples of Meade Peak shale from southeast Idaho suggest that dissolution reactions of water with the shale are sensitive to grain size with higher rates of release associated with finer grain sizes (Herring 2004).

Representative bulk samples (55-gallon drums) of run of mine (ROM) chert and Center Waste Shale were obtained from the Smoky Canyon Mine. These were tested for particle size gradation, as were samples of the solids tested in the column leach tests. The Panels F and G column test results were adjusted to account for the difference between the fine gradation of the rock particles in the leach columns and the coarser gradation of the overburden fills as follows (JBR 2005a):

1. Determine mass of COPC released (mg/PV) by multiplying leach column effluent concentration by the volume of effluent collected (i.e. one pore volume).

2. Determine mass of COPC released per unit mass (mg/Kg) of overburden drill cuttings in leach column by dividing result of #1 by the mass of drill cuttings in column.

3. Determine mass of COPC released per unit surface area (mg/m^2) by dividing result of #2 by the specific surface area (SSA, the area per unit mass) of leach column samples as determined by sieve data using GRAIN 3.0 specific surface area calculation spreadsheet (MDAG 2005).

4. Determine mass of COPC released per unit mass (mg/Kg) of ROM overburden backfill by multiplying result of #3 by the SSA of ROM overburden backfill.

5. Determine the mass of COPC released (mg) from ROM backfill by multiplying result of #4 by the mass of overburden backfill lithology in backfilled mine panel.

6. Determine COPC concentration in ROM backfill effluent (mg/L) by dividing result of #5 by the pore volume of the ROM backfilled overburden lithology.

7. The surface area correction factor (unitless) is then determined by dividing the result of #6 by the concentration of COPC in column effluent.

The calculations summarized above, and specifically for step #6, were determined on a pore volume basis rather than using annual site infiltration data in order to avoid bias that could be introduced based on assumptions of retention time, solute breakthrough, and the affect that these factors may have on dilution.

Correction factors for two specific surface areas (SSA) were calculated, one based on the full range of ROM gradation data, and one excluding all plus ½-inch, ROM Center Waste Shale material. It was decided to use the correction factor based on exclusion of the plus ½-inch material because: 1) it was more comparable to the material in the leach columns which was 100 percent minus ½ inch; 2) although a large percentage of the ROM overburden mass is plus ½ inch size, it will likely have much less affect on the solution chemistry than the fine material; 3) preferential flow of unsaturated seepage through ROM overburden tends to follow paths through fine grained material, and 4) the estimated selenium concentrations for the particle size adjustment excluding the plus ½ inch ROM material appeared to be corroborated by applicable field evidence at Smoky Canyon Mine and in the wider area of southeastern Idaho. The estimated selenium concentrations for the particle size adjustment including all the ROM gradation appeared to be lower than the empirical data.

For selenium, the adjusted concentrations for pit backfill overburden were approximately 20 to 39 percent lower than the concentrations, based on the fine-grained column test results. These pore volume chemistries adjusted for particle size were then used for the impact analysis.

The column test results represented single, homogeneous lithologies within the overburden of Panels F and G. The actual ROM overburden fills would be a mixture of these different lithologies. This would affect the seepage chemistry predicted by the column testing because the different lithologies exhibited different leachate chemistries. The anticipated seepage chemistries from the potential overburden mixtures were determined by weighting the pore volume leachate chemistries by the relative percentages of different lithologies in each mine panel. These weighted averages are shown in **Table 4.3-4**.

TABLE 4.3-4 WEIGHTED AVERAGE PORE WATER CHEMISTRIES FOR ROM OVERBURDEN (MG/L)

ANALYTE	PV1	PV2	PV3	PV5	PV7	PV9	PV10
PANEL F BACKFILL AND EXTERNAL FILL							
Cd	0.0577	0.0011	0.0003	0.0006	0.0010	0.0004	0.0011
Cr	0.009	0.006	0.006	0.003	0.003	0.009	0.005
Mn	0.256	0.057	0.046	0.046	0.026	0.023	0.055
Se	0.532	0.136	0.100	0.055	0.059	0.046	0.080
SO_4	359	118	62	46	56	53	66
Zn	0.70	0.15	0.16	0.10	0.11	0.15	0.27
PANEL G BACKFILL							
Cd	0.0695	0.0030	0.0019	0.0019	0.0030	0.0019	0.0025
Cr	0.039	0.007	0.005	0.002	0.002	0.002	0.002
Mn	0.566	0.093	0.051	0.041	0.040	0.180	0.155
Se	0.640	0.119	0.067	0.037	0.030	0.028	0.017
SO_4	713	354	136	101	115	146	216
Zn	0.84	0.29	0.20	0.16	0.17	0.19	0.21
PANEL G EAST EXTERNAL FILL							
Cd	0.0750	0.0034	0.0021	0.0021	0.0034	0.0021	0.0028
Cr	0.062	0.010	0.006	0.002	0.002	0.002	0.002
Mn	0.515	0.104	0.054	0.043	0.041	0.113	0.106
Se	0.739	0.138	0.078	0.043	0.034	0.032	0.020
SO_4	833	414	161	119	138	181	261
Zn	0.95	0.32	0.20	0.18	0.19	0.21	0.23

To model the potential change in seepage chemistry over time, the weighted average column test results for the COPCs were plotted on graphs. Polynomial curves were calculated for the pore volume data for each COPC. The curve for selenium for the Panel G backfill chemistry is shown in **Figure 4.3-1** as a typical example of the curves.

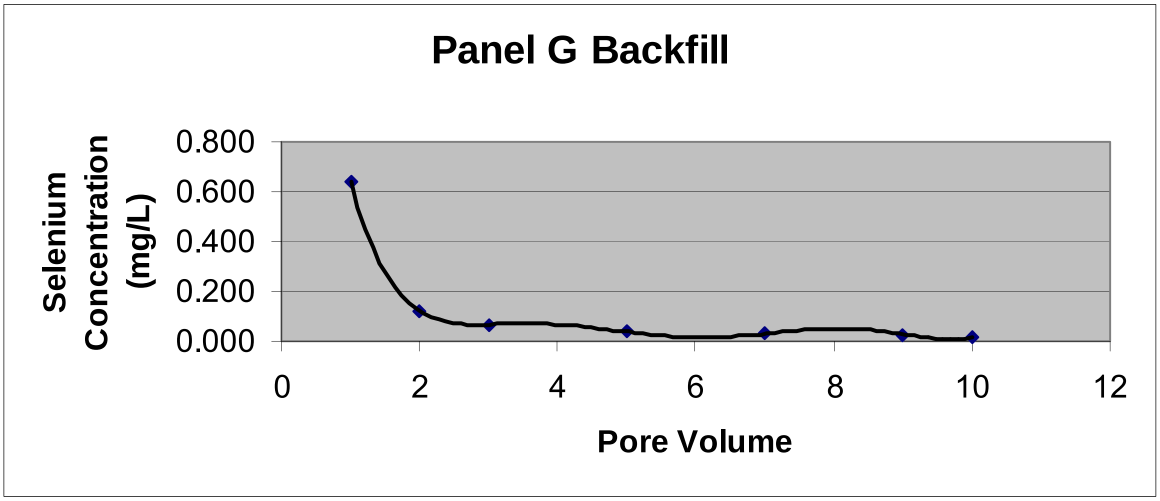


Figure 4.3-1 Weighted Average Panel G Backfill Selenium Concentration

Even though the column test data produced in the laboratory were adjusted as described above to take into consideration the differences between the laboratory test conditions and field-scale conditions in the proposed overburden fills, there is uncertainty as to the accuracy of the final weighted average COPC concentrations used as inputs to the groundwater fate and transport modeling. As described in the groundwater modeling report (JBR 2005a), the selenium input concentrations used in the groundwater modeling generally agree with field observations of selenium concentrations at phosphate overburden seeps in Southeastern Idaho.

A selenium database for monitoring data collected at phosphate mines in southeast Idaho was included in the Simplot Panels B&C SEIS and listed selenium concentrations for ponds, overburden seeps, and French drains (BLM and USFS 2002). These publicly available data are from monitoring conducted by various mines and agencies throughout southeast Idaho. The data were screened to eliminate all values less than the surface water standard for selenium (0.005 mg/L) on the assumption that these waters were not affected by contact with seleniferous materials. The remaining data were grouped into the categories of ponds, (external) overburden seeps, and French drains and then evaluated statistically. None of the external overburden fills included in the database incorporated mitigative features such as infiltration barrier caps. The data in the earlier database were recently updated to include monitoring results through 2004 (JBR 2005b). The revised database indicated the average selenium concentration for overburden seeps at phosphate mines in southeast Idaho was 0.608 mg/L with a geometric mean of 0.147 mg/L. The selenium concentrations for PV1 calculated from the column test data (**Table 4.3-4**) ranged from 0.532 to 0.739 mg/L, which compares well to the average selenium concentration for overburden seeps in the database.

Inspection of **Figure 4.3-1** shows that the concentration of selenium in the leachate from the Panel G ROM backfill is calculated to have an initial concentration of between 0.6 and 0.7 mg/L at the beginning of leaching (PV1) and decrease to 0.119 mg/L by PV2. The concentration remains low for the rest of the leaching. The trends in selenium concentrations for the other ROM backfills are similar (**Table 4.3-4**).

To determine which of the pore volume chemistries were to be used in the impact analyses, pore volume chemistries were correlated with time. This was done by estimating the amount of time it would take for a pore volume of water to enter a pit backfill or external overburden fill at Panels F and G, based only on the infiltration rates estimated in the HELP3 modeling.

Uniform flow through the overburden fills is not expected, and preferential flow in overburden fills and heap leach piles has been well documented in laboratory and field investigations (JBR 2005a). Studies of preferential flow suggest that about 20 to 70 percent of an overburden fill will come into contact with percolating vadose zone water. Because overburden fills as thick as anticipated at the Panels F and G (about 200 feet) would encourage formation of preferential flow paths, it is reasonable to assume that 50 percent or less of the volume of the proposed Smoky Canyon Mine overburden fills would host flow paths for percolating meteoric water due to preferential flow. For a unit square foot area on the 200-foot thick backfills proposed for Panels F and G with an approximate recharge rate of 3 inches per year, the estimated time for each pore volume to infiltrate into the fills is 146 years.

The COPC concentrations in chert were much lower than those in the ROM overburden, and they did not have nearly the same degree of variability over time as the ROM overburden (**Table 4.3-5**). In addition, chert fills used in overburden caps and the Panel G South Overburden Fill had smaller thicknesses (4 – 50 feet) than the ROM pit backfills, thus they would have smaller timeframes for each pore volume to enter them compared to the ROM overburden fills. For these reasons, averages of all the pore volumes for each COPC are considered representative of the pore water chemistry for chert fills.

TABLE 4.3-5 PORE WATER CHEMISTRIES FOR CHERT OVERBURDEN (MG/L)

ANALYTE	PV1	PV2	PV3	PV5	PV7	PV9	PV10	AVG
PANEL G CHERT								
Cd	0.0240	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0037
Cr	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002
Mn	0.708	0.012	0.027	0.020	0.028	0.476	0.372	0.235
Se	0.007	0.003	0.003	0.003	0.003	0.003	0.003	0.003
SO_4	44	5	2	1	1	1	1	8
Zn	0.04	0.07	0.16	0.03	0.02	0.02	0.04	0.05
PANEL F CHERT								
Cd	0.0003	0.0003	0.0003	0.0003	0.0012	0.0003	0.0003	0.0004
Cr	0.0015	0.021	0.016	0.007	0.007	0.037	0.011	0.014
Mn	0.239	0.022	0.063	0.108	0.045	0.030	0.138	0.092
Se	0.036	0.018	0.005	0.011	0.006	0.005	0.0025	0.0119
SO_4	48.9	7.1	2.0	1.3	1.0	0.5	1.0	8.8
Zn	0.06	0.11	0.25	0.18	0.15	0.17	0.43	0.19

A review was made of literature and empirical data collected from the Smoky Canyon Mine related to potential chemical attenuation of selenium and cadmium in the flow paths being modeled from the Panels F and G overburden sources to the points of groundwater discharge to the surface environment (JBR 2005a). There is abundant information in the literature supporting chemical attenuation of selenium in specific chemical and biological environments. However, at the present time, it was concluded that there is insufficient evidence that these specific chemical environments exist to the degree necessary within the modeled flow paths for Panels F and G to allow estimation of significant chemical attenuation of selenium. Although there may be some chemical attenuation of selenium in these flow paths, none has been used in the fate and transport modeling for the groundwater impact assessment.

There is also abundant literature showing that dissolved cadmium is quite reactive in the environment and is readily attenuated chemically (Allen et al. 1993; Fuller and Davis 1987; Hinz and Slim 1964; Papadopoulos and Rowell 1988, Zachara et al. 1991). The resulting reaction of cadmium solutions in alkaline environments causes precipitation of the cadmium carbonate mineral Otavite. Dissolved cadmium is also attenuated by sorption to clays, carbonates, and other minerals. Cadmium attenuation is enhanced in neutral to alkaline pH conditions, which are prevalent in the Project Area. Review of water quality monitoring data for Smoky Canyon Mine (JBR 2005a) also showed that water issuing from seeps and springs at overburden fills typically have cadmium concentrations that are near or below the surface water standard (0.001 mg/L). Where cadmium concentrations were above surface water standards at overburden fills (Pole Canyon Dump and Panel A backfill), the cadmium concentrations in groundwater downgradient from these sources were below groundwater and surface water standards levels. All this evidence points to the conclusion that dissolved cadmium in overburden seepage at Smoky Canyon Mine is readily attenuated chemically once the seepage leaves the overburden fills and contacts the underlying rocks in the groundwater flow path. For this reason, it was concluded that cadmium would be fully attenuated chemically in the flow paths down gradient from the Panels F and G overburden fills.

Groundwater Quality Impact for Wells Formation

A groundwater solute transport computer model was prepared to simulate migration of COPCs contained in leachate from the overburden disposal facilities in the Proposed Action and Alternatives. The two-dimensional flow model, MODFLOW, that was used for the groundwater impact modeling was described in **Section 3.3.6**. This same groundwater model was used for the fate and transport modeling of the COPCs from the overburden fills using the computer code MT3DMS. The following assumptions were made in the fate and transport model:

1. Infiltration chemistry for runs of the model consisted of column test values for the COPCs: cadmium, chromium, manganese, selenium, sulfate, and zinc. The model runs were conducted in 1-year increments using the weighted average COPC concentrations of the leachate chemistry for each specific overburden area determined from the polynomial curves of the weighted average pore volume chemistries.

2. Percolation through the overburden for the Proposed Action was the quantity estimated with the HELP3 model for the pit backfills and the external overburden disposal areas (**Table 4.3-1**).

3. Steady-state conditions for the percolating water consisted of the estimated infiltration rates impinging directly on the water table with no attenuation of water flow in the overburden fill or the vadose zone between the base of the fill and the water table.

4. Infiltrated water was assumed to move vertically through the overburden fills and then through the vadose zone of the Wells formation, which was assumed to be homogeneous. Once in the saturated zone, groundwater flow was assumed to be through a homogeneous and isotropic aquifer.

5. COPCs were uniformly mixed with the upper Layer 1 of the aquifer under the overburden sources and down gradient. COPCs that migrated from Layer 1 to the underlying Layer 2 by advection and dispersion were also uniformly mixed with Layer 2.

6. Dispersion and dilution in a homogeneous and isotropic aquifer were the only processes that reduced concentrations; effects of bedding and any chemical or sorption attenuation were not modeled.

7. Transverse dispersivity was equal to 0.3 times the longitudinal dispersivity, which was set at 100 feet. These are typical literature values for similar aquifers (Zheng and Bennett 1995). Vertical dispersivity was equal to 0.1 times the longitudinal dispersivity.

8. Background chemical concentrations in groundwater were set at zero, so model results indicate estimated increases in groundwater concentrations over background.

9. Model runs simulated time periods that were as great as 500 years. This was done to determine the maximum COPCs concentrations where groundwater from the Wells formation discharges to the surface, i.e. South Fork Sage Creek Spring, Books Spring, Lower Deer Creek, and Crow Creek.

10. With the exception of cadmium, concentrations of COPCs were conservative and were considered to be unaffected by chemical retardation or attenuation. Cadmium was considered to be fully chemically attenuated due to precipitation reactions with carbonate minerals in the vadose zone under the overburden fills.

The groundwater flow and fate and transport modeling description is provided in the Groundwater Flow and Solute Transport Modeling Report (JBR 2005a). Solute concentrations in groundwater at specific locations within the model domain were calculated. These specific locations are listed below and shown on **Figure 4.3-2**.

- East boundary of the northern Manning Lease area (Observation Point A)
- East boundary of the southern Manning Lease area (Observation Point B)
- East boundary of the S. Manning Lease Modification area (Observation Point C)
- East boundary of the Deer Creek Lease area (Observation Point D)
- Point of groundwater discharge to Lower Deer Creek
- Books Spring
- South Fork Sage Creek Spring
- Point of groundwater discharge to Crow Creek

Peak modeled concentrations and times are shown for the COPCs at the above listed locations in **Tables 4.3-6** and **4.3-7**. Concentrations that exceed an applicable groundwater or surface water standard are shown in bold face.

TABLE 4.3-6 PEAK CONCENTRATIONS AT GROUNDWATER OBSERVATION POINTS FOR PROPOSED ACTION

SOLUTE	A		B		C		D	
	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)
Se	47	**0.067**	20	0.017	21	0.023	23	**0.070**
Cr	54	0.001	22	0.0003	23	0.0004	23	0.005
Mn	47	0.032	20	0.008	21	0.011	23	**0.06**
SO4	50	48	21	12	22	16	26	87
Zn	46	0.08	19	0.02	21	0.03	24	0.1

Groundwater standard for manganese is 0.05 mg/L. The standard for selenium is 0.05 mg/L.

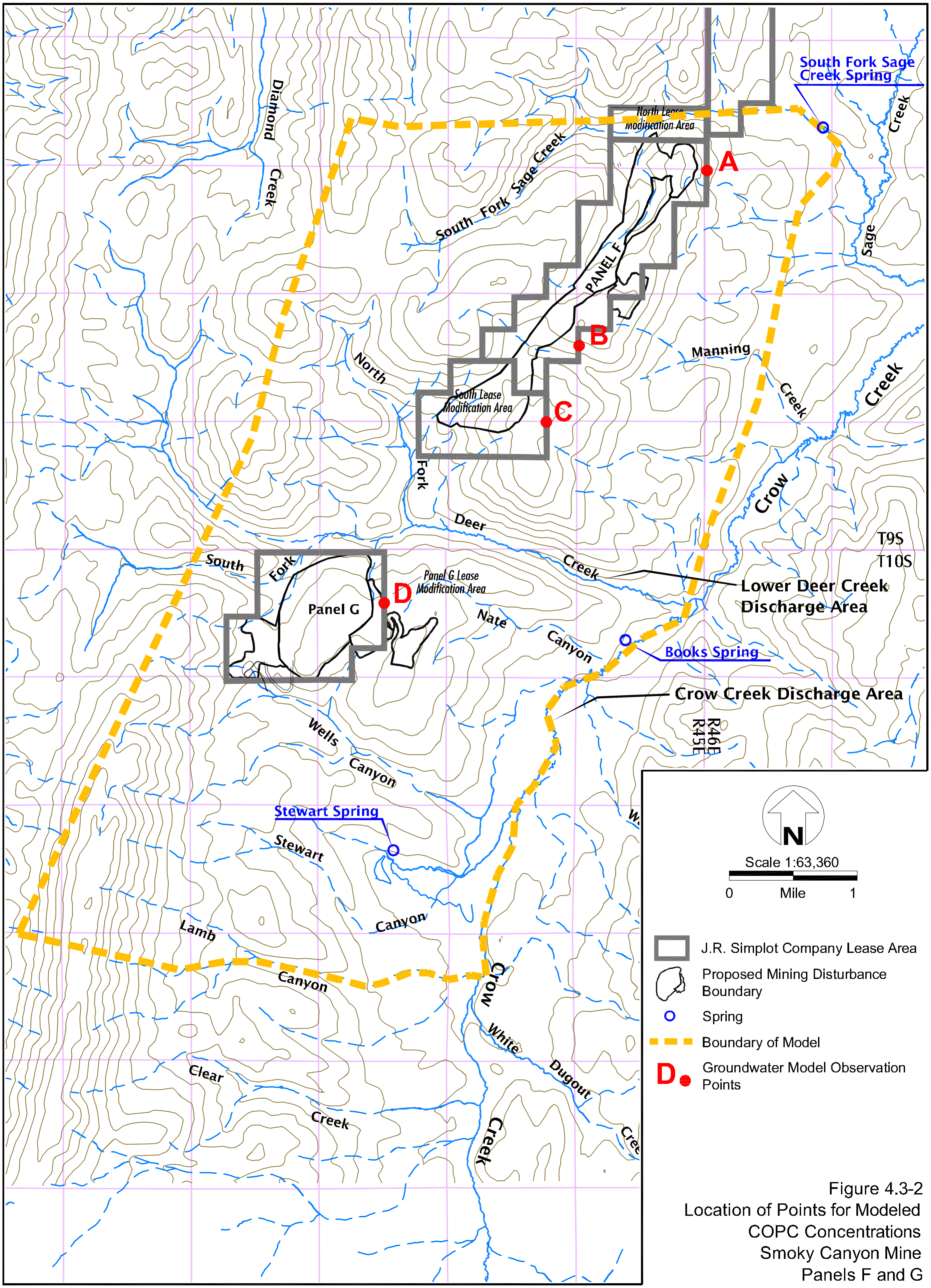


Figure 4.3-2
Location of Points for Modeled
COPC Concentrations
Smoky Canyon Mine
Panels F and G

TABLE 4.3-7 PEAK CONCENTRATIONS AT GROUNDWATER DISCHARGE POINTS FOR PROPOSED ACTION

SOLUTE	SF SAGE		BOOKS		DEER CREEK		CROW CREEK	
	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)
Se	97	**0.010**	70	0.004	52	**0.010***	81	0.004
Cr	108	0.0003	69	0.0003	51	0.0009	80	0.0003
Mn	96	0.005	70	0.004	52	0.012	81	0.004
SO4	100	7	317	7	56	18	371	6
Zn	95	0.01	361	0.01	53	0.02	394	0.01

* Concentration in creek after mixing groundwater discharge with stream water
Surface water quality standard for selenium is 0.005 mg/L.

The values shown in **Table 4.3-6** show that manganese and selenium peak concentrations at observation points A and D are estimated to exceed groundwater standards at the listed times. This would be a major, local effect on groundwater quality for a long-term. It should be noted that the groundwater standard for manganese is a secondary standard based on esthetic reasons and not human health. Maximum concentrations of chromium, sulfate, and zinc are estimated to be below the groundwater standards at the downgradient lease boundaries. **Figure 4.3-3** shows the maximum extent of the area within the aquifer where the estimated selenium concentration exceeds the groundwater standard for selenium (i.e. groundwater plume). This would occur at 47 years after selenium seepage began to enter the groundwater under the mine panels.

The peak values in **Table 4.3-7** for the surface water locations show that selenium is estimated to exceed the surface water standard at South Fork Sage Creek Spring and lower Deer Creek. This would be a major, local effect on surface water quality for a long-term. The peak concentrations of all the other COPCs are estimated to be less than applicable surface water standards at all the discharge locations. Concentrations for sulfate and zinc peak later at Books Spring and Crow Creek because their concentrations in Panel G overburden leachate do not fall as quickly as the other COPCs.

Concentration of selenium in groundwater discharged to lower Deer Creek (**Table 4.3-7**) would be diluted by perennial surface water flow entering lower Deer Creek from above. The main stem and south fork of Deer Creek are intermittent, but there is perennial flow into lower Deer Creek from the north fork of Deer Creek. Based on the water balance information used to develop the groundwater model, perennial flow into Lower Deer Creek from above was 0.35 cfs, and groundwater discharge into lower Deer Creek was 0.9 cfs for a total flow at the mouth of Deer Creek of 1.25 cfs. The baseline selenium concentration in water flowing into lower Deer Creek from above is estimated to be 0.00083 mg/L, which is the average of concentrations from low-flow samples obtained 8/13/03, 10/28/03, and 8/26/04 at SW-DC-500 (Maxim 2004c). The groundwater modeling estimated that the peak selenium concentration in groundwater discharging to lower Deer Creek was 0.014 mg/L. The mixture concentration in the stream flow in lower Deer Creek below the groundwater discharge was estimated by:

$$[(0.9\text{cfs}/1.25\text{ cfs}) \times 0.014\text{ mg/L}] + [(0.35\text{cfs}/1.25\text{cfs}) \times 0.00083\text{ mg/L}]$$

The above formula yields a concentration of the mixture of groundwater and surface water in Deer Creek downstream from the groundwater discharge (0.010 mg/L), which is above the surface water standard of 0.005 mg/L.

Figure 4.3-4 shows the selenium groundwater plume at 100 years for the surface water standard. The time frame of 100 years is roughly coincident with the longest time for the peak concentration of selenium at the groundwater discharge locations. Local recharge from seasonal stream infiltration is the cause of the small area of lower selenium concentration under Manning Creek.

It should be noted that the term groundwater "plume" as used in this EIS means that the modeled concentration of selenium in the Wells formation aquifer everywhere within the boundary of the plume is greater than the referenced standard. When showing the plume for the surface water standard, this means that inside the plume area, selenium concentrations in the aquifer are greater than 0.005 mg/L. This plume only affects overlying surface streams at specific locations where groundwater from the Wells formation aquifer discharges to the surface.

The peak times estimated in the modeling assume steady-state conditions are established at the start of the modeling. That is, all flows through the overburden fills and unsaturated zones beneath the overburden fills are fully established at the beginning of the modeled period. This is an artificial simplification made for modeling purposes that would not be expected in the real field conditions because it will take some time for seepage from the top of the overburden to reach the bottoms of the fills and percolate through the unsaturated zone between the base of the overburden fills and the aquifer water table. This time lag is difficult to accurately estimate. Field observations in southeast Idaho of phosphate mine overburden fills have indicated that some overburden fills have not yet developed any noticeable seepage from their bases whereas seepage has been observed from specific locations at the bases of other overburden fills in less than 10 years. For these reasons, estimating a lag time for the peak concentrations in the groundwater due to wetting up the overburden fills was not included in the groundwater impact analysis, and the time estimates to arrive at the peak concentrations shown in this impact analysis do not include lag times for unsaturated flow in the overburden fills and underlying unsaturated zones in the Wells formation. It is likely that actual times to maximum concentrations in the groundwater would be longer than indicated by the modeling.

There is uncertainty related to the accuracy of the model inputs, including aquifer parameters. All model results are based on these inputs. The effects of the uncertainty of the aquifer parameters are discussed in the modeling report as well as sensitivity analyses that were conducted (JBR 2005a).

The following groundwater flow parameters were tested for sensitivity: hydraulic conductivity, recharge, and porosity. The model was least sensitive to hydraulic conductivity and either doubling or halving the hydraulic conductivity varied the estimated groundwater discharge by less than 6 percent. Changing recharge in the model domain had a greater impact than changing hydraulic conductivity. Varying porosity in the body of the groundwater model had a pronounced effect on the estimated flow velocities of groundwater in the model. Decreasing porosity increased the flow velocity. The values of hydraulic conductivity and porosity estimated from previous pump tests at the Smoky Canyon Mine appeared to produce reasonable results in the groundwater model.

The following solute transport parameters were tested for sensitivity: solute concentration in seepage, seepage quantity, dispersion, and relative amount of preferential flow. The model was most sensitive to solute concentration in seepage. Doubling and halving the concentrations resulted in changes in groundwater concentrations of plus and minus 67 percent. The model was slightly less sensitive to changes in seepage quantity. Doubling and halving the seepage

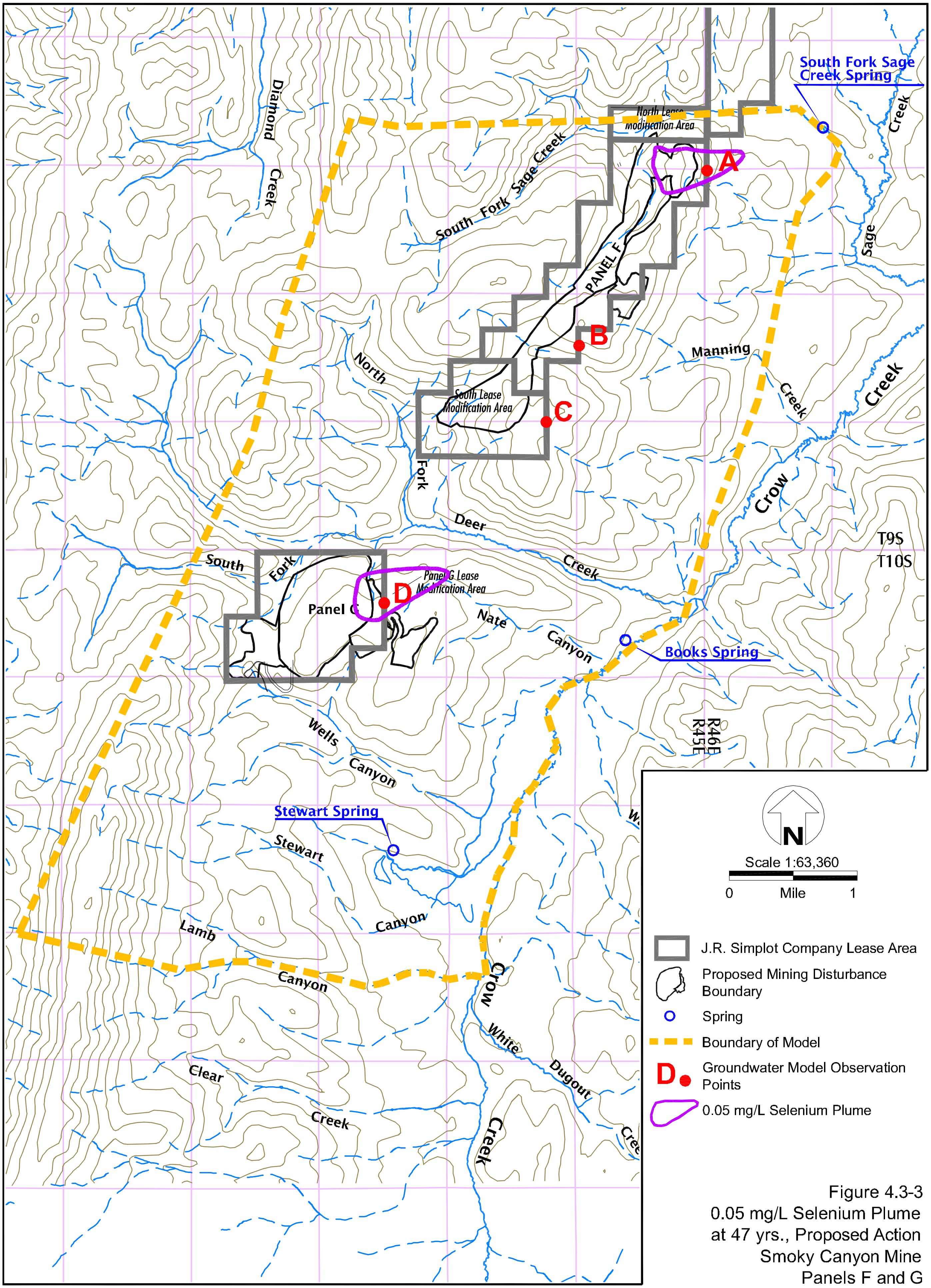


Figure 4.3-3
0.05 mg/L Selenium Plume
at 47 yrs., Proposed Action
Smoky Canyon Mine
Panels F and G

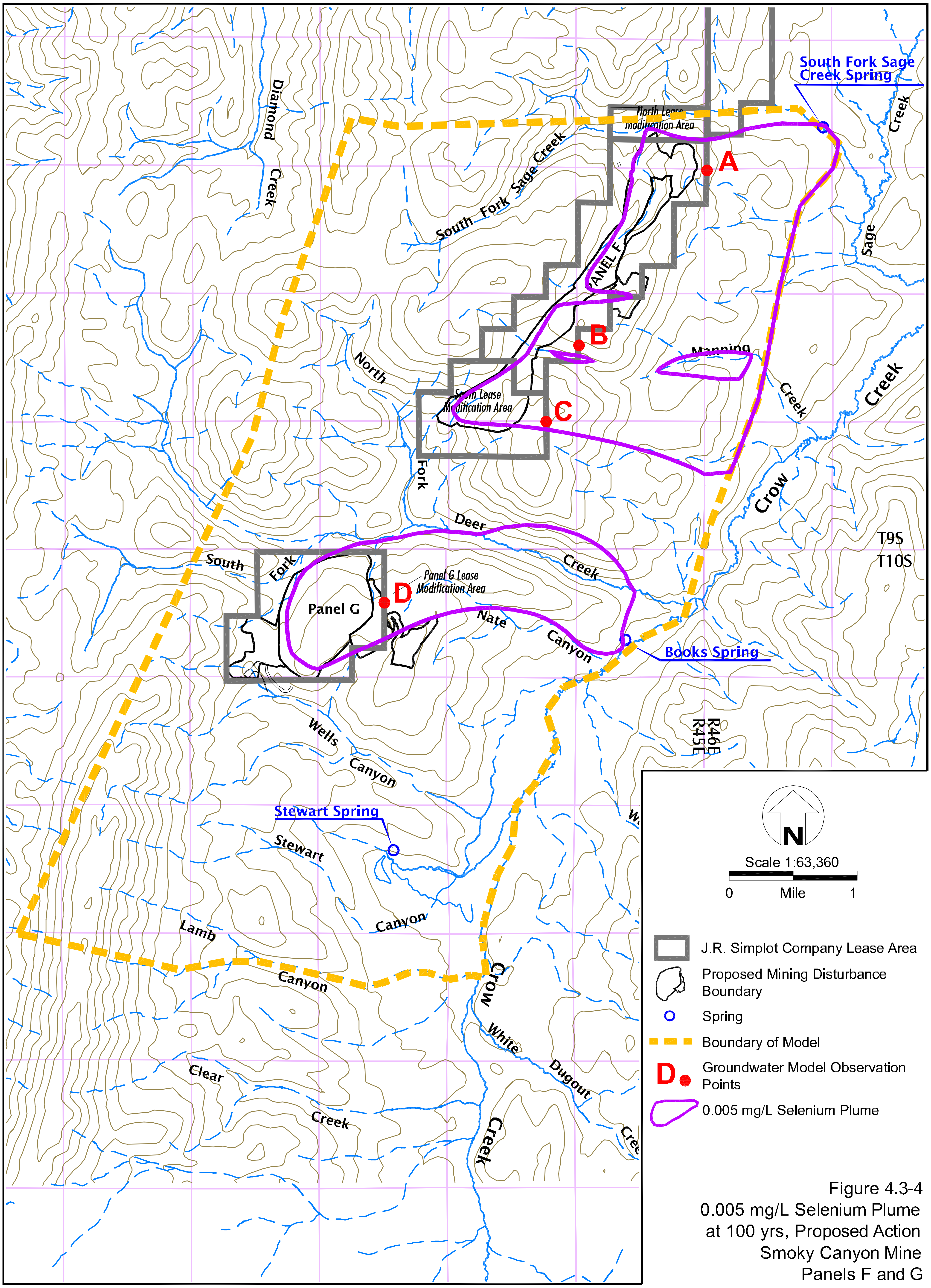


Figure 4.3-4
0.005 mg/L Selenium Plume
at 100 yrs, Proposed Action
Smoky Canyon Mine
Panels F and G

rate resulted in changes in groundwater concentrations of 40 to 60 percent. Doubling and halving dispersivity produced changes in groundwater concentrations from 3 to 39 percent. Doubling and halving the amount of preferential flow through the overburden produced changes in groundwater concentrations of 6 to 20 percent.

Groundwater Quality Impact for Wells Formation due to Panel E Pit Backfill

The groundwater effects of backfilling Pit E-0 were not modeled as this area was outside the model domain. However, there are very strong similarities between Panels E and F that can be used to estimate the effects on groundwater as a result of backfilling this pit.

The overburden backfill and groundwater flow characteristics in Panel E are expected to be very similar to those under the northern portion of the Panel F backfill. The lithology and leaching characteristics of the overburden used in the backfill in both panels is essentially the same material. The characteristics of the seepage through the Panel E backfill, both in rate and chemistry, are expected to be very similar to those estimated for Panel F. The groundwater regime under the Panel E backfill is also similar to that under Panel F. In both cases, the groundwater that could be affected is contained in the Wells formation and is flowing toward the east. Past studies of the groundwater at the Smoky Canyon Mine suggested the groundwater flowing under Panel E discharges at Hoopes Spring and not South Fork Sage Creek Spring (JBR 2001b).

The similarities in seepage chemistry and groundwater flow for Pit E-0 suggest that groundwater chemistry impacts downgradient of the Pit E-0 backfill alone would be similar to those estimated for the northern part of Panel F.

A big difference between the existing Pit E-0 site and the proposed Panel F backfill is that the area surrounding Panel E has already been used for overburden disposal in upgradient (west) pit backfills and an external overburden fill downgradient (east) of Pit E-0. The overburden placed in these locations was mined at Panel E and may not have exactly the same lithology and geochemistry as Panel F. The COPCs in seepage through the Panel E overburden are expected to be the same as Panel F but the concentrations in the seepage could be different. This seepage through the existing overburden fills around Pit E-0 would affect groundwater chemistry in addition to any effects caused by the Pit E-0 backfill. The groundwater effects from the existing Panel E overburden fills is outside of the scope of this EIS and is being studied under separate AOC studies being conducted under the authority of the USFS, IDEQ and other agencies. Taken in concert with the existing situation around Pit E-0, the effect of the seepage through the Pit E-0 backfill would likely be minor, local, and long-term. Any groundwater impacts resulting from the E-0 backfill, whether minor or major, would be addressed along with the collective impacts from the other Panel E and D pit backfills through actions taken under the AOC.

Proposed Action Effects on Springs

Certain springs or seeps could be affected by the proposed disturbance; their locations relative to the Proposed Action components are shown in **Figure 3.3-3**. These are described in **Table 4.3-8** and are discussed in the following sections.

TABLE 4.3-8 GROUNDWATER DISCHARGES POTENTIALLY AFFECTED BY THE PROPOSED ACTION

SPRING/SEEP	FLOW (CFS)	POTENTIAL EFFECT
PANEL F		
SP-UTSFSC-100	0.01	Physically disrupted by mining Panel F
SP-UTSFSC-200	0.01	Physically disrupted by mining Panel F
SP-MC-300	0.04	Physically disrupted by mining Panel F
SP-UTNFDC-400	0.005	Physically disrupted by mining Panel F
SP-UTNFDC-600	0.007	Physically disrupted by mining Panel F
SP-SFSC-750	4.5*	Water quality affected by seepage from overburden
SP-UTSC-850	0.0007	Water quality affected by seepage from overburden
SP-UTNFDC-540	0.014	Reduced upgradient recharge by mining Panel F
SP-UTNFDC-530	NM	Reduced upgradient recharge by mining Panel F
PANEL G		
SP-UTDC-800	0.002	Physically disrupted by mining Panel G
SP-UTDC-700	0.003	Reduced upgradient recharge by mining Panel G
SP-UTWC-300	0.09	Covered by overburden from Panel G
SP-UTSFDC-500	0.002	Covered by overburden from Panel G
SP-DC-100	0.004	Covered by road fill from West Haul/Access Road
SP-DC-120	NM	Covered by road fill from West Haul/Access Road
SP-WC-400	0.3	Water quality affected by seepage from overburden
SP-UTSFDC-600	Wet	Water quality affected by seepage from overburden
SP-Books	2.9*	Water quality affected by seepage from overburden
Lower Deer Creek	0.9*	Water quality affected by seepage from overburden
Crow Creek	1.8*	Water quality affected by seepage from overburden

Note: Flow rates are approximate averages from measurements in Maxim (2004d) except where indicated with "*", which are flow rates used in groundwater modeling.
One cfs = 449 gpm, NM=not measured, Wet=unmeasurable low flow

4.3.1.1 Proposed Action

Panel F, Including Lease Modifications

Groundwater quality impacts to the Wells formation aquifer from meteoric water leaching of the Panel F backfill has been described above in **Tables 4.3-6** and **4.3-7** and **Figures 4.3-3** and **4.3-4**. Quality of groundwater under and immediately downgradient of the mine panel backfill would be affected by increased concentrations of COPCs. The modeled peak concentrations of these solutes were less than the applicable groundwater quality standards at the down gradient lease boundaries with the exception of selenium at observation point A.

Much of the Wells formation groundwater that discharges at South Fork Sage Creek Spring (SP-SFSC-750) flows under Panel F and quantities of COPCs added to this groundwater under the mine panel would flow eastward toward the thrust fault and then north along the fault to discharge at South Fork Sage Creek Spring. Modeled peak concentrations of COPCs at this spring were all less than the applicable surface water quality standards with the exception of selenium. Selenium concentrations are estimated to peak at about 100 years from when the COPCs are added to the groundwater and the calculated peak selenium concentration (0.010 mg/L) would be about twice the surface water standard (0.005 mg/L). Baseline data indicate the selenium concentration in Wells formation groundwater upgradient of the spring at MC-MW-1 is below the detection limit for selenium (Maxim 2004d). The effect of the Proposed Action on the water quality of this spring would be major, long-term, and local (see page 4-1 for definitions).

The small spring (SP-UTSC-850) located along the Meade Thrust Fault south of South Fork Sage Creek Spring (**Figure 3.3-3**) was not included in the groundwater modeling because of its small flow and uncertainty if it was connected to the Wells formation aquifer. If the spring is supported by shallow, alluvial groundwater flow, it might not be affected by the mining activities. If it is connected to the same groundwater flow system along the fault zone as South Fork Sage Creek Spring, it is expected to exhibit similar water quality effects to water chemistry.

The springs/seeps that are described in **Table 4.3-8** as being physically disrupted by mining Panel F would be excavated by the mining activity and the ground at the seep/spring site broken up and removed. Reclamation would replace overburden back into these locations but the hydraulic conditions that naturally supported the spring/seeps could not be restored to pre-mining conditions. Therefore, it is assumed that these springs/seeps would be permanently removed by the mining. Panel F mining operations would disrupt five small springs located within the disturbance footprint of the mine panel. One of these springs, SP-MC-300 is located just west of the Panel F highwall and could potentially be outside the disturbance limits but is assumed for this impact analysis to be likely disrupted by the mining operations. The effect of the Proposed Action mining on these disrupted springs would be moderate to major, site-specific, and long-term.

For the two Panel F springs and seeps identified in **Table 4.3-8** as potentially being affected by reduced upgradient recharge, mining would excavate the Rex Chert and/or Meade Peak members uphill from the seep or spring location. This would replace part of the existing, shallow groundwater flow conditions upgradient of the seep or spring with a backfilled mine pit that would likely redirect most recharge downward to the Wells formation. This redirection of the recharge could reduce lateral, shallow groundwater flow to the spring/seep in question. Backfilling the pit against the Rex Chert highwall could result in seleniferous pit backfill leaching small quantities of COPCs into the Rex Chert. Any added amounts of these COPCs could potentially flow to the downhill springs. These effects are uncertain because the exact groundwater sources and upgradient flow conditions for the listed springs/seeps are not known. The effect of the Proposed Action mining on these springs with reduced recharge would be moderate to major, site-specific, and long-term.

<u>Panel F Haul/Access Road</u>
The Panel F Haul/Access Road would largely be built over the outcrop area of the Wells formation with clean fill obtained from cuts in that lithology. There should be no impacts to groundwater quality or flow from this road. There are no mapped seeps or springs that would be affected by construction of this road.

<u>Panel G</u>
Groundwater quality impacts in the Wells formation aquifer from meteoric water leaching of the Panel G backfill has been described above in **Tables 4.3-6** and **4.3-7** and **Figures 4.3-3** and **4.3-4**. Quality of groundwater under and immediately downgradient of Panel G at the lease boundary is estimated to be affected by increased concentrations of COPCs. The modeled peak concentrations of these solutes were less than the applicable groundwater quality standards at observation point D with the exception of selenium and manganese, which are estimated to exceed their respective groundwater standards (**Table 4.3-6**). The effect of mining on the groundwater quality under and down gradient of Panel G under the Proposed Action would be major, local, and long-term.

Field observations and the groundwater modeling indicate that Wells formation groundwater flowing under Panel G in the Wells formation aquifer can discharge to the surface environment at lower Deer Creek, Books Spring, and Crow Creek upstream of Books Spring. Modeled peak concentrations of all COPCs at Books Spring and discharge to Crow Creek are greater than background and lower than applicable surface water standards (**Table 4.3-7**). Modeled peak concentrations of COPCs at lower Deer Creek indicate all COPC concentrations at the spring discharge would be less than the applicable surface water quality standards with the exception of selenium. Selenium concentrations are estimated to peak at about 52 years from when the COPCs are added to the groundwater, and the resulting peak selenium concentration in the creek (0.010 mg/L) is estimated to be about twice the surface water standard (0.005 mg/L). The baseline selenium concentration in the stream at the point where the groundwater discharge occurs is about 0.0008 mg/L. The effect of mining Panel G on the water quality of this reach of Deer Creek would be major, local, and long-term.

The Panel G South Overburden Fill would be located over outcrop of the Rex Chert and would be constructed of chert with a topsoil cover. Baseline studies have shown that the Rex Chert member in this location contains groundwater (**Section 3.3.5**). Aquifer parameters and average water quality chemistry for the Rex Chert aquifer in this area have been determined from well DC-MW-3 located a short distance north of the South Overburden Fill (**Figure 3.3-8**).

The Rex Chert is contained on top of the Meade Peak member aquitard within the downward-folded Webster Syncline (Section D-D’, **Figure 3.1-3**). This fold plunges toward the north-northeast, meaning the bottom of the Rex Chert is inclined toward the north-northeast, and the groundwater within the Rex Chert is also moving in that direction. The Panel G South Overburden Fill is located over an outcrop area of the Rex Chert in the narrow portion of the syncline. Downward percolating recharge water through the overburden placed in this fill would eventually enter the groundwater in the Rex Chert and affect its water chemistry.

Column testing of the Panel G chert overburden material indicated the results shown in **Table 4.3-5**. The average pore volume analytical results shown in **Table 4.3-9** were used to characterize the seepage from the Panel G South Overburden Fill to the deep groundwater system. As discussed before, cadmium was determined to be fully attenuated by reaction with alkalinity in the soil and bedrock underlying the overburden fill.

Seepage from the overlying chert overburden (annual average 11.6 gpm) was mixed with the amount of Rex Chert groundwater estimated to flow under the overburden fill (3.8 gpm), having the baseline water quality shown in **Table 4.3-9** yielding the final concentrations shown in the table.

TABLE 4.3-9 COPC CONCENTRATIONS IN REX CHERT GROUNDWATER UNDER THE PANEL G SOUTH OVERBURDEN FILL

ANALYTE	BACKGROUND CONC.	MODELED SEEPAGE CONC.	MODELED FINAL CONC.	SW/GW STANDARDS
Cr	0.00015	0.002	0.0015	0.01 / 0.1
Mn	0.0135	0.235	0.181	NS/0.05s
Se	0.00058	0.003	0.0024	0.005 / 0.05
SO_4	38.1	8	15.4	NS/250s
Zn	0.00073	0.05	0.04	0.105 / 5.0s

Note: Background groundwater concentrations shown are the average of samples obtained from DC-MW-3 on 10/11/03 and 6/30/04 (Maxim 2004d). Seepage concentrations are average of PV1 – PV10 for Panel G Chert. Final concentrations are equal to: background conc. x 0.247 + seepage conc. x 0.753.

These results indicate that COPC concentrations in the Rex Chert groundwater after mixing with the overburden seepage (total concentration) are expected to be greater than background but would not exceed any surface water or primary (health-based) groundwater standards. Manganese is estimated to exceed the secondary (esthetics-based) groundwater standard. The effect of this overburden fill on the water quality of the Rex Chert aquifer would be minor, local, and long-term.

SP-WC-400 is described as discharging from the Rex Chert at the contact with the Meade Peak member (Maxim 2004c). This spring is located about 200 feet downhill from the proposed toe of the Panel G South Overburden Fill **(Figure 3.3-3**). The potential groundwater chemistry impact to the Rex Chert aquifer under this overburden fill was previously described. The water chemistry of groundwater discharging at SP-WC-400 could be affected the same as the Rex Chert aquifer under the Panel G South Overburden Fill in this area (**Table 4.3-9**). The actual chemistry effect to this spring would likely be less than to the groundwater under the overburden fill because Rex Chert groundwater under the overburden fill is thought to be moving toward the northeast, and the spring is located south of the overburden fill. Effects would be from manganese only; the other COPCs could be above baseline but below applicable standards.

SP-UTSFDC-600 is a very small seep located immediately north of the Panel G South Overburden Fill within an area underlain by Rex Chert (**Figure 3.3-3**). If the water discharged at the seep is only from the Rex Chert aquifer, its chemistry could be affected the same at the Rex Chert aquifer under the nearby Panel G South Overburden Fill (**Table 4.3-9**).

A small spring located within the footprint of the Panel G pit (SP-UTDC-800) would be physically disrupted by mining and would be eliminated (**Figure 3.3-3**). Another small spring downhill of Panel G (SP-UTDC-700) could have its flow reduced or eliminated because the Panel G excavation would decrease the uphill recharge area. The effect of mining on these springs would be major, local, and long-term.

Groundwater flow to the springs/seeps that would be covered by overburden or road fills would not necessarily be physically disrupted, but the seeps/springs would be buried and removed from their current surface environment. Groundwater flow could still discharge at these locations under the overburden or road fill material. Whether or not these springs/seeps would eventually discharge again to the surface environment through the fill material cannot be accurately predicted. Groundwater discharging at these new down slope locations may be chemically affected by passing through the overburden or road fill material. Two springs that would be covered with the Panel G South Overburden Fill (SP-UTWC-300 and SP-UTSFDC-500) would be covered with chert that has low potential to generate problematic concentrations of COPCs. The effect of mining Panel G on these springs would be major, site-specific, and long-term.

For mining Panel G, Simplot proposes to install a water supply well at the west side of the panel that would obtain an average of 100 gpm from the Wells formation (**Figure 2.4-1**). Water for dust control and other uses at Panel F would be hauled in water trucks from the existing Smoky Canyon Mine. This well would be pumped as needed (primarily in summer and fall) during the life of that mine panel. An estimate of the extent of the draw down from this well on the Wells formation aquifer was made using the same groundwater model described in **Section 3.3.6**. For this modeling, it was estimated that the well pumped at 100 gpm, and the maximum extent of the draw down was delineated for the steady state condition. This showed that maximum draw down at the well would be approximately 20 feet. Modeled draw down was negligible at the nearest points of discharge for the Wells formation aquifer, Stewart Spring and Lower Deer Creek, over two miles away from the pumping well. There are no other water wells or springs tapping this aquifer within the predicted area of noticeable draw down. The amount of water removed from the well each year, assuming constant pumping, approximately 161 acre-feet per year, is about 1.5 percent of the estimated annual recharge for the model area, 11,100 acre-feet per year. The Proposed Action well would produce a negligible, local and short-term effect on the water table in the Wells formation aquifer.

Panel G West Haul/Access Road

The Panel G West Haul/Access Road would not affect groundwater quality or flow. The road fill may cover two springs, SP-DC-100 and SP-DC-120 in the upper reaches of the Deer Creek drainage (**Figure 3.3-3**).

Power Line Between Panels F and G

The power line from Panel F to Panel G would not affect groundwater quality or flow.

4.3.1.2 Mining Alternatives

The effects of the different mining alternatives on water quality in the Wells formation aquifer were modeled separately and are discussed in the following narrative. The selenium concentrations were estimated by the groundwater model at the same observation points and groundwater discharges discussed for the Proposed Action (**Table 4.3-10**). Estimated concentrations greater than applicable groundwater or surface water standards are shown in bold face.

TABLE 4.3-10 MODELED PEAK SELENIUM CONCENTRATIONS FOR MINING ALTERNATIVES (MG/L)

LOCATION	TIME (YR)	ALT. A	ALT. B	ALT. C	ALT. D
A	47 - 60	**0.067**	**0.051**	**0.052**	**0.023**
B	20 - 22	0.017	0.017	0.017	0.009
C	18 - 23	0.000	0.023	0.023	0.011
D	23 - 26	**0.070**	**0.056**	**0.056**	**0.032**
SF Sage Sp.	85 - 109	**0.008**	**0.009**	**0.010**	**0.0048**
Books Sp.	70 - 326	0.004	0.004	0.004	0.0029
Deer Creek	52 - 55	**0.010***	**0.009***	0.009*	**0.0048***
Crow Creek	81 - 374	0.004	0.003	0.003	0.0026

* Concentration in creek after mixing groundwater discharge with stream water

Mining Alternative A – No South and/or North Panel F Lease Modifications

Groundwater quality impacts from Panel F would be reduced under this alternative compared to the Proposed Action because the surface area of ROM backfill would be reduced by the portion of the open pits that would be in the north and south lease modification areas.

No Panel F North Lease Modification

The reduction in pit backfill surface area for the North Lease Modification is only 2 acres compared to the 435 acres of the rest of the Proposed Action Panel F mine area. This 0.5 percent reduction would have a negligible effect on the groundwater quality impact for Panel F compared to the Proposed Action.

No Panel F South Lease Modification
The reduction in pit backfill surface area for the South Lease Modification is 138 acres, or about 32 percent of the Proposed Action Panel F backfill area. The groundwater model was run for this alternative to estimate the groundwater quality impacts.

The only COPC modeled in Alternatives A, B, and C was selenium because its groundwater impacts in the Proposed Action were greater than other COPCs. The main difference in source characterization for Alternative A is the elimination of the pit backfill in the South Lease Modification area. The peak selenium concentrations and times for Alternative A are shown in **Table 4.3-10**.

Modeled concentrations exceeded the groundwater standard at observation points A and D in Alternative A. **Figure 4.3-5** shows the selenium plumes for the groundwater standard at 48 years when concentrations peaked in Observation Point A. These results at the observation points are essentially the same as for the Proposed Action.

Modeled selenium concentrations exceeded the surface water standard of 0.005 mg/L at South Fork Sage Creek Spring and lower Deer Creek. **Figure 4.3-6** shows the selenium plume at the surface water standard concentration at 100 years, which is approximately the time the concentrations peak at South Fork Sage Spring. The groundwater discharge result at lower Deer Creek is the same as for the Proposed Action, and the estimated concentration in lower Deer Creek after mixing with the stream water is the same (0.010 mg/L). The maximum selenium concentration at South Fork Sage Creek Spring in Alternative A (0.008 mg/L) is less than the result for the Proposed Action (0.01 mg/L) and occurs a few years sooner; 85 years in Alternative A compared to 97 years for the Proposed Action. The effect of this alternative on the groundwater quality under and down gradient of the mine panels would be major, local, and long-term.

The most noticeable difference between Alternative A and the Proposed Action results is the size and distribution of the Panel F plume. The southern portion of the Panel F plume in Alternative A is essentially gone compared to the Panel F plume for the Proposed Action, and the peak selenium concentration at South Fork Sage Spring is less. These reductions occur because the contaminant source in the South Lease Modification Area of Panel F is eliminated in Alternative A compared to the Proposed Action. This is also likely the reason why the concentration peaks in South Fork Sage Creek Spring a little earlier in Alternative A compared to the Proposed Action.

If the South Lease Modification was not mined, four springs (SP-UTNFDC-400, SP-UTNFDC-530, SP-UTNFDC-540, and SP-UTNFDC-600) that would or could be affected by the Proposed Action would be left unaffected.

Groundwater impacts to water quality and quantity from Panel G would remain the same under this alternative as for the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills
The only COPC modeled in Alternative B was selenium for the same reasons as Alternative A. The main difference in source characterization between this alternative and the Proposed Action is that long-term disposal of seleniferous overburden is eliminated from the external overburden fills for both panels. The peak concentrations and times for selenium are shown in **Table 4.3-10**.

Modeled selenium concentrations exceeded the groundwater standard at observation points A and D in Alternative B. **Figure 4.3-7** shows the selenium plumes for the groundwater standard at 50 years, when concentrations peaked in observation point A. The shapes of these plumes are very similar to those for the Proposed Action. The peak concentration at observation point A under this alternative (0.051 mg/L) is less than the Proposed Action (0.067 mg/L). The peak concentration at observation point D (0.056 mg/L) is less than the Proposed Action (0.07 mg/L). These reductions are due to reduced surface area of seleniferous overburden up gradient of these observation points. However, these reductions in groundwater concentrations may be overstated because the model runs assumed there would be no seleniferous overburden in the external overburden fills at any time, whereas there would be temporary storage of seleniferous overburden in the overburden fills during mining, and this seleniferous material would be relocated to the pit backfills at the end of mining.

Modeled selenium concentration exceeded the surface water standard of 0.005 mg/L at South Fork Sage Creek Spring and lower Deer Creek. The result at South Fork Sage Creek Spring (0.009 mg/L) is less than the Proposed Action (0.01 mg/L). The selenium concentration for the groundwater discharge at Lower Deer Creek in Alternative B (0.0127 mg/L) is less than for the Proposed Action (0.0143 mg/L). Again, this difference may be overstated. The estimated selenium concentration in Deer Creek after mixing with surface flow is 0.009 mg/L.

Figure 4.3-8 shows the selenium plume at the surface water standard at 100 years, which is approximately the time the concentrations peak at South Fork Sage Creek. The shape of this plume is very similar to that for the Proposed Action. Like the Proposed Action, the effect of this alternative on the groundwater quality under and down gradient of the mine panels would be major, local, and long-term.

Mining Alternative C – No External Overburden Fills At All

As in Alternatives A and B, the only COPC modeled for Alternative C was selenium. The main difference in source characterization between this alternative and the Proposed Action is that seleniferous overburden is eliminated from the external overburden fills, which is the same effect as for Alternative B. The peak concentrations and times for Alternative C for selenium are shown in **Table 4.3-10**.

Similar to the Proposed Action and Alternative B, modeled selenium concentrations exceeded the groundwater standard at observation points A and D in this alternative. **Figure 4.3-9** shows the selenium plume for the groundwater standard at 50 years when concentrations peak in observation point A. The shapes of these plumes are very similar to those for the Proposed Action and are essentially the same as Alternative B.

Modeled selenium concentrations exceeded the selenium surface water standard of 0.005 mg/L at South Fork Sage Spring and Deer Creek. The concentration at lower Deer Creek is the same as for Alternative B. The concentration at South Fork Sage Creek Spring is slightly higher than Alternative B and the same as the Proposed Action. This is because Pit 4 of the Proposed Action and Alternative B would be filled with seleniferous overburden in Alternative C. This negates the beneficial effect of eliminating seleniferous overburden from the Panel F external overburden fill.

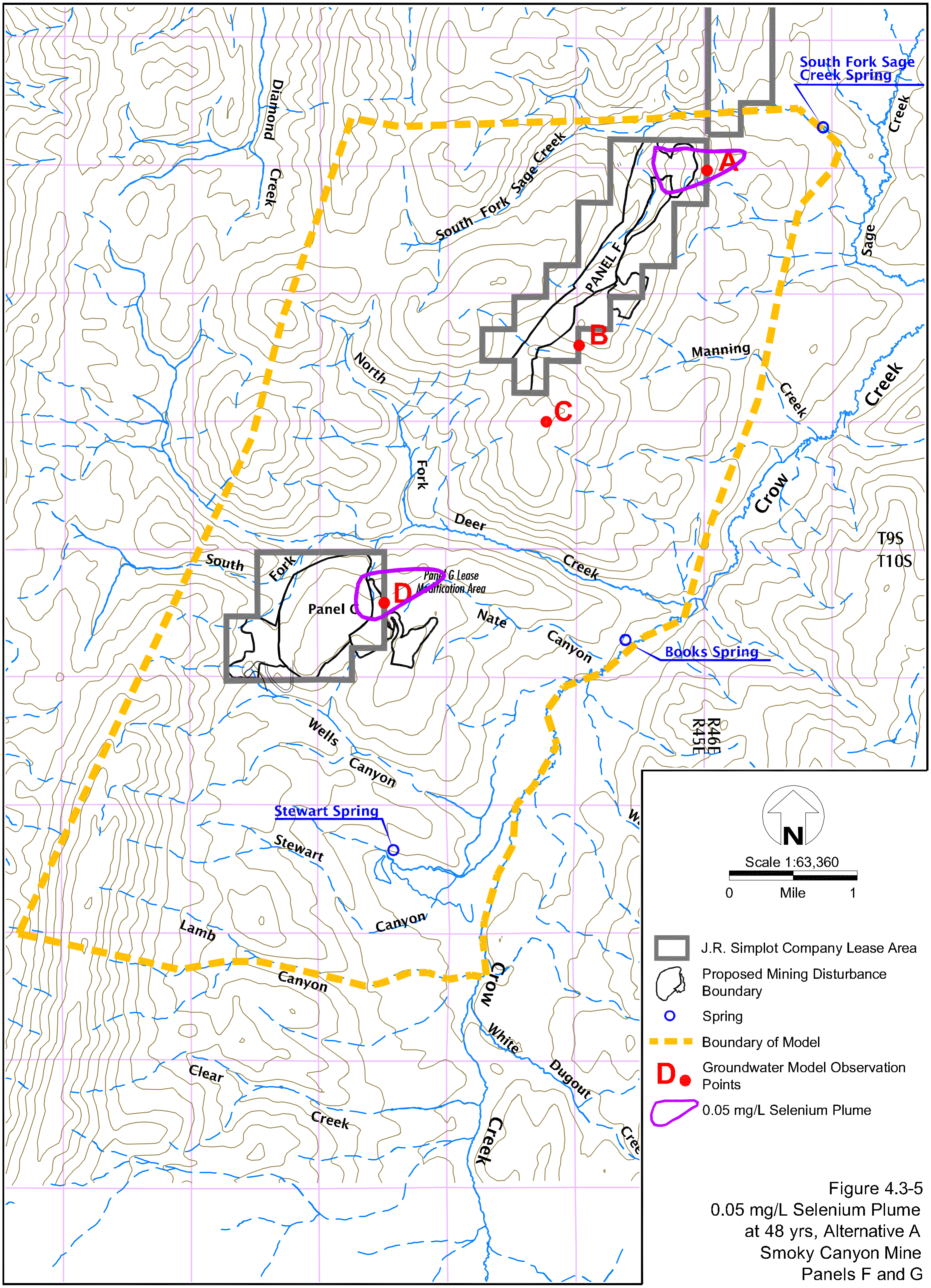


Figure 4.3-5
0.05 mg/L Selenium Plume
at 48 yrs, Alternative A
Smoky Canyon Mine
Panels F and G

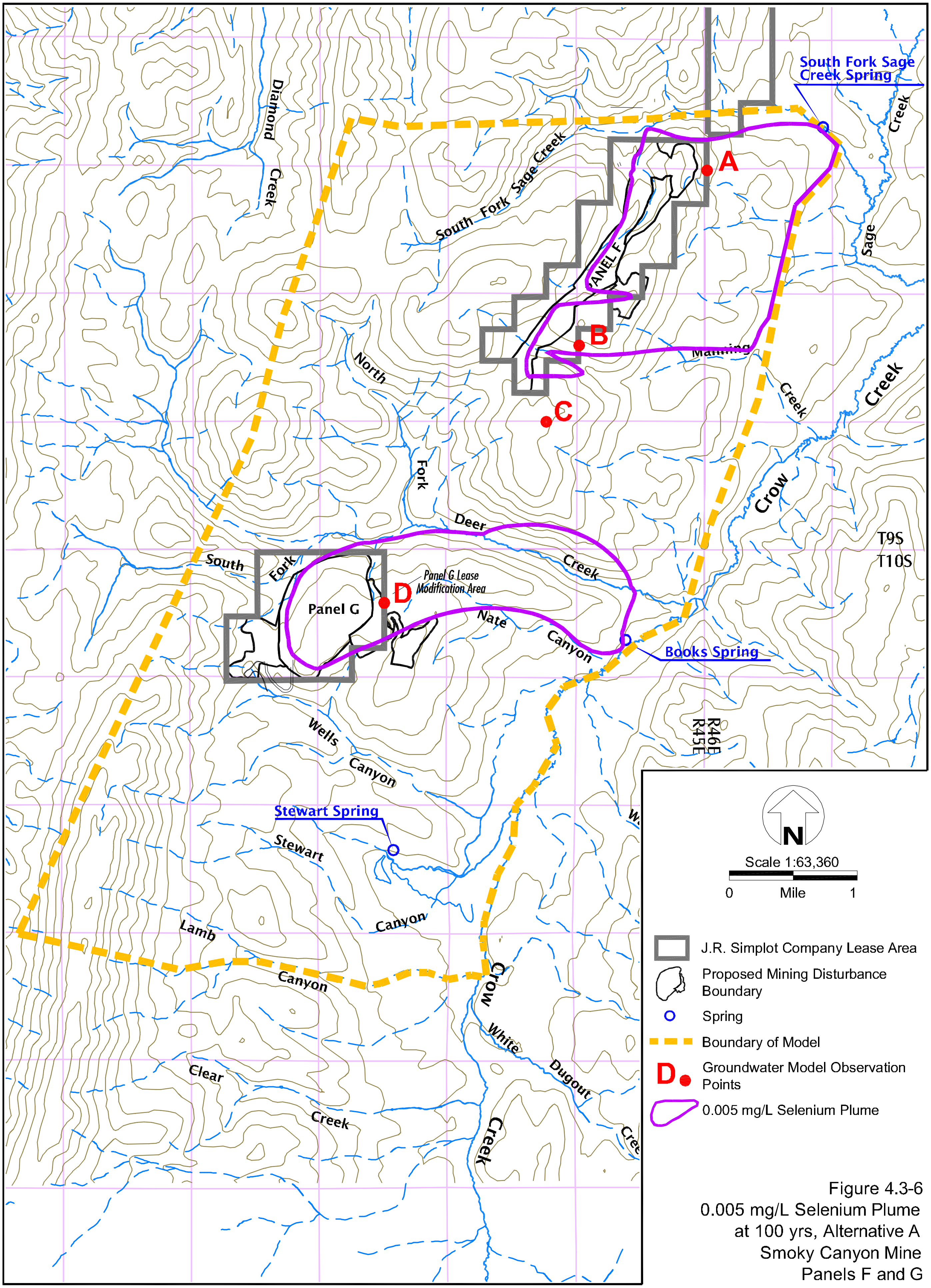


Figure 4.3-6
0.005 mg/L Selenium Plume
at 100 yrs, Alternative A
Smoky Canyon Mine
Panels F and G

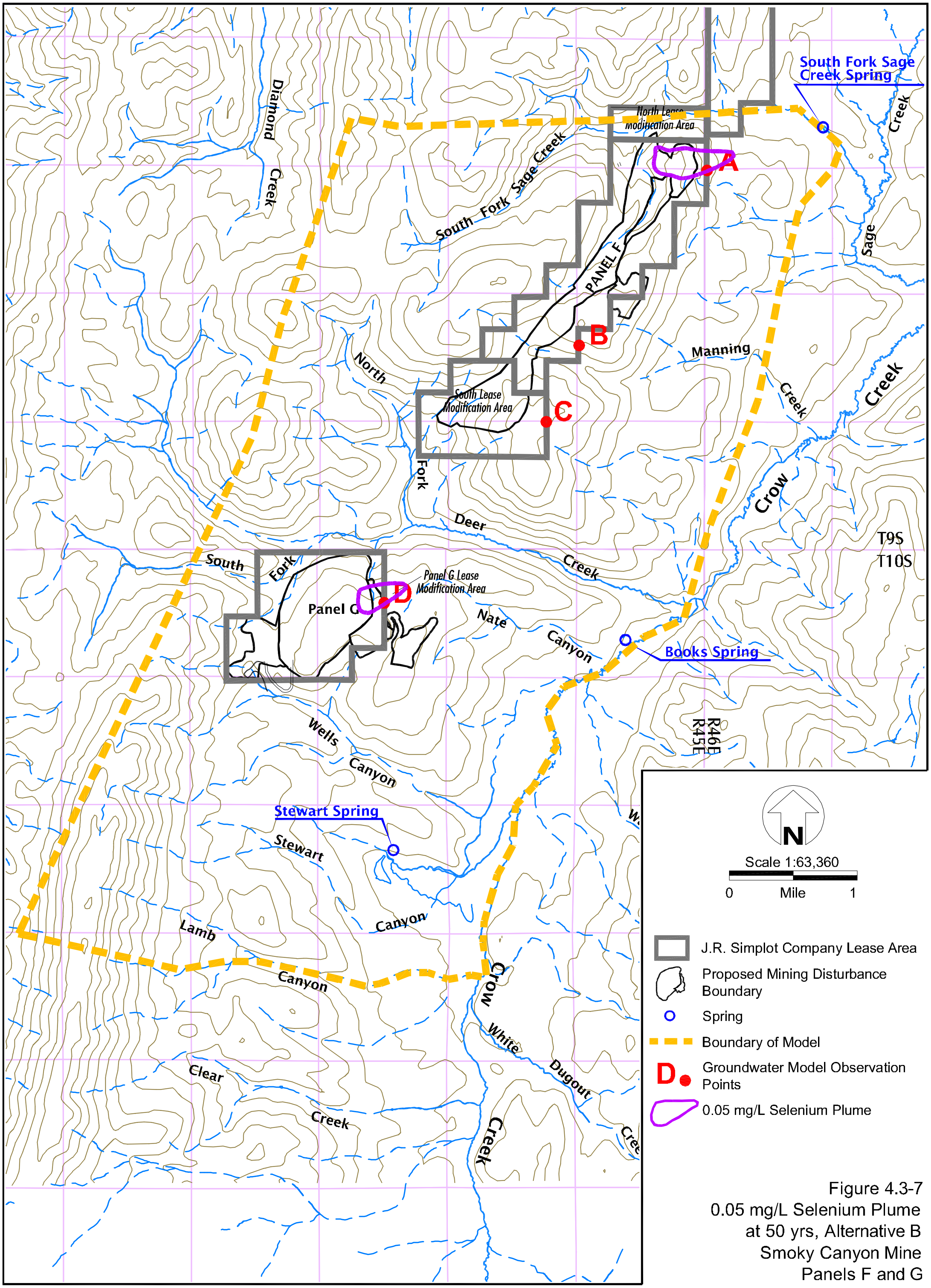


Figure 4.3-7
0.05 mg/L Selenium Plume
at 50 yrs, Alternative B
Smoky Canyon Mine
Panels F and G

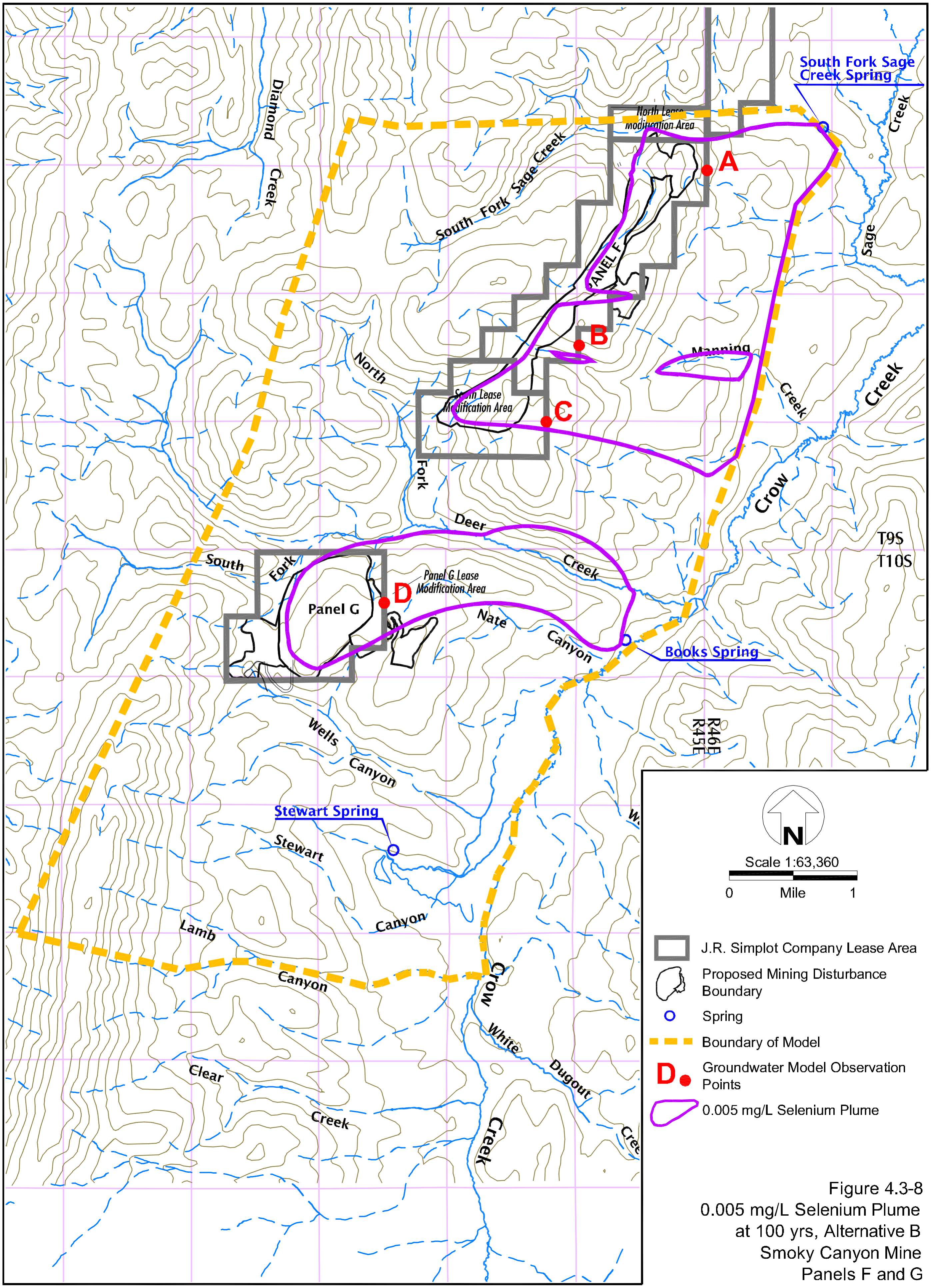


Figure 4.3-8
0.005 mg/L Selenium Plume
at 100 yrs, Alternative B
Smoky Canyon Mine
Panels F and G

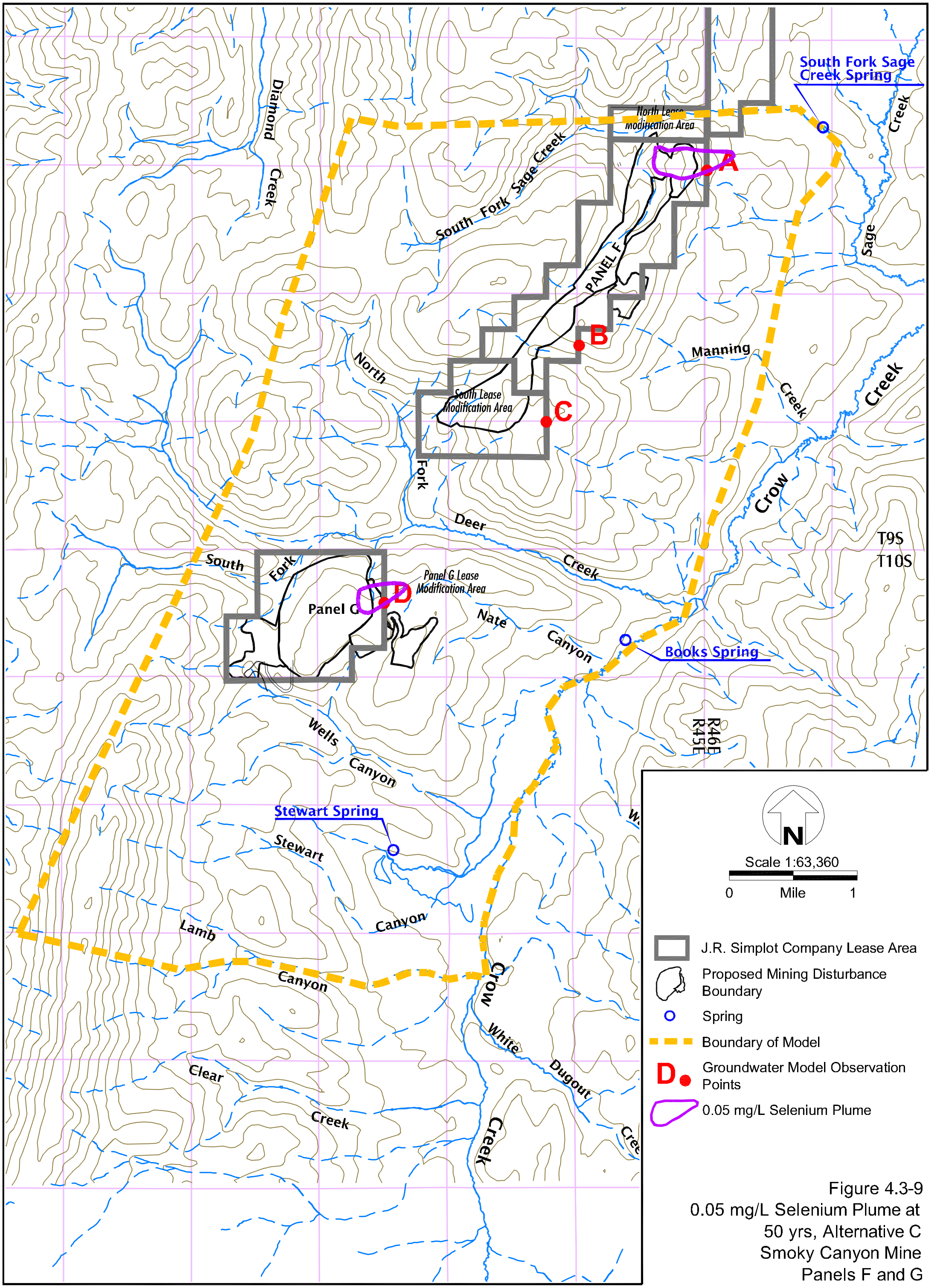


Figure 4.3-9
0.05 mg/L Selenium Plume at 50 yrs, Alternative C
Smoky Canyon Mine
Panels F and G

Figure 4.3-10 shows the selenium plume at the surface water standard at 100 years, which is approximately the time the concentrations peak at South Fork Sage Creek. The shape of this plume is very similar to that for the Proposed Action and the same as Alternative B. Like the Proposed Action, the effect of this alternative on the groundwater quality under and down gradient of the mine panels would be major, local, and long-term.

Mining Alternative D – Infiltration Barriers on Overburden Fills

An iterative process was used to determine maximum infiltration rates at Panels F and G so that the surface water standard for selenium would not be exceeded at any of the Wells formation surface discharge locations. When the surface water standard for selenium was met at the groundwater discharges, the groundwater quality at the observation points also complied with the groundwater standard for selenium. A recharge rate of 0.8 in/yr infiltration for the northern portion of Panel F (Pits 1 and 2) and 1.5 in/yr for the southern portion of Panel F (Pit 3) resulted in a peak selenium concentration at South Fork Sage Creek Spring (0.0048 mg/L) of just under the surface water standard.

A recharge rate of 1.2 inches/year throughout the Panel G backfill and the east external overburden fill resulted in a low enough peak selenium concentration at lower Deer Creek (0.0063 mg/L), which after mixing with stream flow, results in a concentration in the stream (0.0048 mg/L) of just under the surface water standard of 0.005 mg/L.

The maximum concentrations of all the COPCs at the observation points and discharge locations were then obtained for the model runs with these maximum percolation rates. These values are shown in **Tables 4.3-11** and **4.3-12**.

TABLE 4.3-11 MODELED PEAK CONCENTRATIONS AT OBSERVATION POINTS FOR INFILTRATION BARRIER

PROPOSED ACTION	A		B		C		D	
	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)
Cr	65	0.0004	23	0.0002	24	0.0002	25	0.0021
Mn	59	0.011	22	0.004	23	0.006	26	0.027
Se	60	0.023	22	0.009	23	0.011	26	0.032
SO_4	62	16	22	6	23	8	29	38
Zn	59	0.03	21	0.01	22	0.01	27	0.04

TABLE 4.3-12 MODELED PEAK CONCENTRATIONS AT DISCHARGE POINTS FOR INFILTRATION BARRIER

PROPOSED ACTION	SF SAGE		BOOKS		DEER CREEK		CROW CREEK	
	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)	TIME (YR)	CONC (MG/L)
Cr	119	0.0001	322	0.0002	55	0.0004	370	0.0002
Mn	109	0.002	325	0.003	55	0.005	372	0.002
Se	109	0.0048	326	0.0029	55	0.0048*	374	0.0026
SO_4	112	3	376	5	65	7	413	5
Zn	108	0.01	361	0.01	57	0.01	399	0.004

* Concentration in creek after mixing groundwater discharge with stream water

Using an infiltration barrier design of 0.8 in/yr infiltration for the northern portion of Panel F, 1.5 in/yr for the southern portion of Panel F, and 1.2 in/yr infiltration for Panel G, chromium, manganese, sulfate, and zinc did not exceed either the groundwater or surface water standards at any location. Selenium and manganese did not exceed the groundwater standard at any of the observation points. The concentrations of selenium at South Fork Sage Creek Spring, Books Spring, and Crow Creek were all below the surface water standard. At Deer Creek, the groundwater discharge concentration (0.0063 mg/L) after mixing with stream water is estimated to produce a concentration below the surface water standard of 0.005 mg/L.

The shape of the selenium plume at 100 years for the surface water standard concentration is shown in **Figure 4.3-11**. The reduced amount of selenium loading to the Wells formation aquifer under this alternative is reflected in the smaller plume sizes, particularly the plume downgradient of Panel F. The effect of this alternative on the groundwater quality under and down gradient of the mine panels would be moderate, local, and long-term.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

This alternative would route the power line along a haul/access road instead of a direct right-of-way between Panels F and G. This alternative would have no bearing on the potential impacts to groundwater resources.

Mining Alternative F – Electrical Generators at Panel G

This alternative would eliminate the power line to Panel G and replace it with diesel generators. This alternative would have no bearing on the potential impacts to groundwater resources. Potential spills from additional diesel fuel tanks would be avoided through implementation of structural controls and the Smoky Canyon Mine SPCC Plan.

4.3.1.2 Transportation Alternatives

Alternative 1 – Alternate Panel F Haul/Access Road

This alternative would not affect groundwater quality or flow.

Alternative 2 – East Haul/Access Road

The road fill for this alternative would be very close to, and possibly cover SP-MC-600 where the road crosses the Manning Creek drainage (**Figure 3.3-3**). It would have no effect on groundwater quality or flow.

Alternative 3 – Modified East Haul/Access Road

The road fill for this alternative would be very close to, and possibly cover SP-MC-600 where the road crosses the Manning Creek drainage (**Figure 3.3-3**). It would have no effect on groundwater quality or flow.

Alternative 4 – Middle Haul/Access Road

Road fill for this alternative would cover a small spring, SP-NFDC-50, in the headwaters of North Fork Deer Creek. It would have no effect on groundwater quality or flow.

Alternative 5 – Alternate Panel G West Haul/Access Road

The road fill for this alternative would cover SP-DC-100 and SP-DC-120, two small springs (0.004 cfs or less) in the upper reaches of the Deer Creek drainage (**Figure 3.3-3**). It would have no effect on groundwater quality or flow.

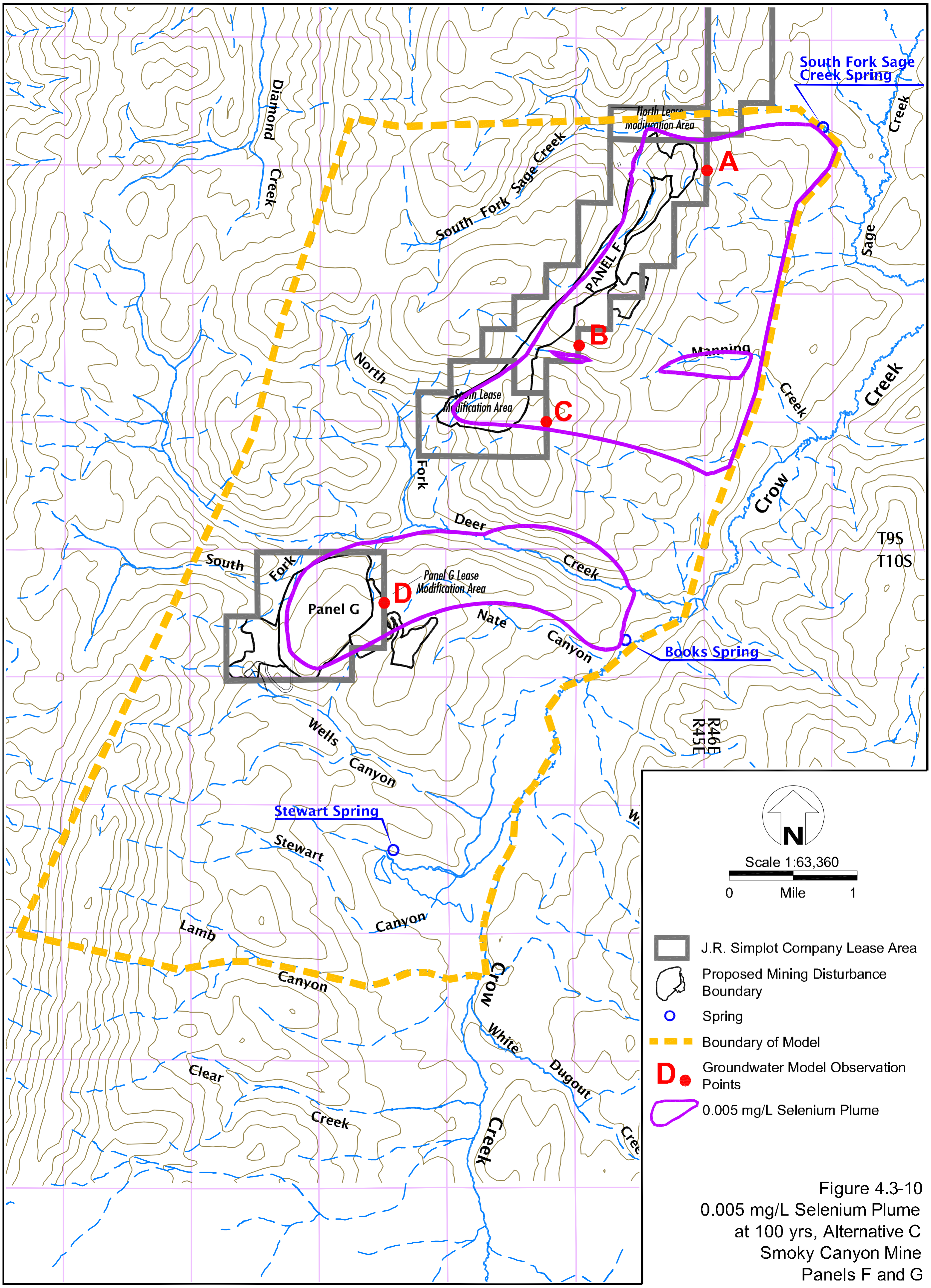


Figure 4.3-10
0.005 mg/L Selenium Plume
at 100 yrs, Alternative C
Smoky Canyon Mine
Panels F and G

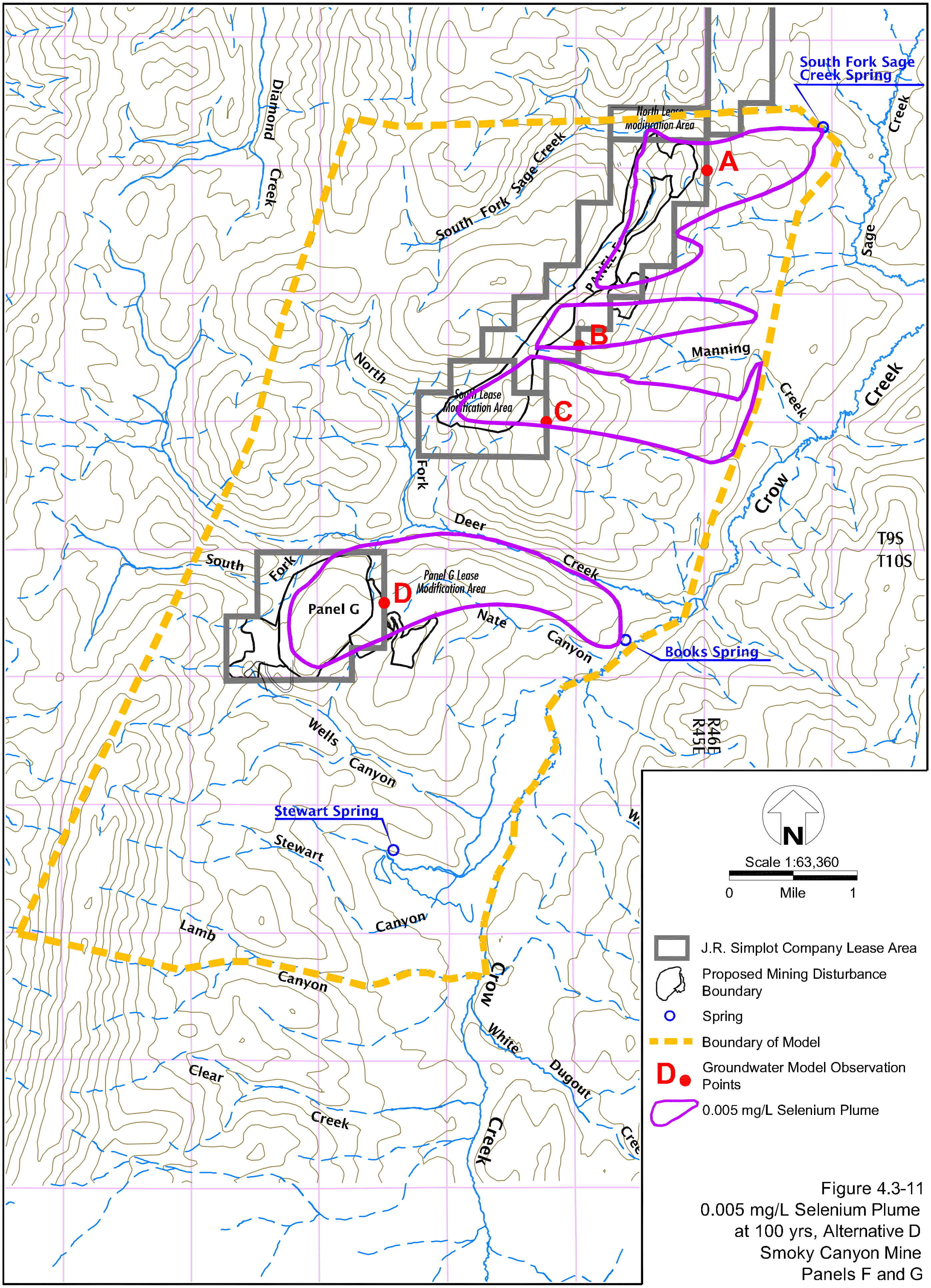


Figure 4.3-11
0.005 mg/L Selenium Plume
at 100 yrs, Alternative D
Smoky Canyon Mine
Panels F and G

Alternative 6 – Conveyor from Panel G to Mill
This alternative would not affect groundwater quality or flow.

Alternative 7 – Crow Creek/Wells Canyon Access Road
This alternative would not affect groundwater quality or flow.

Alternative 8 – Middle Access Road
This alternative would cover SP-DC-350, SP-NFDC-50 with road fill (**Figure 3.3-3**). It would have no effect on groundwater quality or flow.

4.3.1.3 No Action Alternative

Under the No Action alternative, impacts to groundwater at the mine would not change beyond those caused by currently approved mine plans that are already occurring at the Smoky Canyon Mine. Natural dissolution, mobilization, and migration of COPCs in the Project Area would still occur at current rates unaffected by the proposed mining activities.

4.3.2 Surface Water – Direct and Indirect Impacts

<u>Watershed Area Disturbance</u>
The RFP (USFS 2003a) states that not more than 30 percent of a watershed or subwatershed should be in a hydrologically disturbed condition (defined in the RFP as "Changes in natural canopy cover (vegetation removal) or a change in surface soil characteristics, such as compaction, that may alter natural streamflow quantities and character") at any one time. The HUC 6 and HUC 5 watersheds wherein disturbances would occur under either the Proposed Action or any of the Alternatives were examined in regard to this RFP guideline. Types of existing disturbances deemed to represent hydrologically disturbed conditions include roads, seedings, utility lines, agricultural fields, homes, mine disturbances, etc. For the additional amount of land that would become hydrologically disturbed under the Proposed Action and the Alternatives, information on disturbed acreage from Chapter 2 was used, including all of the categories of pit, overburden, other, and road disturbance. Once reclamation has been successfully completed, mining areas that would remain as hydrologically disturbed would be minimal. Details of the disturbance effects of each Proposed Action component and the alternatives on watersheds are described in the following sections. Each of the Proposed Action components and alternatives would result in different amounts of watershed disturbance, and these impacts are generally considered to be minor (see page 4-1 for definition), local, and have short-term durations limited to the mining period.

In general, the better condition a watershed and its stream channel are in, the more resilient it is to the effects of disturbance. The CNF (USFS 2003b) notes that the EPA and USGS assessed the Salt River watershed (4th scale HUC) overall with the best possible rating, a "1" on their 1 to 5 Index of Watershed Indicators (IWI). This rating indicates that the basin has "low vulnerability to additional stressors such as pollutant loadings." While this does not mean that individual HUC 5 or HUC 6 subwatersheds within the Salt River watershed would also have a "1" rating, or that the watershed or subwatersheds have the ability to accept any level or type of additional disturbance, it can indicate that the Salt River watershed as a whole may have a better ability to absorb the proposed disturbances than would a different watershed with a higher vulnerability rating.

Runoff Reduction

Precipitation falling within the disturbed areas associated with pits, overburden storage areas, and most topsoil stockpiles would either infiltrate or be retained in constructed runoff/sediment ponds. Water would either evaporate or infiltrate. These ponds would be designed to contain the expected runoff from events up to and including the 100-year, 24-hour precipitation plus additional snowmelt. This means that runoff from these disturbed areas, rather than supplying surface flow to streams as occurs under the undisturbed condition, would be retained during mining and reclamation so that they would not contribute to storm flow. Essentially, these disturbed areas would be withdrawn from the contributing watershed area of a given stream, thereby potentially reducing runoff volumes and peak flows during mining until reclamation is completed and the retention basins are removed. There is not necessarily always a direct one-to-one correlation between contributing area and runoff peak or volume, but generally the greater the percentage by which the watershed area is reduced, the greater the reduction in flows. This general relationship was verified for the Project watersheds and the predicted levels of disturbance using regional regression methods (USGS 2001d and 2004g). Therefore, the percent reduction in contributing watershed is used herein to represent the relative percent reduction in stream flows that could occur from the proposed activities. These numbers should be used to compare alternatives, rather than as absolute numbers representing change in stream flows.

Assuming that the runoff/sediment ponds are designed and maintained correctly, during the general life of the mine disturbance there should only be an 8 to 10 percent chance that runoff from the mining disturbance would leave the ponds and potentially enter a stream. This percent chance is calculated by a standard calculated risk equation ($Pn=1-((Tr-1)/Tr)^n$, (where Pn is the probability of occurrence, Tr is recurrence interval in years, and n is design life in years). Information on Simplot's existing activities suggests that ponds do not necessarily always function to capture runoff as intended. The March 15, 2004 SWPPP (Simplot AgriBusiness 2004) indicates that 0.88 inch of rainfall occurred in April 2004, with resultant discharges from two ponds at the D and E Panels. It is not clear whether the discharge of runoff water was due to problems with design, maintenance, or the ponds having insufficient storm capacity due to inflow from dump seeps. However, it is clear that the precipitation event was less than the design precipitation event (3.0 inches), and there is no mention of excessive snowmelt during this period, so it is apparent that the system did not work as intended. The SEIS for Simplot's B&C Panel states that there were six instances of pond overflow between the fourth quarter of 1998 and the second quarter of 1999. Again, there is no indication that design precipitation was exceeded during this time. This is relevant to the current impact analysis because it suggests that there is, in reality, a greater potential than the calculated theoretical chance that discharge from disturbed areas could enter stream channels. However, the impact of these occasional discharges would not have a great effect on flow regimes; the impact to water quality from these occurrences is discussed below.

Once reclamation has been successfully completed, these areas would again function as part of the watershed and regularly contribute runoff to streams. Details of the effects of each Proposed Action component and the alternatives on runoff are described in the following sections. The effects of the Proposed Action components and alternatives on estimated runoff are different but, in general, the impacts to runoff are considered to be minor, local, and have short-term durations limited to the mining period.

Baseflow Reductions

As noted, the stream flow reductions discussed above would be due to withholding surface runoff generated on the disturbed area. Additional reductions in stream baseflows would occur if groundwater discharge to these stream channels is reduced or eliminated, either as a result of destroying or drying up a spring, or diminishing diffuse groundwater inflow intercepted by a channel. **Section 4.3.1** describes this potential in more detail, but in summary, the predictions in that section are that dispersed groundwater flow contributions to area streams would not be diminished by mining, but several small springs would be eliminated or measurably diminished. The resultant implications to stream baseflow as a result lost spring flows are discussed in more detail in the individual Panel F, Panel G, and mining alternatives subsections below. Where stream base flow is reduced due to disruption of certain springs, the impacts would be minor, local, and long-term.

Peak Flow Alterations

Haul and access roads have the potential to affect peak stream flows through two primary mechanisms. First, the road drainage network that consists of in-slope ditches and cross drains can alter peak flows and accelerate runoff by increasing drainage density, extending the stream network and causing small-scale trans-basin diversions (Furniss et al. 2000). However, Simplot has committed to minimizing this potential by reducing the amount of hydrologically-connected road as much as possible. Hydrologically-connected road is defined as "any road segment that, during a "design" runoff event, has a continuous surface flow path between any part of the road prism and a natural stream channel." (Furniss et al. 2000).

Second, if a stream crossing culvert cannot pass all stream flow either because it becomes blocked or because the design event is exceeded, overflow may overtop the crossing fill, course down the road and be redirected to a tributary channel other than the intended one, which results in locally higher peak flows (Furniss et al. 1997). Simplot has addressed this potential impact by committing to design culverts for a high-return period design flow of 100 years, which would reduce the likelihood of culvert capacity being exceeded. Given that the mine-use life for the roads under the Proposed Action and Alternatives is about 16 years, there is a 15 percent chance that the flow capacity of any given (fully functional) culvert would be exceeded. This is well below the 50 percent probability of exceedance suggested by the RFP guideline on page 4-51 of the plan (USFS 2003a). However, in the cases where roads would be left for forest access (as described under the relevant road sections), probability of failure would increase because these roads would have a much longer life span.

Once reclamation has been successfully completed, these former road areas would no longer have the potential to cause peak flow alterations, with the exception of the roads that would remain in use as forest roads. The impacts to peak flow from the Proposed Action and alternatives are considered to be minor to moderate, local, and have short-term durations limited to the mining period. Where certain road sections would be retained for long-term public use, the impacts would be long-term.

Sediment Aspects

As described above, runoff/sediment ponds would be in place to retain sediment and runoff generated from mining disturbance (excluding roads) from all events up to and including the 100-year, 24-hour precipitation plus snowmelt. Under these circumstances, the mining disturbance would not likely increase sedimentation levels in the Project Area streams. Should discharge from a pond occur, however, there could be two ways that sediments could be introduced to a stream. First, the pond discharge could convey sediments that have not settled out during detention. Available data from the two overflow events in 2002 described above shows negligible TSS concentrations (6 and 7 mg/L-- much less than the permit's benchmark level of 100 mg/l). Second, should discharge not be controlled, soil eroding between the pond and the receiving channel -- or within the stream channel itself -- could contribute a pulse of sediments during the runoff event. Simplot's SWPPP (Simplot Agribusiness 2004) calls for constructed and armored outflows from ponds in order to minimize this possibility, but in any case, such isolated instances of sediment contributions would not be expected to be problematic for overall water quality at the watershed scale. Nor would such instances represent exceedances of numeric water quality criteria, as there are none for sediment. For Simplot's B&C Panel SEIS, turbidity, suspended sediment and embeddedness data from stream monitoring sites that were paired to represent above- and below-mining locations were compared to determine if mining impacts were evident. The available data (which did not focus specifically on storm events) showed a slight increase in turbidity due to mining. This would potentially be the case for Panels F and G mining activities.

Roads in general, and roads on forest lands specifically, are known sources of sediment loading to streams (USFS 2003b, Ketcheson and Megahan 1996). They can often increase sediment loads by one or two orders of magnitude above background rates for the disturbed areas (Furniss et al. 1991). The USFS, through its San Dimas Technology and Development Center, has developed an extensive series of publications on Water/Road Interactions (USFS 2004c) that describe the types of impacts forest roads can have on water quantity and quality and the ways in which those impacts can be minimized. Simplot has committed to incorporating some of this information into its road design through a series of BMPs and design considerations, which are included in **Appendix 2B**. According to the RFP, "Road effects to watershed and riparian values can be prevented or minimized through proper planning reconnaissance, design, construction, and maintenance techniques." In addition, the RFP indicates that "Any new roads would be constructed with strict standards and guidelines, especially those that could influence the Aquatic Influence Zone (AIZ)." Therefore, a major component of the impact analysis for sediments is based upon the assumption that these practices, correctly implemented, can inherently reduce certain types of impacts to surface water. For example, many of these BMPs would reduce the likelihood that any given culvert would plug, overtop, and result in total road fill failure. If these BMPs were not effective and a culvert was plugged and submerged before it could be cleaned, the affected road fill would impound the water flooding the area immediately upstream. If the water overtopped the road fill, it could erode the fill and deposit this sediment downstream of the plugged culvert.

To compare the various road alternatives with regard to sediment impacts, several indices are used: number of stream channel crossings, proximity to a stream channel, and ground surface slope. The number of crossings, both total and in perennial stream reaches, is related to potential impacts because stream channel crossings present one of the greatest risks of a road to surface water and aquatic resources (Flanigan et al. 1998). The amount of road proposed within AIZs (or its equivalent on non-CNF lands) is used to indicate proximity to streams. The closer a road is to channel system, the more potential it has to disturb floodplain/riparian areas, restrict stream channel processes, contribute eroded sediments to the stream, and affect runoff patterns. Further, AIZs typically encompass riparian buffer strips; according to Belt et al. (1992), such strips "help to maintain the hydrologic, hydraulic, and ecological integrity of the stream channel…", so their use as an indicator provides a means to assess overall risk to surface water resources. Lastly, the percent of total road length located on slopes of varying degrees of steepness indicates potential impacts related to mass movements, erosion, and subsequent road drainage.

Quantifying the amount of sediment that would be contributed from a road to a given stream channel on a storm, annual, or long-term basis is not possible to do with any degree of certainty. The USFS estimates sediment production from roads with the WEPP:Road component of the USFS soil erosion model , Water Erosion Prediction Project (WEPP). This road module was run for all of the Proposed Action and Alternative roads. The road module and the WEPP program as a whole are discussed more thoroughly in **Appendix 4A**, but essentially, the module calculates erosion from the road surface and the fill slope and then uses the buffer slope characteristics to route the eroded material to the stream channel. In order to account for the fact that a number of BMPs that would be implemented on these roads could either reduce erosion or reduce the amount of eroded material that can potentially pass through the buffer, additional analysis was done, as described in **Appendix 4A**.

The sediment quantities calculated using WEPP:Road are estimates that include significant uncertainties and should not be taken as definitive values. However, some sedimentation to area streams from the Proposed Action and from all alternatives should be expected, and the WEPP results are useful to compare alternatives against each other and to baseline WEPP model results. Although the BMPs may minimize or reduce this potential, it is reasonable to expect that some sediment from mining operations and transportation routes may enter from streams over the life of the Project. The USFS has used the basic WEPP model to estimate that baseline soil erosion rates for vegetated areas in the CNF. Applying the WEPP model to 15 specific sites in the CNF predicted erosion rates of 0.03 to 0.08 tons per acre per year for 6 of the 15 sites and no measurable erosion on the other 9 sites (USFS 2003d). JBR conducted WEPP erosion analyses of existing conditions in the Project Area and the results indicated that there would be a 0 to 3 percent probability of erosion, with an average annual upland erosion rate of 0.04 tons per acre (**Appendix 4A**).

Using long culverts for roads crossing streams potentially adds to sediment loading from fills (as reflected by the WEPP:Road modeling) and also has the potential to alter channel morphology and habitat characteristics. With proper design, these effects may not extend any great distance downstream, but they would occur within the local confines of culvert placement. The Simplot commitment to design culverts for a 100-year flow means that, in general, any particular culvert would likely span the active channel width. This can minimize associated upstream aggradation and widening, and reduce downstream scour and undercutting. Further, such design features help to prevent culvert failure, which can result in road fill failure and mass loading to the stream. Overall, it can be assumed that, with the prescribed design and maintenance protocol, sediment contributions to stream channels and extensive channel changes should be held to levels that allow beneficial uses to continue over much of a stream's length. The various indicators presented above will be used in the relevant subsections to discuss the likelihood that specific road alternatives can meet this general statement.

Once reclamation has been successfully completed, these former road disturbance areas should revert back to natural erosion and sedimentation rates. Though there would be some areas that would remain unreclaimed, their extent and impact should be minimal. The sedimentation impacts for these roads are considered to be moderate, localized, and have short-term durations equal to the mine life. In the cases where roads would remain in use as forest roads (though they would be narrowed to USFS standards and partially reclaimed), sedimentation potential would be long-term, should gradually reduce with time, but would not revert totally to background rates.

COPC Aspects

Phosphate mining throughout southeast Idaho, including Simplot's existing operations, has impacted, and continues to impact, surface water quality by contributing various COPCs, primarily selenium. In recent years, focus on this issue has resulted in various environmental protection strategies and BMPs to reduce or eliminate such contributions. The Proposed Action and Alternatives incorporate several of these strategies. As such, past or current examples of mining-impacted surface water quality cannot necessarily be cited to predict similar impacts from the proposed mining. These strategies and BMPs have not yet been monitored over any extended period of time, so their effectiveness is assumed through general experience to be sufficient at this time.

Assuming that the environmental protection strategies called for in Chapter 2 are effective in reducing overburden seeps and eliminating surface exposure of selenium-bearing materials that runoff can contact, related impacts from the proposed mining on surface water quality should be negligible. However, there remains the mechanism whereby infiltrated precipitation percolates through overburden, picks up selenium and other COPCs, and is eventually discharged as groundwater contributing to area streams. Details on this mechanism are described in the previous groundwater discussion in **Section 4.3.1**. The implications of the contaminated groundwater to the water quality of area streams are further discussed here.

In simple terms, groundwater flowing at a given rate and with a given selenium concentration would enter a stream channel through either diffuse flow or a discrete spring discharge. (Because the other COPCs do not result in any surface water protection criterion exceedances due to the groundwater discharges, they are not discussed here, but the mechanism for dilution and mixing would be the same as described here for selenium.) The stream is also flowing at a given rate and with or without a measurable baseline selenium concentration. The two water sources would mix, and based upon relative flow rates and concentrations, a new selenium concentration would be present in the combined, downstream flow. Calculations using existing flow and water quality data for area streams and predicted groundwater flows and concentrations were made to predict the selenium concentration of these mixed flows. Baseflows in late summer/early fall represent one examined scenario; a winter scenario was also analyzed wherein flows for irrigation are not being diverted. Much of this predicted effect to water quality would not occur in the near future, but instead would be lagged by a number of years due to slow groundwater flow rates (**Section 4.3.1**); however, once initiated, they would continue for the long-term, with concentrations peaking at the times presented in **Section 4.3.1**. Impacts to surface streams from COPCs contributed by groundwater discharges are considered to be local and long-term. Where the resulting stream concentrations of the COPCs are within applicable regulatory criterion, the impacts would be minor to moderate. Where the concentrations are over regulatory criterion, the impacts would be major.

The overburden and runoff handling strategies described above -- in combination with the proper implementation of Simplot's SWPPP -- should prevent increases of COPCs in streambed sediments as a result of mining. This impact would be negligible to minor, site-specific, and short-term. As described in **Section 3.3**, baseline streambed samples in several of the Project Area streams showed concentrations of several COPCs that were greater than the IDEQ benchmark levels and/or removal action levels.

The haul or access roads associated with mining activity may have the opportunity to affect surface water quality and streambed substrate in regard to selenium and other COPCs. Where a road is built over the seleniferous Meade Peak Shale of the Phosphoria formation, seleniferous shale would become exposed in the cut slopes (Simplot has committed to not using this material for fill – thus reducing the exposure). This provides a potential mechanism for runoff waters to pick up dissolved amounts of selenium and perhaps other COPCs through oxidation and dissolution, and convey those contaminants to area stream channels. Any eroded cut slope materials that made their way to stream channels could contribute to streambed COPC levels. One indicator for the likelihood of impact from this source is the length of roadway that would cross the Meade Peak Shale outcrop. In addition, the closer the road is to a stream channel and the steeper the topography through which the road traverses, the more likely this type of contamination could occur.

The proposed road BMPs would help to reduce this potential effect, and once reclamation has been successfully completed, the potential for selenium contribution from these former road areas should greatly diminish, except where roads would remain in place as forest roads, though narrowed to USFS standards and partially reclaimed. The impacts from road construction across Meade Peak Shale are considered to be minor, site-specific, and short-term, because full, end-bench haul construction methods would ensure that all of this material would be removed from the road and handled as other Meade Peak Shale material.

<u>Other Pollutants</u>
Accidental releases of materials associated with mining such as oils and chemicals represent potential impacts to surface water quality during the life of the mining activity.

Potential hydrocarbon-related effects to water quality would be minimized through non-structural BMPs in the SWPPP and secondary containment and other procedures in Simplot's Spill Prevention Control Countermeasures (SPCC) Plan. Vehicle accidents, which would presumably be rare, could also release fuel, oil, or other substances to the road drainage network. In the event of any such releases, standard response and cleanup practices would occur, but there could be some short-term effects on water quality and biotic stream components if spilled materials reached nearby streams. The potential for such spills to occur would be low, and the potential for stream impact even less so. These impacts are considered to be negligible to minor, site-specific, and short-term.

<u>Water Rights and Water Uses</u>
There are two ways in which water rights to streams could be affected: by reducing streamflow and thus restricting quantity of water delivered to a right holder; or by impacting water quality in a manner that would preclude the beneficial uses for which the right is granted. The water rights in the Project Area that would have the potential to be impacted are granted for stockwatering, typically on a point-to-point basis in a given stream reach, and irrigation.

While certain rights may be affected, the RFP (page 3-14) states that "Loss of available surface water sources for uses such wildlife or grazing, as a consequence of mining operations shall be replaced or mitigated…". This statement implies that Simplot would have to replace all lost waters that have such uses, even if they are unattached to a water right. This would be feasible for the relatively small and isolated stockwatering uses. Assuming this requirement of the RFP is followed, impacts to water rights would be minor, site-specific, and short-term.

For loss of a surface water to wildlife (fisheries) due to selenium contamination, this loss could not be readily replaced or mitigated. Where this loss via contamination is predicted to occur, it could be contrary to the stated RFP standard. Such impacts are considered to be major, local, and long-term.

Baseflow impacts would be the relevant flows by which to assess water right impacts; general baseflow impacts were discussed above, and specifics are discussed (along with the related water right impact) for each Project alternative below.

There are no regulatory sediment or selenium water quality criteria for stockwatering or irrigation. The IDEQ (2004b) used a selenium removal action level of 0.050 mg/L for domestic animal drinking water use in its Area Wide Risk Management Plan. Other sources use a selenium threshold of 0.02 mg/l for irrigation water, including the Food and Agriculture Organization (FAO) of the United Nations (FAO 1992). These values will be used herein to assess impact to water right holders as a result of selenium in Crow Creek and its tributaries.

4.3.2.1 Proposed Action

Panel F, Including Lease Modifications

As shown in **Table 4.3-13**, Panel F, including lease modifications, overburden storage areas, and topsoil piles would increase the amount of hydrologically disturbed land by less than 2 percent in each of the affected HUC 6 watersheds and by 0.5 percent in the HUC 5 Crow Creek watershed.

TABLE 4.3-13 PERCENT OF WATERSHED AREA IN A HYDROLOGICALLY DISTURBED CONDITION

HUC NO.	WATERSHED DESCRIPTION	EXISTING	PROPOSED ACTION					
			POWER LINE	PANEL F	PANEL G	F ROAD	G ROAD	TOTAL P.A.
170402712	Diamond Creek	6.8	0	0	0	0	0.1	0.1
170402071203	Diamond Creek Below Timber Creek	7.9	0	0	0	0	0.1	0.1
1704010507	Crow Creek	7.3	<0.1	0.5	0.5	0.1	0.2	1.2
170401050705	Crow Creek Above Deer Creek	4.5	0	0	1.4	0	0	1.4
17040150707	Deer Creek	1.0	0.2	1.6	3.2	0	1.5	6.5
17040150703	Middle Crow Creek	1.7	<0.1	0.7	0	0	0	0.7
17040150708	SF Sage Creek	22.5	0.1	1.9	0	0.4	0.6	3.0

Table 4.3-14 shows the percentage by which contributing watershed areas would be reduced under the Proposed Action and the various mining alternatives due to runoff and sediment control features (retention ponds). Disturbed areas associated with roads are not assumed to be withheld from contributing runoff, although in some cases, runoff from roads would also be directed to ponds. With the exception of the Deer Creek basin, these basins are smaller than the HUC 6 level watershed, so at the HUC 6 or HUC 5 levels, percentage reduction would be smaller because it would be calculated using a larger-size drainage area.

TABLE 4.3-14 REDUCTION IN CONTRIBUTING WATERSHED AREA DUE TO PITS AND OVERBURDEN STORAGE AREAS (%)

WATERSHED	PROPOSED ACTION			ALT. A		ALT. B	ALT. C	ALT. D	ALT. E	ALT. F
	PANEL F	PANEL G	TOTAL F+G	NO N. MOD.	NO S. MOD.					
SOUTH FORK SAGE CREEK	8	0	8	8	8	8	8	9	8	8
MANNING CANYON	6	0	6	6	6	6	6	9	6	6
DEER CREEK	2	3	5	2	0	5	5	6	5	5
WELLS CANYON	0	11	11	0	0	11	11	12	11	11

The contributing runoff area reductions from the Panel F, including lease modifications, due to open pits, overburden storage areas, and topsoil piles would be 296 acres in South Sage Creek watershed, 93 acres in the Manning Creek watershed, and 126 acres in Deer Creek watershed. Potential reductions in surface flows due to these contributing area reductions are expected to generally follow the percent reductions in contributing watershed size given in **Table 4.3-14**. Panel F mining would be responsible for all of these reductions in the South Sage Creek and Manning Creek watersheds, slightly more than one-third of the Deer Creek reductions, and none of the Wells Canyon reductions. Such levels would not be expected to be of any noticeable consequence to channel morphology or water supply of the streams during the time in which mining occurs.

Much of an unnamed tributary to South Fork Sage Creek would be removed by the Panel F. This tributary flows only ephemerally according to the baseline studies (Maxim 2004d). Further, baseline studies note that this channel becomes poorly defined just above its confluence with South Fork Sage Creek, indicating that much of its flow may be subsurface by the time it reaches this location (Maxim 2004d). The Panel F pit would also remove the headwater channel of Manning Creek, which flows ephemerally.

Within the South Fork Sage Creek basin, two springs (SP-UTSFSC-200 and SP-UTSFSC-100) would likely be eliminated during Panel F mining, as discussed in **Section 4.3.1**. In late summer and early fall, when baseflow conditions dominate, these springs averaged a combined flow of about 0.01 cfs (Maxim 2004d). Baseline information indicates that these flows typically infiltrate into the otherwise dry channel bed of the unnamed tributary, and do not contribute surface flow to South Fork Sage Creek. These springs could provide subsurface flow channel flow to South Fork Sage Creek. The USFS has stockwatering rights (No. 4054) to SP-UTSFSC-100. While this right would be affected by mining due to the loss of the spring, its minimal flow contribution means that rights to stream flows downstream should not be measurably affected.

According to **Section 4.3.1**, several discrete springs in the Deer Creek basin would be disrupted, or diminished (SP-UTNFDC-400, SP-UTNFDC-600, SP-UTNFDC-530, and SP-UTNFDC-540) during Panel F mining. Not including SP-UTNFDC-530 (for which no flow information was collected during baseline studies), these springs were supplying a combined flow of about 0.0007 to 0.0033 cfs during the baseflow monitoring events (Maxim 2004d). Comparing that amount with the total flow in Deer Creek (SW-DC-500) at that same time shows that those springs may supply between about ½ to 1 percent of the Deer Creek baseflow at that location. There are no water rights associated with these four springs, and given the small amount they supply to downstream surface water, rights to stream flows downstream of those springs should not be measurably affected.

A spring at the head of Manning Canyon (SP-MC-300) is located just west of the proposed highwall for Panel F and would likely be disrupted. Thus, it would no longer contribute to Manning Creek, but it does not appear to contribute very much under current conditions. The USFS holds a water right on SP-MC-300 (4053), which would be affected.

For the purposes of this analysis, it is presumed that all of the above-mentioned diminutions in baseflow would be permanent. The RFP (USFS 2003a) requires under the "drastically disturbed lands" category that "Loss of available surface water sources for uses such as wildlife or grazing, as a consequence of mining operations shall be replaced or mitigated by the mine operator. This includes the loss of water quality sufficient to maintain post-mining uses."

Using the results of the groundwater modeling, given in **Section 4.3.1** above, and the baseline surface water data (Maxim 2004d), estimates of selenium increases in area streams were made, as shown in **Table 4.3-15**. Under the Proposed Action, Panel F mining would result in the aquatic criterion for selenium (0.005 mg/l) being exceeded during summer/fall baseflow conditions in South Fork Sage Creek, Sage Creek, and Crow Creek downstream of Sage Creek. The same would occur during the winter baseflow conditions, with the exception that Crow Creek downstream of Sage Creek would be equal to the criterion. There are already seasonal exceedances of the aquatic criterion for selenium (0.005 mg/l) in the lower reaches of Sage Creek (downstream of Hoopes Spring), due to the existing Smoky Canyon Mine (NewFields 2005). Selenium loading to South Fork Sage Creek would increase over baseline conditions under the Proposed Action and all mining alternatives. Using the current selenium loading in lower Sage Creek, exceedances of the selenium criterion are estimated to occur but this assumes the current selenium loading to the stream stays the same until the peak selenium concentrations for the various alternatives occur in South Fork Sage Creek, which are modeled to occur in approximately 85 to 100 years. This assumption is very conservative because the regulatory agencies and Simplot would presumably make efforts over a much lesser period of time to mitigate the current selenium loading to lower Sage Creek.

At these analyzed stream locations, selenium concentrations would not affect water right holders' abilities to use this water for either stock watering or irrigation, based upon the action levels and thresholds discussed above.

TABLE 4.3-15 ESTIMATED SELENIUM CONCENTRATIONS IN AREA STREAMS

LOCATION	PROPOSED ACTION*	MINING ALT. A	MINING ALT. B	MINING ALT. C	MINING ALT. D
SUMMER/FALL					
Mouth of Deer Creek	0.011	0.011	0.010	0.010	0.005*
Crow Downstream of Deer Creek	0.004	0.004	0.003	0.003	0.002
Mouth of S.F. Sage Creek	0.010	0.008	0.009	0.010	0.005*
Mouth of Sage Creek	0.009	0.008	0.008	0.009	0.007[1]
Crow Downstream of Sage Creek	0.006	0.006	0.006	0.006	0.005
WINTER					
Mouth of Deer Creek	0.011	0.011	0.010	0.010	0.005*
Crow Downstream of Deer Creek	0.003	0.003	0.002	0.002	0.002
Mouth of S.F. Sage Creek	0.010	0.008	0.009	0.009	0.005*
Mouth of Sage Creek	0.009	0.008	0.008	0.008	0.007
Crow Downstream of Sage Creek	0.005	0.005	0.005	0.005	0.004

Note: Alternatives E and F are the same as the Proposed Action for this table. * Listed concentrations are rounded up from 0.0048 mg/L. [1] Selenium exceedances due to current mine impacts.

Some of the overburden from Panel F would be hauled north to the existing Smoky Canyon Mine Pit E-0 for disposal. This pit area is already permitted, and existing runoff/sediment control ponds are meant to contain any surface runoff up to that occurring from the 100-year, 24-hour storm plus additional snowmelt. Any excess would drain toward South Fork Sage Creek.

Panel F Haul/Access Road

The Panel F Haul/Access Road would increase the amount of hydrologically disturbed land by 0.4 percent in the Sage Creek HUC 6 watershed, which would equate to a 0.1 percent increase in the HUC 5 Crow Creek watershed.

The Panel F Haul/Access Road would disturb 66.5 acres within the Sage Creek basin. There would be one drainage channel crossing associated with this road, which would be in a non-perennial reach of South Fork Sage Creek. This culvert would be approximately 230 feet long. It would be designed, constructed, and maintained using the criteria discussed in **Appendix 2B**, in order to reduce the sedimentation and stability impacts inherent in culverted road crossings.

Less than one acre of this road, or 1 percent of its total area, would be within AIZs. About half of the road would be crossing ground slopes of 30 percent or less and about half would be crossing ground slopes between 31 and 65 percent. None of this road would cross Meade Peak Shale outcrops.

According to the WEPP:Road analysis, adjusted for BMP reductions, sediment loading to Sage Creek are calculated be about 0.5 tons annually; most of this amount would be contributed directly to South Fork Sage Creek. This is about 0.3 percent of the calculated baseline sediment load for this stream.

There would be no impact to water rights due to this road.

Panel G

As shown in **Table 4.3-13**, Panel G, include pits, overburden storage areas, and topsoil piles, would increase the amount of hydrologically disturbed land by 3.2 percent in the Deer Creek HUC 6 watershed and by 1.4 percent in the Crow Creek above Deer Creek HUC 6 watersheds. This results in an overall increase of 0.5 percent in the HUC 5 Crow Creek watershed.

Mining of Panel G, including the pits, overburden storage areas, and topsoil piles would result in a reduction in contributing watershed area of about 245 acres in the Deer Creek drainage and about 220 acres in Wells Canyon. Potential reductions in surface flows due to these contributing area reductions are expected to generally follow the percent reductions in contributing watershed size given in **Table 4.3-14**. Panel G mining would be responsible for all of these reductions in Wells Canyon, slightly less than two-thirds of the Deer Creek reductions, and none of the South Fork Sage and Manning watershed reductions. Such levels would not be expected to be of any noticeable consequence to channel morphology or water supply during the time in which mining occurs.

According to **Section 4.3.1**, two discrete springs in the Deer Creek basin would be removed or diminished during Panel G mining: SP-UTDC-700 and SP-UTDC-800. These springs were supplying a combined flow of about 0.0001 to 0.003 cfs during the baseflow monitoring events (Maxim 2004c). Comparing that amount with the total flow in Deer Creek (SW-DC-500) at that same time shows that those springs may supply up to about 2 percent of the Deer Creek baseflow at that location. Another spring (UTSFDC-500) would be covered by the overburden dump, but it may still continue to flow and contribute the unnamed tributary to the South Fork of

Deer Creek. According to Maxim (2004d) this spring flows in May but dries up later in the season. There are no water rights associated with those springs, nor would their minimal flow contribution be expected to impact downstream water rights to streamflow.

One spring (SP-UTWC-300) that contributes flow to Wells Canyon is expected to be eliminated during Panel G mining, as described in **Section 4.3.1**, but all three late summer/early fall observations of that spring reported dry conditions, so it likely does not materially contribute to any surface flow in the Wells Canyon channel during the baseflow season. There is no water right associated with this spring.

For the purposes of this analysis, it is presumed that all of the above-mentioned diminutions in baseflow would be permanent.

Using the results of the groundwater modeling, given in **Section 4.3.1**, and the baseline surface water data (Maxim 2004d), predictions of selenium increases in area streams were made, as shown in **Table 4.3-15** above. Panel G mining would result in the aquatic criterion for selenium (0.005 mg/l) being exceeded during baseflow conditions (summer, fall, and winter) in lower Deer Creek, but once Deer Creek flows are mixed with Crow Creek flows, Crow Creek would meet the criterion. At these analyzed stream locations, selenium concentrations would not affect water right holders' abilities to use this water for either stock watering or irrigation, based upon the action levels and thresholds discussed above.

<u>Panel G West Haul/Access Road</u>

The Panel G West Haul/Access Road would increase the amount of hydrologically disturbed land by 1.5 percent and 0.6 percent in the HUC 6 Deer Creek and Sage Creek watersheds, respectively. This results in an overall increase of 0.2 percent in the HUC 5 Crow Creek watershed. The road would also increase the hydrologically disturbed land in the HUC 6 Diamond Creek watershed below Timber Creek and the HUC 5 Diamond Creek watershed by 0.1 percent. This road is the only aspect of the Proposed Action that would affect the Diamond Creek watershed, which is in the Blackfoot Basin, unlike the rest of the watersheds, which are in the Salt River Basin.

The Panel G West Haul/Access Road would disturb about 88 acres within the Sage Creek basin, 17 acres in Diamond Creek watershed, and 112 acres in the Deer Creek basin. There would be 5 drainage channel crossings associated with this road, 2 of which would be in perennial stream reaches. Crossing Upper Deer Creek would require an approximate 280-foot long culvert and crossing South Fork Deer Creek would require an approximate 260-foot long culvert. The culverts would cross approximately perpendicular to the stream channels. These culverts would be designed, constructed, and maintained using the criteria discussed in **Appendix 2B**, in order to reduce the sedimentation and stability impacts related to culverted crossings.

Two springs (SP-DC-100 and SP-DC-120) would be located under the current design footprint of this road.

There would be no effects to water rights due to this road.

About 15 acres of this road, or 7 percent of its total area, would be within AIZs (a small amount of this would be for the road-associated topsoil stockpiles). About 44 percent of the road would cross ground slopes of 30 percent or less and 56 percent would cross ground slopes between

31 and 65 percent. Additionally, about 10 acres, or 5 percent of this road, would cross Meade Peak Shale outcrops.

According to the WEPP:Road analysis, adjusted for BMP reductions, sediment loading to Deer Creek are calculated to be about 8.3 tons annually, and to South Fork Sage Creek, about 0.15 tons per year. These sediment loadings are about 2.7 percent and 0.1 percent, respectively, of the calculated baseline sediment loads for these streams.

Because this road would remain in place after mining as a forest road (though narrowed to USFS standards and partially reclaimed), the potential for the types of impacts described above would continue once mining was completed, although at a reduced scale.

Power Line Between Panels F and G

As shown in **Table 4.3-13** above, the power line would have a negligible effect on the amount of hydrologically disturbed land in any of the affected watersheds.

4.3.2.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications

Table 4.3-16 below, shows the percent of watershed area that would be hydrologically disturbed due to each aspect of Mining Alternative A. This table only reflects the changes to the Panel F mine plan as compared to the Proposed Action and does not include any roads or the disturbances associated with the Panel G mining, which would remain as stated for the Proposed Action. If this alternative were to replace the Panel G portion of the Proposed Action, it would not cause the total amount of land in a hydrologically disturbed condition to rise above 30 percent in any of the affected HUC 5 or HUC 6 watersheds.

TABLE 4.3-16 PERCENT OF WATERSHED AREA IN A HYDROLOGICALLY DISTURBED CONDITION – ALTERNATIVE A

HUC NO.	WATERSHED	EXISTING DISTURBANCE	PANEL F WITHOUT NORTH MODIFICATION	PANEL F WITHOUT SOUTH MODIFICATION
170402712	Diamond Creek	6.8	0	0
170402071203	Diamond Creek Below Timber Creek	7.9	0	0
1704010507	Crow Creek	7.3	0.5	0.3
170401050705	Crow Creek Above Deer Creek	4.5	0	0
17040150707	Deer Creek	1.0	1.6	<0.1
17040150703	Middle Crow Creek	1.7	0.7	0.6
17040150708	Sage Creek	22.5	1.9	1.9

The predictions of selenium increases in South Fork Sage Creek, Sage Creek, and Crow Creek downstream of Sage Creek are the same as, or slightly less than, those predicted for the Proposed Action Mining of Panel F, as shown in **Table 4.3-15**.

No Panel F North Lease Modification

As shown in **Table 4.3-16**, Panel F, without the north lease modification, would result in less than 2 percent of the land being hydrologically disturbed in any of the affected HUC 6 watersheds and by 0.5 percent in the HUC 5 Crow Creek watershed. This is essentially the same as the Proposed Action for Panel F. Further, the percent reduction in contributing watershed area, should this alternative replace the Panel F portion of the Proposed Action, would not be measurably different than the Proposed Action, as shown in **Table 4.3-14**.

Impacts to South Fork Sage Creek and Deer Creek baseflows and water rights due to spring diminishment would be the same under this alternative as under the Proposed Action Panel F.

If the Panel F North Lease Modification were not approved, impacts to surface water quantities in the Deer Creek and Manning Creek drainages would be the same as under the Proposed Action for Panel F. Impacts to surface water quantities in South Fork Sage Creek would essentially be the same as under the Proposed Action Panel F including the lease modifications.

No Panel F South Lease Modification

As shown in **Table 4.3-16**, Panel F, without the South Lease Modification, would result in 1.9 percent in the Sage Creek HUC 6 watershed and by 0.6 percent in the Middle Crow Creek HUC 6 being hydrologically disturbed. Combined, this would represent 0.3 percent of the HUC 5 Crow Creek watershed. These numbers are slightly less than, or equal to, the Proposed Action numbers for Panel F under the Proposed Action. This alternative would not increase disturbances in the Deer Creek HUC 6 watershed.

In regard to the percent reduction in contributing watershed area, if this sub-alternative replaced the Panel F portion of the Proposed Action, **Table 4.3-14** shows that there would be no measurable difference between the two proposals for the South Fork Sage Creek and Wells Canyon watersheds. However, there would be somewhat less reduction for both the Manning and Deer Creek watersheds under this alternative than under the Proposed Action.

Impacts to South Fork Sage Creek baseflows and downstream water rights due to spring diminishment would be the same under this alternative as under the Proposed Action Panel F. Unlike the Proposed Action mining for Panel F, Deer Creek baseflows would not be affected because no contributing springs would be lost.

If the Panel F South Lease Modification were not approved, there would be no impacts to surface water quantities in the Deer Creek drainage from mining Panel F. The impacts to surface water quantities in South Fork Sage Creek and Manning Creek would essentially be the same as under the Proposed Action for Panel F, except that the disturbed acreage in Manning Creek drainage would be reduced.

Mining Alternative B – No External Seleniferous Overburden Fills

Under this alternative, both the amount of land that would become hydrologically disturbed, and the amount of runoff reduction due to reduced contributing watershed areas would be the same as for the Proposed Action. Baseflow reductions to Deer and South Fork Sage Creek would be the same as under the Proposed Action.

The estimates of selenium increases in area streams would be the same as, or slightly less than the Proposed Action depending upon the location, as shown in **Table 4.3-15**.

Mining Alternative C – No External Overburden Fills at All

Under this alternative, both the amount of land that would become hydrologically disturbed and the amount of runoff reduction due to reduced contributing watershed areas would be the same as for the Proposed Action. Baseflow reductions to Deer Creek and South Fork Sage Creek would be the same as under the Proposed Action.

The estimates of selenium increases in area streams are the same as those predicted for Alternative B, as shown in **Table 4.3-15**.

Mining Alternative D – Infiltration Barriers on Overburden Fills

Under this alternative, the amount of land in a hydrologically disturbed condition would increase over the amount for the Proposed Action, due to the need for the Dinwoody borrow pits and stockpiles. **Table 4.3-17** provides the percent disturbance that would result from this alternative, which includes the Proposed Action disturbances. This Alternative would not cause the total amount of land in a hydrologically disturbed condition to rise above 30 percent in any of the affected HUC 5 or HUC 6 watersheds.

TABLE 4.3-17 PERCENT OF WATERSHED AREA IN A HYDROLOGICALLY DISTURBED CONDITION – ALTERNATIVE D

HUC NO.	WATERSHED	EXISTING DISTURBANCE	ALTERNATIVE D
170402712	Diamond Creek	6.8	0.1
170402071203	Diamond Creek Below Timber Creek	7.9	0.1
1704010507	Crow Creek	7.3	1.3
170401050705	Crow Creek Above Deer Creek	4.5	1.5
17040150707	Deer Creek	1.0	6.8
17040150703	Middle Crow Creek	1.7	0.9
17040150708	Sage Creek	22.5	3.5

In regard to the percent reduction in contributing watershed area, the proposed Dinwoody borrow pits are presumed to be impounding structures, and the stockpiles are presumed to be either internally draining or within the confines of disturbance directed to retention ponds. If all of the borrow pit disturbances under this alternative were added to the Proposed Action disturbances (which is a conservative analysis), **Table 4.3-14** shows that there would be a percent or two greater runoff reduction than the Proposed Action.

Baseflow reductions to Deer Creek and South Fork Sage Creek would be the same as under the Proposed Action.

Using the results of the groundwater modeling and the baseline surface water data, estimates of selenium increases in area streams were made, as shown in **Table 4.3-15** above. Under this alternative, mining would raise selenium concentrations such that they would be just under or at the aquatic criterion for selenium at the mouth of Deer Creek, the mouth of South Fork Sage Creek, and at Crow Creek downstream of Sage Creek during the summer/fall baseline period. This would contribute to already occurring exceedances in the lower reaches of Sage Creek. The existing Smoky Canyon Mine causes these exceedances, and they are currently under investigation through a CERCLA process to determine how best to correct the situation. Actions taken under the AOC to reduce selenium loading to these surface waters would reduce the potential for exceedances of surface water standards in the lower reaches of Sage Creek due to Panels F and G activities. During the winter baseline period, the same would occur except that Crow Creek downstream of Sage Creek would be less than the criterion. At these analyzed stream locations, selenium concentrations would not affect water right holders' abilities to use this water for either stock watering or irrigation, based upon the action levels and thresholds discussed above.

Mining Alternative E - Power Line Connection from Panel F to Panel G Along Haul/Access Road

The fewer acres of disturbance for this alternative, which would be distributed across several HUC 6 watersheds, would not measurably change the percent of hydrologically disturbed land or the percent of runoff reduction from those values for the Proposed Action. Further, baseflow reductions to Deer Creek and South Fork Sage Creek would be the same as under the Proposed Action. This alternative would have no discernable affect on water quality in addition to that for the haul/access road along which the power line would be constructed.

Mining Alternative F - Electrical Generators at Panel G

This alternative would have the same disturbance areas as the Proposed Action. Therefore, the percent of hydrologically disturbed land and the percent of runoff reduction would be equal to the Proposed Action. Baseflow reductions to Deer Creek and South Fork Sage Creek would be the same as under the Proposed Action. This alternative would have no direct effect on water quality in addition to the Proposed Action. There would be a slightly higher risk of a fuel oil spill for this alternative over the Proposed Action because of the greater requirement for vendor delivery of fuel for the generators.

4.3.2.3 Transportation Alternatives

In addition to pit and overburden fill disturbances, roads would also contribute to the amount of land that would become hydrologically disturbed. For the Proposed Action roads and all eight transportation alternatives, the percent of additional hydrologically disturbed land is shown in **Table 4.3-18**. Under any of these alternatives, the resulting percentage would not cause the total amount of land in a hydrologically disturbed condition to rise above 30 percent in any of the affected HUC 5 or HUC 6 watersheds.

All culvert crossings of stream channels would be designed, constructed, and maintained using the criteria discussed in **Appendix 2B** in order to reduce the sedimentation and stability impacts inherent in culverted crossings. These criteria would also minimize the chance that any given culvert could plug and result in culvert failure, overtopping, road fill failure, and mass loading of road fill material into the stream.

Table 4.3-19 provides a comparison of the road indicators discussed in the general impacts section above for the Proposed Action and the transportations alternatives. Sediment loading from roads is outlined in **Table 4.3-20**, with details of this assessment found in **Appendix 4A**. Lastly, **Table 4.3-21** provides information on the amount of road crossing Meade Peak Shale outcrops.

Alternative 1 – Alternate Panel F Haul/Access Road

The Alternate Panel F Haul/Access Road would disturb 46 acres within the Sage Creek watershed. As shown in **Table 4.3-18** above, this road alternative would result in 0.3 percent of hydrologically disturbed land in the Sage Creek HUC 6 watershed, which would equate to less than 0.1 percent in the HUC 5 Crow Creek watershed.

As shown in **Table 4.3-19**, there would be one drainage channel crossing associated with this road, which would be in a non-perennial reach of South Fork Sage Creek, and the same length and alignment as for the Proposed Action Panel F Haul/Access Road.

About 2 acres of this road, or 4 percent of its total area, would be within AIZs (**Table 4.3-19**). About 63 percent of the road would be crossing ground slopes of 30 percent or less, and 37 percent would be crossing ground slopes between 31 and 65 percent. None of this road would cross Meade Peak Shale outcrops (**Table 4.3-21**).

According to the sediment loading analysis, sediment loading to Sage Creek is calculated at about 0.7 tons annually; with about half of this amount contributed directly to South Fork Sage Creek (**Table 4.3-20**). The added sediment to South Fork Sage Creek would be about 0.2 percent of its calculated baseline sediment load.

There would be no effects to water rights due to this road.

Some of these indicators are greater and some lesser than for the Proposed Action Panel F Haul/Access Road. However, the general effects to surface water resources would be in the same range for both of these roads.

Alternative 2 – East Haul/Access Road

The East Haul/Access Road would disturb 35 acres within the Sage Creek HUC 6 basin, 77 acres in the Middle Crow Creek HUC 6 basin, 23 acres in the Deer Creek HUC 6 basin, and 81 acres in the Crow Creek above Deer Creek HUC 6 basin. As shown in **Table 4.3-18**, these disturbances result in 0.2, 0.5, 0.3, and 0.4 percentages, respectively, of hydrologically disturbed land within these HUC 6 basins. Total disturbance from this alternative within the Crow Creek HUC 5 basin would be 0.2 percent.

There would be 10 drainage channel crossings associated with this road, one of which would be perennial (**Table 4.3-19**). The perennial crossing would be in Lower Deer Creek, and would require a culvert about 300 feet long. The road would cross the channel at a near right angle.

About 5 acres of this road, or 2 percent of its total area, would be within AIZs, as shown in **Table 4.3-19** (a small amount of this would be for the road-associated topsoil stockpiles). This table also shows that 73 percent of the road would be crossing ground slopes of 30 percent or less, and 27 percent would be crossing ground slopes between 31 and 65 percent. Additionally, about 3 acres, or 1 percent of this road, would cross Meade Peak Shale outcrops (**Table 4.3-21**).

Sediment loading to various streams within the Crow Creek basin is calculated to be about 4.5 tons annually, which is 0.4 percent of the calculated baseline sediment load in **Table 4.3-20** that underestimates the actual sediment load in the basin from all upstream tributaries.

The road fill for this alternative would be very close to, and possibly cover one spring (SP-MC-600) where the road crosses the Manning Creek drainage.

There would be no effects to water rights due to this road.

TABLE 4.3-18 ADDITIONAL PERCENT OF WATERSHED IN A HYDROLOGICALLY DISTURBED CONDITION-DUE TO TRANSPORTATION ALTERNATIVES

HUC NO.	WATERSHED	EXISTING	P.A. F ROAD	P.A. G ROAD	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 8
170402712	Diamond Creek	6.8	0	0.1	0	0	0	0	0.1	0	0	0
170402071203	Diamond Crk. Below Timber Creek	7.9	0	0.1	0	0	0	0	0.1	0	0	0
1704010507	Crow Creek	7.3	0.1	0.2	<0.1	0.2	0.2	0.2	0.2	0.1	0.1	0.1
170401050705	Crow Crk. Above Deer Crk.	4.5	0	0	0	0.4	0.4	0	0	0	0.2	0
17040150707	Deer Creek	1.0	0	1.5	0	0.3	1.1	2.1	2.0	0.4	<0.1	1.0
17040150703	Middle Crow Crk.	1.7	0	0	0	0.5	0.5	0.1	0.1	0.1	0.2	0.1
17040150708	Sage Creek	22.5	0.4	0.6	0.3	0.2	0.2	0.1	0.2	0.2	<0.1	0.1
17040150702	Crow Crk. Above Spring Crk.	7.8	0	0.1	0	0	0	0	0	0	0.2	0
17040150701	Lower Crow	23.5	0	0.1	0	0	0	0	0	0	0.1	0

TABLE 4.3-19 COMPARISON OF ROAD CHARACTERISTICS

CHARACTERISTIC	P.A. F ROAD	P.A. G ROAD	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 8
# Drainage Culverts*	1	5	3	10	10	14	9	2	21	14
# Perennial Drainage Culverts	0	2	0	1	1	0	2	0	4	0
Area in AIZs (Acres)	<1	15	2	5	10	9	15	6	11	10
Area in AIZs (%)	1	7	4	2	4	5	7	10	10	10
Area on 0 - 30% Slopes (ac.)	33	86	29	127	122	46	82	39	88	35
Area on 0 - 30% Slopes (%)	50	44	63	73	53	24	40	63	77	35
Area on 31 - 65% Slopes (ac.)	33	107	17	46	104	142	120	22	26	64
Area on 31 – 65% Slopes (%)	50	56	37	27	45	74	60	37	23	65
Area on 66+% Slopes (ac.)	0	0	0	0	6	3	0	0	0	0
Area on 66+% Slopes (%)	0	0	0	0	2	2	0	0	0	0

*Note that drainage crossing culverts counted above do not include smaller ditch relief culverts or minor crossing culverts that may be proposed during final road design.

TABLE 4.3-20 SEDIMENT LOADING TO STREAMS FROM TRANSPORTATION ALTERNATIVES ROAD EROSION (TONS/YEAR AVERAGE)

STREAM	EXISTING STATUS	P.A. F HAUL	P.A. G HAUL	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 8
SF SAGE	154.8	0.45	0.15	0.35	0	0	1.05	1.05	0	0	0.20
L SAGE*	NA	0.05	0	0.35	0.50	0.50	0	0	0	0	0
MANNING	58.7	0	0	0	1.20	1.10	0.25	0.25	0	0	0
DIAMOND	482.4	0	0	0	0	0	0	0	0	0	0
DEER	307.8	0	8.30	0	0.60	1.50	6.45	9.35	0.40	0	1.9
NATE	22.0	0	0	0	1.20	1.20	0	0	0	0	0
WELLS	83.5	0	0	0	0	0	0	0	0	0.65	0
CROW**	NA	0	0	0	1.00	0.75	0	0	0	0.30	0
TOTAL***	1,109.2	0.50	8.45	0.70	4.5	5.05	7.75	10.65	0.40	0.95	2.1

*Contributed to Sage Creek downstream of South Fork Sage; does not include quantities listed for South Fork Sage.

**Includes quantities contributed directly to Crow Creek or to one of the small, unnamed tributaries to it; does not include quantities listed for the other named tributaries listed in the table.

*** This total only includes the listed tributaries and does not include sediment load from all other tributaries in the Crow Creek basin.

TABLE 4.3-21 AREA OF ROAD ALTERNATIVES CROSSING MEADE PEAK SHALE OUTCROP

INDICATOR	P.A. F HAUL	P.A. G HAUL	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 8
AMOUNT OF ROAD (ACRES) TRAVERSING OUTCROP	0	10	0	3	3	10	10	2	1	9
% OF ROAD TRAVERSING OUTCROP	0	5	0	1	1	5	5	4	<1	10

As compared with the Proposed Action Panel G West Haul/Access Road, this alignment generally presents less impact to surface water resources. While it has an overall greater number of stream crossings, only one is perennial, compared to two for the Proposed Action Panel G road. Otherwise, this alternative avoids more AIZs, steep slopes, and Meade Peak Shale than the Proposed Action Panel G West Haul/Access Road. The WEPP analysis rated this alternative as much lower impact, in regard to sedimentation, than the Proposed Action Panel G West Haul/Access Road.

Alternative 3 – Modified East Haul/Access Road

The Modified East Haul/Access Road would disturb 34 acres within the Sage Creek HUC 6 basin, 77 acres in the Middle Crow Creek HUC 6 basin, 83 acres in the Deer Creek HUC 6 basin, and 82 acres in the Crow Creek above Deer Creek HUC 6 basin. As shown in **Table 4.3-18**, these disturbances amount to 0.2, 0.5, 1.1, and 0.4 percentages, respectively, of hydrologically disturbed land within those HUC 6 basins. Total disturbance from this alternative within the Crow Creek HUC 5 basin would be 0.2 percent. While much of this disturbance would be the same as for the Alternative 2 East Haul/Access Road, the disturbance in Deer Creek drainage would be greater under Alternative 3 than Alternative 2.

There would be 10 drainage channel crossings associated with this road, one of which would be perennial (**Table 4.3-19**). Many of the culverts would be the same as for the Alternative 2 East Haul/Access Road, except the culvert in Deer Creek, which would be located further upstream and would be longer at about 390 feet. These culverts would be designed, constructed and maintained using the criteria discussed in **Appendix 2B**, in order to reduce the sedimentation and stability impacts inherent in culverted crossings.

About 10 acres of this road, or 4 percent of its total area, would be within AIZs (a small amount of this would be for the road-associated topsoil stockpiles), compared with 15 acres for the Proposed Action Panel G West Haul/Access road, and 5 acres for Alternative 2 (**Table 4.3-19)**. This table also shows that 45 percent of the road would be crossing ground slopes of 30 percent or less, 45 percent would be crossing ground slopes between 31 and 65 percent, and 2 percent would be crossing ground slopes greater than 65 percent. Overall, this alternative would be on flatter ground than the Proposed Action West Haul/Access Road, but would have some steep sections; it would be on generally steeper ground than Alternative 2. Additionally, about 3 acres, or 1 percent of this road, would cross Meade Peak Shale outcrops, which is less than for the Proposed Action West Haul Road, but more than for Alternative 2 (**Table 4.3-21)**.

According to the sediment loading analysis, sediment loading to various streams within the Crow Creek basin from this road is calculated at about 5 tons annually, which is 0.45 percent or less of the calculated baseline sediment load for this stream. This is less than predicted for the Proposed Action Panel G West Haul/Access Road, and similar to Alternative 2.

The road fill for this alternative would be very close to, and possibly cover one spring (SP-MC-600) where the road crosses the Manning Creek drainage.

There would be no effects to water rights due to this road.

This alternative is closer in impact level to Alternative 2 East Haul/Access Road than it is to the Proposed Action Panel G West Haul/Access Road.

Alternative 4 – Middle Haul/Access Road

The Middle Haul/Access Road would disturb 14 acres within the Sage Creek HUC 6 basin, 16 acres in the Middle Crow Creek HUC 6 basin, and 162 acres in the Deer Creek HUC 6 basin.

As shown in **Table 4.3-18**, these disturbances amount to 0.1, 0.1, and 2.1 percentages, respectively, of hydrologically disturbed land within those HUC 6 basins. Total disturbances from this alternative within the Crow Creek HUC 5 basin would be 0.2 percent. The Deer Creek disturbance would occur further downstream in the watershed than would occur under the Proposed Action Panel G West Haul/Access Road or the Alternate Panel G West Haul/Access Road, and further upstream than would occur under the Modified East or East Haul/Access Roads.

There would be 14 drainage channel crossings associated with this road, none of which would be in perennial stream reaches (**Table 4.3-19**). This is more total crossings than the Proposed Action Panel G West Haul/Access Road, but fewer perennial ones. About 9 acres of this road, or 5 percent of its total area, would be within AIZs, which is less than estimated for the Proposed Action Panel G West Haul/Access Road (**Table 4.3-19**). This table also shows that 24 percent of the road would be crossing ground slopes of 30 percent or less, 74 percent would be crossing ground slopes between 31 and 65 percent, and 2 percent would be on ground sloping greater than 2 percent. Slightly more of this road would be on steeper slopes than would the Proposed Action Panel G West Haul/Access Road. Additionally, about 10 acres, or 5 percent of this road, would cross Meade Peak Shale outcrops, the same as for the Proposed Action Panel G West Haul/Access Road (**Table 4.3-21**).

According to the sediment loading analysis, sediment loading to Deer Creek from this road is calculated to be about 6.4 tons annually, slightly less than for the Proposed Action Panel G West Haul/Access Road; with smaller amounts being contributed to South Fork Sage and Lower Sage Creek directly (**Table 4.3-20**). The sediment load to Deer Creek is about 2 percent of the calculated baseline sediment load of this stream.

One spring (SP-NFDC-50) would be located under the current design footprint of this road, and could be covered by road fill.

There would be no effects to water rights due to this road.

Alternative 5 – Alternate Panel G West Haul/Access Road

The Alternate Panel G West Haul/Access Road would disturb 38 acres within the Sage Creek HUC 6 basin, 16 acres in the Middle Crow Creek HUC 6 basin, 155 acres in the Deer Creek HUC 6 basin, and 17 acres in the Diamond Creek below Timber Creek HUC 6 basin. As shown in **Table 4.3-18**, these disturbances amount to 0.2, 0.1, 2.0, and 0.1 percentages, respectively, of hydrologically disturbed land within those HUC 6 basins. This results in a total disturbance of 0.2 percent in the HUC 5 Crow Creek watershed and 0.1 percent in the HUC 5 Diamond Creek watershed.

There would be 9 drainage channel crossings associated with this road, 2 of which would be in perennial stream reaches (**Table 4.3-19**). The two perennial crossings, as well as several of the other culvert crossings would be the same as for the Proposed Action West Haul/Access Road.

About 15 acres of this road, or 7 percent of its total area, would be within AIZs, as shown in **Table 4.3-19** (a small amount of this would be for the road-associated topsoil stockpiles). This table also shows that 40 percent of the road would be crossing ground slopes of 30 percent or less, and 60 percent would be crossing ground slopes between 31 and 65 percent. Additionally, about 10 acres, or 5 percent of this road, would cross Meade Peak Shale outcrops (**Table 4.3-21)**. These values are quite similar to the Proposed Action Panel G West Haul/Access Road.

According to the sediment loading analysis, sediment loading to Deer Creek from this road is calculated to be about 9.4 tons annually; with a total of 10.7 tons to various streams within the Crow Creek basin, or slightly more than estimated for the Proposed Action West Haul/Access Road. These sediment loads to Deer Creek and Crow Creek are about 3 percent and 1 percent increases, respectively compared to the calculated baseline sediment loads in these streams in **Table 4.3-20**. Because the table does not include sediment loads from all upstream tributaries of Crow Creek, the actual percentage increase in sediment to Crow Creek would be less.

As with the Proposed Action version of this road alignment, two springs (SP-DC-100 and SP-DC-120) would be located under the current design footprint of this road and could be covered by road fill.

There would be no effects to water rights due to this road.

Alternative 6 – Conveyor from Panel G to Mill

The conveyor and its associated maintenance road would disturb 24 acres within the Sage Creek HUC 6 basin, 8 acres in the Middle Crow Creek HUC 6 basin, and 29 acres in the Deer Creek HUC 6 basin. As shown in **Table 4.3-18**, these disturbances amount to 0.2, 0.1, and 0.4 percentages, respectively, of hydrologically disturbed land within those HUC 6 basins. Total disturbances from this alternative within the Crow Creek HUC 5 basin would be 0.1 percent. The Deer Creek disturbance would occur further downstream in the watershed than would occur under the Proposed Action Panel G Haul/Access Road or the Alternate Panel G West Haul/Access Road.

As shown in **Table 4.3-19**, there would be 2 drainage channel crossings associated with this road, neither of which would be in perennial streams reaches (the road would stop short of both South Fork Sage Creek and Deer Creek to avoid crossing those streams). About 6 acres of this conveyor corridor, or 10 percent of its total area, would be within AIZs, as shown in **Table 4.3-19** (a small amount of this would be for the road-associated topsoil stockpiles). This table also shows that 63 percent of the road would be crossing ground slopes of 30 percent or less, and 37 percent would be crossing ground slopes between 31 and 65 percent. About 2 acres, or 4 percent of this road, would cross Meade Peak Shale outcrops (**Table 4.3-21)**.

According to the sediment loading, sediment loading to Deer Creek from this corridor is calculated at about 0.40 tons annually, much less than for the Proposed Action Panel G West Haul/Access Road (**Table 4.3-20**).

There would be no effects to water rights due to this Alternative.

When compared with the Proposed Action and other haul road alternatives to the Proposed Action Panel G West Haul/Access Road, there would be less impact to surface water resources under this alternative. Alternative 7 or 8 would also need to be considered along with the conveyor alternative for a full comparison.

Alternative 7 – Crow Creek/Wells Canyon Access Road

Alternative 7 would disturb 5 acres within the Lower Crow Creek HUC 6 basin, 40 acres within the Crow Creek above Spring Creek HUC 6 basin, 5 acres within the Sage Creek HUC 6 basin, 25 acres in the Middle Crow Creek HUC 6 basin, 1 acre in the Deer Creek HUC 6 basin, and 38 acres in the Crow Creek above Deer Creek HUC 6 basin. As shown in **Table 4.3-18**, these disturbances amount to 0.1, 0.2, <0.1, 0.2, <0.1, and 0.2 percentages, respectively, of hydrologically disturbed land within those HUC 6 basins. The total increase from this alternative within the Crow Creek HUC 5 basin would be 0.1 percentage point.

There would be 21 drainage channel crossings associated with this road, 4 of which would be in perennial stream reaches, but most of these crossings are already present along the existing road (**Table 4.3-19**). The 5 perennial crossings would be located near the mouths of: Deer Creek, Sage Creek, Hardmans Hollow, and an unnamed stream. Culvert lengths would be 185, 105, 75, and 70 feet, respectively.

About 11 acres of new construction on this road, or 10 percent of its total area would be within AIZs, which is less than for the Proposed Action Panel G West Haul/Access Road (**Table 4.3-19**). This table also shows that 77 percent of the road would be crossing ground slopes of 30 percent or less, and 23 percent would be crossing ground slopes between 31 and 65 percent. This would be on flatter ground than the Proposed Action Panel G West/Access Haul Road. Additionally, about 1 acre, or less than 1 percent of this road, would cross Meade Peak Shale outcrops, which is much less than for the Proposed Action Panel G West/Access Haul Road (**Table 4.3-21**).

According to the sediment loading analysis, annual sediment loading to Crow Creek and Wells Canyon from this road is calculated to be about 0.30 and 0.7 tons, respectively, much less than the Proposed Action Panel G West Haul/Access Road, even when combined with Alternative 6 (**Table 4.3-20**).

One spring (SP-Books) is located adjacent to the footprint of this road. It is presumed that the existing road footprint for this road allows the spring to function adequately and that the upgraded road would also allow this. There is a water right (4069) associated with the spring.

The Wells Canyon portion of this road would remain in use as the permanent access up Wells Canyon after mining is completed, so the potential impacts from it that are described above would continue. However, the existing Wells Canyon Road, which is located in the canyon bottom, would be decommissioned and reclaimed, eliminating the existing impacts that it causes to the Wells Canyon stream channel.

Alternative 8 – Middle Access Road

The Middle Access Road would follow the same alignment as much of the Middle Haul/Access Road (Alternative 4), thus disturbing the same watersheds. However, because it would be a narrower road, it would disturb less acreage than that alternative. This alternative would disturb 11 acres within the Sage Creek HUC 6 basin, 9 acres in the Middle Crow Creek HUC 6 basin, and 79 acres in the Deer Creek HUC 6 basin. As shown in **Table 4.3-18**, these disturbances amount to 0.1, 0.1, and 1.0 percentages, respectively, of hydrologically disturbed land within those HUC 6 basins. Total disturbance from this alternative within the Crow Creek HUC 5 basin would be 0.1 percent.

There would be 14 drainage channel crossings associated with this road, none of which would be in perennial stream reaches (**Table 4.3-19**). About 10 acres of this road, or 10 percent of its total area, would be within AIZs (**Table 4.3-19**). This table also shows that 35 percent of the road would be crossing ground slopes of 30 percent or less, and 64 percent would be crossing ground slopes between 31 and 65 percent. Additionally, about 9 acres, or 10 percent of this road, would cross Meade Peak Shale outcrops (**Table 4.3-21**). This would be less acreage than for the Proposed Action Panel G West Haul/Access Road that would cross AIZs, steep slopes, and shale outcrops.

According to the results of the sediment loading analysis, sediment loading to Deer Creek from this road is calculated at about 1.9 tons annually and about 0.20 tons annually to South Fork Sage Creek, much less than for the Proposed Action Panel G West Haul/Access Road. These sediment loads are about 0.6 percent and 0.1 percent, respectively of the calculated baseline sediment loads in these streams.

Two springs (SP-NFDC-50 and SP-DC-350) would be covered by the currently designed road fill of this road.

There would be no effects to water rights due to this road.

4.3.2.4 No Action Alternative

Under the No Action alternative, effects to surface water in the affected drainages would not change beyond those currently caused by mining in the Sage Creek drainage, previous exploration activities in the nearby drainages including Deer Creek, and existing forest roads. The percent hydrologic disturbance would remain at current levels, which is well below the allowed 30 percent, leaving room for other types of development on forest land.

4.3.3 Mitigation Measures

Where haul/access roads are currently designed close to or over springs, the finally selected road would be rerouted around them, or if that is not feasible, Simplot would install culverts, drains or other mechanisms in the base of the road fills to ensure the natural spring flows would continue to flow.

Springs currently in use that are disrupted by mining or covered by road building would be replaced with alternate, permanent and generally equivalent water sources by Simplot, in accordance with the RFP requirements.

Additional surface water monitoring sites, pertaining to this Project would be added to the current water monitoring program at Smoky Canyon Mine. An outside consultant would conduct the monitoring. Additional groundwater monitoring sites pertaining to this Project would be added to the current water monitoring program at Smoky Canyon Mine. Monitoring of surface water and groundwater would be conducted in accordance with the requirements of the Record of Decision and an agency-approved, surface water and groundwater monitoring plan.
Regular inspections would be conducted along the outer toes and slopes of all overburden fills to look for indications of seeps or springs discharging from the overburden.

Simplot would conduct infiltration testing within the footprint of the seleniferous overburden disposal sites prior to placing overburden. This testing would be conducted according to a plan that would be reviewed and approved by the Agencies before implementation. The testing would be intended to demonstrate that the vertical percolation rate in the seleniferous interior of the external overburden fills is sufficient to prevent development of seleniferous external overburden seeps.

Record keeping and use of a third party quality control inspector satisfactory to the Agencies would be employed by Simplot to ensure that the external overburden disposal facilities are built as proposed.

Roads would be designed, constructed, and operated to prevent a fuel or oil spill from entering a nearby stream by implementing suitable BMPs to contain such an event.

Monitoring would take place for COPC content analysis of overburden proposed for use as construction material according to an agency-approved geochemical sampling program.

Monitoring of the construction and functioning of Alternative D would be conducted in accordance with the Record of Decision and an agency-approved infiltration barrier construction and operation monitoring plan. This plan would include monitoring of construction to provide data showing the infiltration barrier was built in accordance to agency-approved plans and specifications. It would also include monitoring of the operation of the infiltration barrier to provide data showing the cap is functioning as designed. Operational monitoring would include collection of representative data on saturated and unsaturated soil moisture conditions within each functional layer of the cap and in a number of locations within the overburden under the cap for comparison with assumed/modeled conditions used in design studies. Soil moisture data collection methods and instruments would allow monitoring of seasonal and daily conditions within the materials and have long usable lives.

4.3.4 Unavoidable (Residual) Adverse Impacts

Groundwater

Unavoidable adverse effects to groundwater conditions at the site after mining ceases and any mitigation and/or final reclamation has occurred would be mainly from a water quality impact. Since it has been determined that infiltration of precipitation through seleniferous overburden has the potential to affect groundwater quality by releasing selenium and other COPCs into the groundwater regime, residual effects would still be likely to remain and be ongoing after proposed reclamation actions have been completed. Over hundreds of years, the concentration of contaminants in the infiltrating water may decrease as steady-state geochemical conditions are approached.

Surface Water

The water quality impacts caused by groundwater contributions of selenium to surface waters would result in increased levels, and in some cases exceedances of aquatic criterion, of this parameter beyond the mining timeframe. Similarly, the contributions of baseflow to surface water (although small) from the springs that would be eliminated would be lost beyond the mining timeframe.

Road corridors remain a potential source of sedimentation to streams, even with high design standards, BMP implementation, and maintenance commitments, for some years after their reclamation.

4.3.5 Relationship of Short-Term Uses and Long-Term Productivity

The local, short-term use of the mineral resources and groundwater supply for phosphate mining would result in ongoing employment and other economic benefits to the local and regional economies affected by the Smoky Canyon Mine and the Don Plant in Pocatello. It would also provide fertilizer for the agricultural areas supplied by the Don Plant.

Groundwater

Seepage of infiltration through seleniferous overburden and contribution of COPCs to groundwater down gradient of the overburden disposal areas would result in long-term water quality impacts of this groundwater. Where the contaminated groundwater discharges to the surface environment, the contaminants would be transferred from the subsurface to the surface environment for long periods of time. Over many centuries, these concentrations are expected to decrease.

Surface Water

The short-term use of the affected watershed areas for phosphate mining would benefit the local and regional economy. The long-term productivity of the streams affected by COPCs contributed through groundwater discharges would be diminished to varying degrees based on the concentrations of the COPCs.

4.3.6 Irreversible and Irretrievable Commitments of Resources

Groundwater

The loss of groundwater quantity that is used for mining at Panel G during the proposed mining operations would practically all be recovered through natural precipitation and infiltration. Based on the aquifer characteristics of the formations in the area, impacts to groundwater quantity would not be irreversible or irretrievable.

Irretrievable changes in groundwater quality under and downgradient of the overburden disposal areas would occur. This would occur because of the long-term infiltration of water through the seleniferous overburden material disposed on site. An area of the Wells formation aquifer extending east from Panel F to the Meade Thrust Fault and then north to South Fork Sage Creek Spring has been modeled to have water quality impacts from overburden seepage. An area of the Wells formation aquifer extending northeast from Panel G to the Lower Deer Creek – Books Spring – Crow Creek discharge locations has also been modeled to have water quality impacts from overburden seepage.

Springs/seeps that would be disrupted by mine panels would be permanently eliminated. Some springs and seeps downgradient of mine panels would have various degrees of permanent decreases in flows due to reductions in upgradient recharge. Certain springs/seeps would be permanently covered with mine overburden.

Surface Water

For practical purposes, streams that are negatively impacted by COPCs in groundwater discharges would be irreversible commitments of these resources. The same is true for springs that are permanently disrupted by mining or covered by road fills.

4.4 Soils

Issue:

The mining operations and related transportation activities may have the potential to affect soil resources in the Project Area.

Indicator:

Estimated quantity of soil loss due to erosion from disturbed areas during mining and reclamation.

4.4.1 Direct and Indirect Impacts

The Proposed Action and Alternatives would have direct and indirect impacts to the soil resources within the Project Area. Soil resources outside the Proposed Action and Alternatives would not be directly affected. Direct impacts to soil resources include loss of soil during salvage, sediment loss due to erosion, exposure and potential mobilization of selenium, and reduced productivity. Indirect impacts related to soil resources include water quality degradation related to erosion or selenium in sediment, potential elevated selenium content of vegetation on reclaimed areas, and reduced viability of vegetation related to soil fertility factors.

Indirect impacts related to the selenium content of plant growth medium within the Project Area are possible but would be greatly reduced by caps with low selenium concentrations that would be placed over seleniferous overburden fills.

Potential impacts to soil resources would be similar for the Proposed Action and all Alternatives except the No Action Alternative. The described activities would be similar for the different alternatives presented, although the acres affected and reclaimed may vary depending on the alternative. With implementation of growth medium salvage and reuse practices, soil conservation measures, BMPs, and other proposed operating procedures, the impacts to this resource under the Proposed Action and Alternatives would be site-specific, long-term, and moderate (see page 4-1 for definition).

Physical Changes to Soil Resources

Surface disturbance and removal of soil resources for replacement during reclamation activities would result in direct impacts to soils within the Project Area. Physical and chemical changes to the soil are expected to be moderate and would occur by mixing during initial salvage operations and when the soil is placed in stockpiles for future reclamation use.

Microorganisms such as bacteria and fungi are important in the decomposition of biological materials and the formation and improvement of soil itself (USDA 1979). Natural processes, such as dust blowing on the site from other areas, would reinoculate the site with these microorganisms. Root penetration and the development of a rhizosphere environment are also thought to perpetuate the growth of microorganisms (USDA 1979). Microbiotic soil crusts are recognized as an important aspect of soil quality (USDA 2003a), and damage to these crusts would occur during disturbance, reducing soil quality by increasing erosion potential and changing the properties of the associated soil.

Direct physical impacts to soil resources include compaction and crushing of the soil and soil crust by equipment during recovery, stockpiling, and subsequent replacement during reclamation. Physical effects of soil compaction would be moderate and include reduced permeability and porosity, damage to microbiotic crusts, increased bulk density, decreased available water holding capacity, increased erosion potential, reduced gaseous exchange, and loss of soil structure. Soils in the area of the Proposed Action or Alternatives characteristically have a high percentage of coarse fragments, which would provide support for heavy equipment without compressing the underlying soils.

Productivity

Productivity is defined as the rate of vegetation production per unit area, usually expressed in terms of weight or energy. Primary factors that influence natural soil productivity include length of growing season, climate and soil depth, and production/fertility. As identified in the RFP

(USFS 2003a), soil productivity and soil quality on the Forest are generally stable, but some areas, associated with management actions, show declines.

Production and fertility of the stockpiled growth medium would be directly affected by mixing of the soils during salvage operations. Incorporation of slash and vegetative materials into the growth medium during stripping would increase the organic matter content of the material and elevate the production potential. Mixing of soils with low coarse fragment content together with soils of high coarse fragment content would serve to dilute the coarse fragment content and is likely to increase the production potential of the growth medium.

Soil compaction can contribute to soil erosion and reduced soil productivity. Productivity loss due to compaction influences would be negligible with implementation of the Proposed Action or Alternatives.

Soil Salvage

Soil salvage, planting methods, and seed mix selection are important for establishment of permanent vegetation on reclaimed areas. Topsoil/growth medium would be salvaged for reclamation purposes and stockpiles placed on stable landforms would be protected from erosional forces. Temporary cover crops established on the stockpiles serve to enhance productivity potential and reduce soil loss over the life of the stockpile.

Soil salvage would be based on suitability criteria as described in this document, including site slope and configuration. Direct haul and placement of growth medium to sites ready for immediate reclamation would minimize the need for stockpiling the material and would be done whenever possible. Based on suitable soil depths shown in **Tables 3.4-1 and 3.4-4**, the average potential topsoil stripping depth for soils within the area of the Proposed Action is estimated to be about 22 inches. A summary of in-situ topsoil/growth medium volumes for mapped soil units in the area of the Proposed Action and Alternatives is presented in **Table 3.4-4**. These mapped units occur within a specific study area and do not represent the entire area encompassed by the transportation alternatives or haul/access roads. The total volume of suitable, in-situ growth medium to be salvaged with implementation of the Proposed Action is estimated at 3,962,700 cubic yards. The amount of growth medium to be salvaged was calculated using the estimated 1,340 acres of disturbance and the average topsoil stripping depth of 22 inches (1.833 feet). Although the topsoil within the topsoil stockpile footprints would not be salvaged, once the stockpiled topsoil is removed from these areas and used for reclamation, the existing topsoil underneath the stockpiled locations would be ripped and scarified to aid in reclamation. Thus, this proposed disturbance acreage was included in calculating the available topsoil to be salvaged.

Considering the effects of inaccuracies in the estimation of average thickness of suitable soils within the disturbance footprint, potential swell of soil volumes during excavation, and potential compaction of soil during reapplication, the resulting re-applied soil would yield a layer of growth medium of about 1.5 feet (ranging from one to two feet) available for placement over the 1,269 acres of disturbance to be reclaimed. Growth medium placed to this depth would enhance the long-term productivity of the reclaimed areas. The actual total volume of available growth medium resources may be slightly different than estimated, due to variable site conditions.

Soil Loss

Localized declines in soil quantity are directly associated with increasing loss of soil from erosion and displacement, loss of fine litter and coarse woody debris, changes in vegetation composition, and increases in bulk density from compaction (USDA 2003a). A portion of the soils within the Project Area would be physically lost during salvage and replacement operations through mechanical and erosion effects. Soil mixing and loss of some soil would also occur during final growth medium distribution and completion of reclamation.

Erosion would occur in areas of new or increased surface disturbance. Soil characteristics identified in **Table 3.4-5** suggest that disturbed areas would experience moderate erosion potential, either by wind or water. Measures would be implemented for sediment and erosion control to reduce soil loss and sedimentation that could be caused by sheet and gully erosion from drainage and surface runoff. Reducing the duration of time that the soil is exposed would limit the degree of erosion by wind or water. Growth medium stockpiles would be graded and seeded to reduce the loss of soil resources by erosion. Concurrent and timely revegetation of disturbed areas would reduce the potential for soil erosion in the Project Area by improving ground cover.

Soil erosion potential is determined based on physical soil characteristics and slope. Areas located on steep slopes are inherently more susceptible to erosion. The majority of reclaimed areas identified in the Mine and Reclamation Plan incorporate a 3:1 (Horizontal:Vertical) slope surface during regrading and reclamation activities, yielding an average slope value of approximately 33 percent.

Localized factors such as type and amount of vegetative ground cover, percentage, and type of rock fragments on the ground surface, and/or implementation of soil conservation BMPs may prevent soil erosion, even in areas with inherently high soil erosion potential.

Water Erosion

Potential for water erosion would be increased after soil salvage operations due to the removal of the vegetative cover and the loss of soil structure. Erosion of topsoil/growth medium after redistribution on regraded sites during the final stages of reclamation would also have a greater potential until the soil is stabilized by successful revegetation.

Surface runoff management ditches, culverts, settling ponds, and sediment traps would be constructed following approved BMPs and practices described in the Smoky Canyon Storm Water Pollution Prevention Plan (SWPPP) (Simplot AgriBusiness 2004). The SWPPP was developed in accordance with U.S. EPA General Storm Water and National Pollution Discharge Elimination System (NPDES) permit requirements, in addition to other regulatory input. Sediment entrained in runoff would be routed to settlement basins to collect, settle, infiltrate, and evaporate runoff water. These structures would be sized to contain the expected volume of sediment and runoff associated with the 100-year, 24-hour precipitation event. The settlement basins would be properly maintained to ensure adequate containment volume is available throughout the life of the mine. Silt fences, straw bale filters, and rock check dams would also be used to control sediment during construction activities.

Wind Erosion

Wind erosion hazard is expected to be low to moderate due to the characteristic soil features, such as the high percentage of coarse fragments throughout the soil profile. The wind erodibility hazard for the majority of soils within the Proposed Action and Alternatives area has been rated as moderate (Maxim 2004f). Concurrent and timely revegetation of disturbed areas would reduce the potential for soil erosion by improving ground cover.

Soil Quality Maintenance

Soil salvage and site reclamation for all alternatives would meet management objectives to maintain soil productivity by following RFP guidance, BMPs, and proven reclamation practices. Mine excavations, overburden fills, and specified transportation facilities are excluded from R-4 Soil Quality Standards and Guidelines (FSH 2509.18 Supplement r4_2509.18-2002-1). Detrimental soil disturbance may apply to disturbances such as ponds, ditches, topsoil stockpiles, and temporary roads that are outside the mine footprints. All disturbed soils would be ameliorated to meet soil quality standards and guidelines. Topsoil/growth medium would be salvaged prior to disturbance for use during reclamation. An estimated 12 total acres of soil resources in the area of the Proposed Action would not be recovered as growth medium for reclamation due to limiting factors such as rock outcrop, excessive coarse fragments or slope. These areas of unrecovered soil would be scattered throughout the Project Area depending upon the site conditions, and would not occur on areas of 10 acres or greater, per the standards identified in the RFP (USFS 2003a).

Soil Erosion Estimate

The Disturbed WEPP (USDA 2000) model was utilized to represent erosion predictions for reclaimed areas during both interim vegetation establishment and at the completion of successful revegetation. A detailed description of the methodology and operating parameters characteristic of the WEPP modeling program is found in **Appendix 4A**. WEPP predictions for interim vegetation establishment indicate that there would be a 47 to 67 percent chance of erosion during the first three years of reclamation for the Proposed Action and Alternatives. The average annual erosion rate for all WEPP model runs for interim vegetation establishment on the reclaimed areas is 0.78 tons/acre. WEPP predictions for successful vegetation establishment indicate that the chance of erosion after successful reclamation for the Proposed Action and Alternatives would be 17 to 40 percent. The average annual erosion rate for all WEPP model runs for successful vegetation establishment on the reclaimed areas is 0.17 ton/acre.

It should be noted that the WEPP model does not have provisions to allow for the implementation of BMPs, the degree of other coarse fragments in the soil, or other mitigative variables that influence erosion and sedimentation.

Selenium Mobilization

Mackowiak et al. (2004) determined that selenium levels in vegetation growing in undisturbed soils overlying and derived from Phosphoria formation rocks tended to be higher than vegetation in undisturbed soils derived from Wells Limestone or Rex Chert. The total concentration of selenium in soils does not directly determine the concentration of selenium in the plants growing on those soils (Lakin 1972; Bauer 1997; Fisher 1991). Palmer and Olson (1991) indicate that the soluble soil selenium should be a reasonable predictor of plant selenium content. Absorption by plants depends on the chemical form and solubility of the selenium, as well as the pH and moisture content of the soil. The actual amount of selenium in a given plant tissue reflects the amount of selenium available to the plant as well as the accumulating proclivity of that plant (Prodgers and Munshower 1991). The reclamation seed mix would not include vegetation species considered to be selenium accumulator plants.

Section 3.4.5 identifies the processes that influence the mobilization and availability of the four-oxidation states of selenium that may be present in the soil. Soluble selenium in surficial growth medium is mobile and subject to being accumulated in plants and leached out of the material in surface runoff or infiltration. The BMPs proposed for Panels F and G are designed to reduce potential impacts from selenium mobilization to negligible levels.

Studies were conducted in the vicinity of the Proposed Action and Alternatives area (JBR 2001c) and at other phosphate mining operations in southeast Idaho (IMA 2000) to determine the effect of different reclamation treatments on the selenium concentration of growth medium and vegetation. Geochemical analysis conducted by JBR at the Smoky Canyon Mine (2001c) included testing for pH, CEC, total selenium, extractable selenium, and trace metals cadmium, copper, manganese, molybdenum, nickel, zinc, and vanadium. Analysis indicated that there is little correlation between the total selenium and extractable selenium concentrations of the same soil/growth medium material. Additionally, the total concentration of selenium in soils was poorly correlated with the concentration of selenium in the plants growing on those soils. The correlation with extractable selenium was much better. Absorption by plants depends on the chemical form and solubility of the selenium, the tendency for selenium accumulation in certain plant species, as well as soil conditions including pH and moisture content.

The current technique to reduce the exposure of seleniferous overburden to the surface environment is the placement of low selenium chert as a thick cover. Deep and coarse textured chert would deter deep root penetration into underlying seleniferous overburden, thereby reducing bioaccumulation in reclamation vegetation. Studies defining an optimal capping depth that prevents root penetration into the waste rock have not been conducted (Mackowiak et al. 2004). Rooting depths for the reclamation seed mix would typically be less than 4 feet, and the total depth of the approximately 4-foot chert cap plus the growth medium layer would be approximately 5 to 6 feet.

Soils with slightly elevated selenium concentrations would be mixed with growth medium containing lower concentration to dilute the total concentration in salvaged soils. Current recommendations for soil materials and growth medium used in reclamation indicate materials with less than 13 mg/kg total selenium dry weight and less than 0.10 mg/L extractable selenium are considered suitable for use as a planting medium when used in combination with other preventative BMPs (USFS 2003a).

4.4.1.1 Proposed Action

Panel F, Including Lease Modifications

Construction of pits and external overburden storage facilities would result in 515 acres of disturbance to soil resources. Growth medium from soil stockpile area footprints would not be salvaged and placed in stockpile storage areas but would remain in place. Panel F would be largely backfilled, and the pit areas would be recontoured to resemble natural contours and reclaimed. A 38-acre portion of Panel F would not be backfilled, which would leave part of the pit footwall and two remaining hanging walls exposed and unreclaimed.

Panel F Haul/Access Road

Construction of the haul and access roads located outside the pit in Panel F would result in 67 acres of disturbance to soil resources. The salvageable growth medium on the road disturbance areas would not be removed for placement in stockpiles, but would be stockpiled in windrows along the margins of the disturbance area or in discrete growth medium stockpiles and would be readily available for future road reclamation. Approximately half of the road would be constructed on slopes steeper than 33 percent (3h:1v), which increases the hazard of erosion in those areas. Approximately 4 acres of roads constructed in areas of steep slopes would not be fully recontoured or reclaimed.

Panel G

The open pit and external overburden fills for Panel G would result in the disturbance of 513 acres of soil resources. Growth medium salvaged on these areas would be placed in stockpiles. Growth medium from soil stockpile area footprints would not be salvaged and placed in stockpile storage areas, but would remain in place. In the final configuration of this pit, an 8-acre portion of the Panel G hanging wall would be left exposed and unreclaimed.

Panel G West Haul/Access Road

Construction of the Panel G West Haul/Access road would result in an estimated 217 acres of disturbance to soil resources. The salvageable growth medium on the road disturbance areas would not be removed for placement in stockpiles, but would be stockpiled in windrows or in discrete growth medium stockpiles along the margins of the disturbance area and would be readily available for future road reclamation. Portions of the haul/access road built across slopes steeper than 33 percent (3h:1v) would not be reclaimed due to equipment limitations and safety concerns. Approximately 21 acres of road disturbance would not be reclaimed. Roads constructed on steep slopes increase the hazard of erosion in those areas.

Power Line Between Panels F and G

The disturbance corridor footprint, outside of the mine pit disturbances, of the power line comprises approximately 28 acres. Soil disturbance would be temporary and would occur within the 25-foot disturbance radius surrounding each of the 74 power poles to be placed in areas of new disturbance. Poles located within the Panel F and G mine disturbance area would not create new disturbance. Cutting of large trees would occur, but downed vegetation and undisturbed low vegetation would be left in place within this disturbance corridor to serve as soil protection and erosion control along the power line route.

4.4.1.2 Mining Alternatives

For comparison of soil impacts, initial mine disturbance areas for Alternatives are assumed to be the same as the Proposed Action (1,056 acres), with the exception of Alternative A, which has fewer acres of disturbance and Alternative D which involves the construction of an infiltration barrier and encompasses a larger disturbance area. Comparisons of the disturbance characteristics for these alternatives are listed in **Table 4.4-1**.

TABLE 4.4-1 SUMMARY OF DISTURBANCE AND RECLAMATION AREAS FOR THE MINING ALTERNATIVES (ACRES)

ALTERNATIVE	A*	B	C	D	E	F
Disturbed Area	1,054 / 918	1,056	1,056	1,193	1,028	1,028
Reclaimed Area	1,008 / 901	1,018	1,056	1,146	982	982
Unreclaimed Area	46 / 17	38	0	46	46	46

* Values are for No North Lease Modification / No South Lease Modification

Mining Alternative A – No South and/or North Panel F Lease Modifications

Boundaries of the Panel F Pit would be decreased on the north and south ends, although disturbance to soil resources related to construction of haul roads, growth medium stockpiles, power line, and other facilities would still occur. Final reclamation contours would be different than the Proposed Action and would result in reduced impacts to soil resources.

No Panel F North Lease Modification

If this alternative were adopted the soil disturbance area for the Panel F Pit would be reduced by 2 acres.

No Panel F South Lease Modification

If this alternative were adopted, the soil disturbance area for the Panel F Pit would be reduced by 138 acres and would not cross over the topographic divide into the Deer Creek drainage, reducing potential soil impacts to this watershed from Panel F. The 38-acre open pit left in Panel F for the Proposed Action would be partially backfilled under this alternative, leaving a 9-acre highwall.

Mining Alternative B – No External Seleniferous Overburden Fills

The initial soil disturbance footprint for this alternative would be the same as the Proposed Action. The 8-acre highwall remaining in Panel G under the Proposed Action would be reclaimed under this alternative. The 38-acre, unreclaimed open pit area in Panel F would remain under this alternative.

Mining Alternative C – No External Overburden Fills at All

The mine footprint and the area of soil resource that would be disturbed would be the same as the Proposed Action with implementation of this alternative. Under this alternative, the 38-acre, open pit in Panel F would be backfilled and reclaimed. The 8-acre Panel G highwall would also be reclaimed.

Mining Alternative D – Infiltration Barriers on Overburden Fills

With this alternative, development of shale borrow pits and stockpile areas would increase the disturbance to soil resources by approximately 137 more acres than the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

Implementation of this alternative would result in no new disturbance to soil resources and would yield a reduction of about three acres of soil disturbance from the Proposed Action because there would be no need for a separate power line corridor between Panels F and G. Trees would not be removed along the power line corridor as described in the Proposed Action. Impacts to soil resources in mining areas and along road alignments would be the same as the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G

Implementation of this alternative would eliminate the three acres of soil disturbance within the proposed power line corridor, and no new disturbance would occur with installation of the electrical generators. Disturbance to soil resources would be limited to proposed mining activities, growth medium stockpiles, roads, and other facilities including settling ponds and ditches. Impacts to soil resources would be the same as the Proposed Action.

4.4.1.3 Transportation Alternatives

Road construction activities would be designed to fit the terrain by avoiding unstable slopes and highly erodible soils to the extent practicable; roadway placement would follow the ground contours as much as possible, and roads would not be constructed with deeper fills and cuts than the geometric road standard requires. If roads were constructed in areas that have been classified as having a high cut and fill erosion hazard (**Table 3.4-6**), special protective measures would be necessary to protect soils and prevent excessive sedimentation (USDA 1990). These protective measures include, but are not limited to, mulch, matting, or slope length shortening. At the completion of mining activities road surfaces would be reclaimed, except in areas where the natural slope is more than 33 percent.

Table 4.4-2 shows the soil map units present along each of the following transportation alternative routes and identifies the range of limitations and suitability ratings for roads and development within each of these units. The majority soil column lists the soil(s) that comprise the majority percentage within the proposed disturbance area for each transportation alternative and the Proposed Action.

Alternative 1 – Alternate Panel F Haul/Access Road
This alternative is 0.5 mile shorter and would have 21 acres less disturbance to soil resources than the Proposed Action. Approximately 5 acres of the total 46 acres involved with implementation of this alternative would remain unreclaimed. As shown in **Table 4.4-2**, approximately 38 acres of the soil resources in this alternative have been identified as having slight to severe revegetation limitation. These areas have also been identified as having fair to good trafficability and a low to moderate erosion hazard for roads and development.

Alternative 2 – East Haul/Access Road
Approximately 7 acres of the total 216 acres of soil disturbance involved in this alternative would remain unreclaimed. **Table 4.4-2** shows that approximately 61 acres of the soil resources in this alternative have been identified as having poor trafficability, slight to moderate revegetation limitation, and a low to moderate erosion hazard for roads and development.

Alternative 3 – Modified East Haul/Access Road
More than a quarter of the route for this alternative would involve construction of road cuts and fills in areas having slopes between 31 percent and 65 percent in order to create switchbacks to reduce the overall road slope. Alternative 3 would involve 276 acres of soil disturbance and 21 acres of this transportation route would remain unreclaimed. Soil limitations on 62 acres would be similar to Alternative 2, with the addition of 89 acres having moderate to high cut and fill erosion hazard and moderate to severe cut and fill revegetation limitation.

Alternative 4 – Middle Haul/Access Road
Steep sandstone slopes would necessitate large road cuts and fills that would be more difficult to reclaim than the Proposed Action or Alternative 2, and portions of this alignment would be located on rocky side slopes with slopes of 60 percent or more. Alternative 4 involves disturbance of a total of 192 acres of soil resources with 34 acres unreclaimed. This alternative would impact the North Fork Deer Creek watershed more than either of the other haul/access roads due to erosion hazard of soil resources. As shown in **Table 4.4-2**, approximately 147 acres of the soil resources in this alternative have been identified as having severe revegetation limitation, poor trafficability and a high erosion hazard for roads and development.

Alternative 5 – Alternate Panel G West Haul/Access Road
This alternative is similar to the Proposed Action except for a route change that would disturb less of the South Fork Sage Creek watershed and eliminate the long, north aspect road section in this area. Approximately 28 acres of the total 226 acres of soil disturbance involved in this alternative would remain unreclaimed. As shown in **Table 4.4-2**, an estimated 137 acres of this road corridor have been identified as having severe revegetation limitation, 58 acres have moderate to high erosion hazard and poor trafficability, and 136 acres have low to moderate erosion hazard.

TABLE 4.4-2 ROAD SUITABILITY RATINGS FOR SOILS PRESENT ALONG TRANSPORTATION ALTERNATIVE ROUTES

ALTERNATIVE	SOIL MAP UNITS (AND ACRES) PRESENT ALONG ROUTE[1]	TOTAL ACRES OF ROAD DISTURBANCE	MAJORITY[2] SOIL MAP UNIT AND LIMITATION(S)/ SUITABILITY	RANGE OF LIMITATIONS FOR ROADS AND DEVELOPMENT			
				UNSURFACED ROAD TRAFFICABILITY	CUT & FILL EROSION HAZARD	CUT & FILL REVEGETATION LIMITATION	CUT SLOPE STABILITY HAZARD
Proposed Action Panel G West Haul/Access Road	656 (91) 755 (45) 301 (26) 381 (12) 653 (12) 201 (7)	217	656 – Severe Revegetation Limitation/ Low to Moderate Erosion Hazard	Poor to Good	Low to High	Moderate to Severe	Low to Moderate
Proposed Action Panel F Haul/Access Road	380 (36) 755 (31)	67	380 – Slight to Severe Revegetation Limitation/ Low to Moderate Erosion Hazard, Fair to Good Trafficability	Poor to Good	Low to High	Slight to Severe	Low to Moderate
Alternate Panel F Haul/Access Road (Alt.#1)	380 (38) 755 (8)	46	380 – Slight to Severe Revegetation Limitation/ Low to Moderate Erosion Hazard, Fair to Good Trafficability	Poor to Good	Low to High	Slight to Severe	Low to Moderate
East Haul/Access Road (Alt.#2)	300 (61) 653 (9) 912 (7) 451 (15) 473 (27) 380 (24)	216	300 – Poor Trafficability/ Low to Moderate Erosion Hazard, Slight to Moderate Revegetation Limitation	Poor to Good	Low to High	Slight to Severe	Low to High
Modified East Haul/Access Road (Alt.#3)	300 (62) 473 (46) 451 (37) 404 (15) 405 (32) 380 (24)	276	300 – Poor Trafficability/ Low to Moderate Erosion Hazard, Slight to Moderate Revegetation Limitation 473, 404 and 405 -- Moderate to Severe Revegetation Limitation, Moderate to High Erosion Hazard	Poor to Good	Low to High	Slight to Severe	Low to High
Middle Haul/Access Road (Alt.#4)	653 (91) 553 (56) 201 (15) 381 (15) 301 (13)	192	653 and 553 – Poor Trafficability, High Erosion Hazard, and Severe Revegetation Limitation	Poor to Good	Low to High	Moderate to Severe	Low to Moderate

ALTERNATIVE	SOIL MAP UNITS (AND ACRES) PRESENT ALONG ROUTE[1]	TOTAL ACRES OF ROAD DISTURBANCE	MAJORITY[2] SOIL MAP UNIT AND LIMITATION(S)/ SUITABILITY	RANGE OF LIMITATIONS FOR ROADS AND DEVELOPMENT			
				UNSURFACED ROAD TRAFFICABILITY	CUT & FILL EROSION HAZARD	CUT & FILL REVEGETATION LIMITATION	CUT SLOPE STABILITY HAZARD
Alternate West Haul/Access Road (Alt.#5)	656 (91) 553 (46) 381 (27) 301 (18) 653 (12)	226	656 – Severe Revegetation Limitation/ Low to Moderate Erosion Hazard 553 – Poor Trafficability, Moderate to High Erosion Hazard, and Severe Revegetation Limitation	Poor to Good	Moderate to High	Moderate to Severe	Low to Moderate
Conveyor (Alt.#6)	381 (21) 404 (11) 301 (10) 380 (13)	61	381 – Slight to Severe Revegetation Limitation/ Low to Moderate Erosion Hazard, Fair to Good Trafficability, Low Cut Slope Stability Hazard	Poor to Good	Low to High	Slight to Severe	Low to Moderate
Wells Canyon and Crow Creek Access Roads (Alt.#7)	755 (22) 653 (2)	114	755 – Moderate to Severe Revegetation Limitation, Moderate to High Erosion Hazard Majority of soils along this route are located on Private land or outside of the Study Area	Poor to Good	Low to High	Slight to Severe	Low to Moderate
Middle Access Road (Alt.#8)	653 (41) 553 (37) 381 (11) 301 (11)	99	653 and 553 – Poor Trafficability, High Erosion Hazard, and Severe Revegetation Limitation	Poor to Good	Low to High	Moderate to Severe	Low to Moderate

1 3rd Order Soil Map Units as identified on **Figure 3.4-3** (Source: USDA 1990). Acreage numbers have been rounded and map units with less than 8 acres may not be included in this list.
2 Majority soil is defined as the soil(s) that comprise the majority percentage of the proposed disturbance area. Limitations and suitability ratings of majority soils would likely have more consideration and applicability for evaluating soils than those map units that compose only a minor portion of the area.

Alternative 6 – Conveyor from Panel G to Mill
This alternative would eliminate the need for a haul road connecting Panels F and G, and a conveyor would be built along a 50-foot corridor to transport ore. The conveyor alternative would have less soil disturbance than any of the haul/access road alternatives, involving 61 total acres with no acres of unreclaimed soil resources. Either Alternative 7 or Alternative 8 access roads would need to be implemented in conjunction with this alternative. Soils in this alternative have slight to severe revegetation limitation, low to moderate erosion hazard, fair to good trafficability, and low cut slope stability hazard.

Alternative 7 – Crow Creek/Wells Canyon Access Road
This alternative involves the improvement and upgrading of an existing road in order to support the conveyor alternative (Alternative 6). Both the Wells Canyon and Crow Creek roads would remain open to the public under this alternative. Implementation of this alternative would involve 114 acres of disturbance to soil resources of which 55 acres would remain disturbed after mining. Soil limitations include moderate to severe revegetation and moderate to high erosion hazard on 22 acres.

Alternative 8 – Middle Access Road
Selection of Alternative 6 necessitates the construction of either this alternative or Alternative 7. Implementation of this alternative would involve 99 acres of disturbance to soil resources, all of which would be reclaimed at the end of mining. As shown in **Table 4.4-2**, approximately 78 acres of the soil resources in this alternative have been identified as having severe revegetation limitation, poor trafficability and a high erosion hazard for roads and development.

The summary of disturbance and reclamation statistics for the transportation alternatives is shown in **Table 4.4-3**.

TABLE 4.4-3 SUMMARY COMPARISON OF TRANSPORTATION DISTURBANCE AREAS (ACRES)

#	ALTERNATIVE	LENGTH (MILES)	TOTAL ACRES	UNRECLAIMED ACRES
1	Alternate Panel F Haul/Access Road	2.1	46	5
2	East Haul/Access Road	7.4	216	7
3	Modified East Haul/Access Road	8.4	276	21
4	Middle Haul/Access Road	6.4	192	34
5	Alternate West Haul/Access Road	8.0	226	28
6	Conveyor	6.1	61	0
7	Crow Creek/Wells Canyon Access Road*[1]	15.1	114	55
8	Middle Access Road	5.9	99	0

*[1] New disturbance only

4.4.1.4 No Action Alternative

Under the No Action Alternative, Simplot's proposed detailed mining and reclamation/mitigation plans for the development of mine Panels F and G would not be approved. Simplot would not be able to proceed with mining of the ore in these panels until such time as a mining and reclamation plan is found to be acceptable by the BLM and USFS. Local effects to soil resources from the mining of Panels F and G would be eliminated since none of the mining or transportation alternatives would be implemented. An area of about 29 acres in the existing Pit E-0 of Panel E would not be reclaimed since overburden generated from the Proposed Action would not be available for backfill material. Mining and reclamation would continue on the existing, approved mine panels. The No Action Alternative temporarily would result in no additional impacts to soil resources in the Project Area. With implementation of the No Action Alternative, mining activities could shift to other Simplot leases in southeastern Idaho earlier than planned, which would defer environmental impacts to other locations.

4.4.2 Mitigation Measures

Simplot would reduce the loss of soil fertility within the Project Area by incorporating slash into the salvaged growth medium to increase the organic matter content, mixing soil types containing few coarse fragments together with soils containing high coarse fragment content in order to dilute the total coarse fragment percentage, and timing salvage operations to optimize revegetation.

Prior to seeding, applied topsoil would be loosened, if it were compacted during application, to allow unrestricted root growth in the reclamation vegetation.

Monitoring the effectiveness of erosion and sedimentation control measures and other soil resource BMPs would be conducted according to the conditions of the Record of Decision and an agency-approved soil resource monitoring plan.

In addition to monitoring effectiveness of proposed Environmental Protection Measures and BMPs, the soil resource monitoring plan would include:

- Monitoring of vegetation germination and growth for assessment of erosion potential based on percentage of ground cover and seedling establishment effectiveness (see monitoring requirement under Vegetation below).

- Soil sampling and analysis for initial nutrient amendment assessment for reclamation activities and to evaluate areas of low production after reclamation activities have concluded.

4.4.3 Unavoidable (Residual) Adverse Impacts

Native soil conditions would be lost on the disturbed areas due to the breakdown of soil structure, adverse effects to microorganisms, and discontinuation of natural soil development as a result of salvage operations. Soils salvaged and utilized in reclamation would initially demonstrate a decrease in infiltration and percolation rates, decrease in available water holding capacity, and loss of organic matter. These effects would be reversed by natural soil development over time. Successful reclamation of disturbed areas would expedite these natural processes and create an environment suitable for long-term vegetation establishment.

Approximately 46 acres of disturbance under the Proposed Action and Alternatives D, E, and F would consist of unreclaimed pit bottoms and highwall areas. An estimated 12 acres of soil resources in the area of the Proposed Action would not be recovered as growth medium for reclamation due to limiting factors such as rock outcrop, excessive coarse fragments or slope. These areas of unrecovered soil would be scattered throughout the Project Area and would not occur on areas larger than 10 acres, per the standards identified in the RFP (USFS 2003a).

4.4.4 Relationship of Short-Term Uses and Long-Term Productivity

The use of this area for recovery of phosphate resources would provide economic support for the local economy of southeast Idaho. Reclamation of disturbed areas would return the disturbed soil to long-term productivity by being utilized as growth medium in reseeded areas, while the unreclaimed pit bottoms highwall areas, and road cuts would permanently eliminate 71 acres from potential production.

Short-term uses and long-term productivity potential for soil resources would be similar with implementation of the Proposed Action or Alternatives. Implementation of the No Action Alternative would not change the short-term uses or the long-term productivity of soil resources in the Project Area.

4.4.5 Irreversible and Irretrievable Commitment of Resources

Unreclaimed areas of soil disturbance for open pits, highwalls, and road disturbances would produce an irreversible commitment of soil resources disturbed by these features.

Implementation of the No Action Alternative would constitute an irreversible commitment of soil resources over an area of about 29 acres in the existing Pit E-0 of Panel E, which would not be reclaimed since overburden generated from the Proposed Action would not be available for backfill material.

Irretrievable commitment of resources includes the disturbance of soil resources with implementation of any alternative except the No Action Alternative. Approximately 1,340 acres of soil resources would be disturbed with implementation of the Proposed Action or Alternatives B, C, E, or F; 1,200 acres for Alternative A, and 1,477 acres with Alternative D.

4.5 Vegetation

Issue:

The mining operations and related transportation activities may affect vegetation patterns and productivity in the Project Area, including Threatened, Endangered, Proposed, Candidate, and Sensitive (TEPCS) plant species habitat.

Indicators:

Acres of vegetation communities and suitable TEPCS plant species habitats that would be disturbed and also potentially subjected to an increase in weed invasion;

Acres of disturbed area that are planned for reclamation and the types of vegetation that would be restored;

Bioaccumulation potential for reclamation vegetation to become contaminated in excess of USFS guidelines from reclaimed backfills or external dumps;

Acres of permanent vegetation conversion from forest to non-forest cover and predicted re-growth rate back to forest conditions;

Compliance with the applicable RFP Standards and Guidelines.

4.5.1 Direct and Indirect Impacts

4.5.1.1 Proposed Action

Over an approximately 16-year period, the Proposed Action would remove 1,340 acres of vegetation (**Table 4.5-1**). While ground clearing and mining activities are occurring at Panel F, Panel G and associated Haul/Access Roads would remain undisturbed until mining activities begin at Panel G. Reclamation in Panel F and in Panel G would begin approximately two years following initial disturbance in specific areas as described in **Section 2.3.7** and in the Mine and Reclamation Plan.

TABLE 4.5-1 ACRES OF VEGETATION COVER DISTURBED UNDER THE PROPOSED ACTION

PROPOSED ACTION	ASPEN	ASPEN/ CONIFER	DOUGLAS -FIR	MOUNTAIN MAHOGANY	MT. SNOW-BERRY/ SAGE BRUSH	RIPARIAN SHRUB/ WETLANDS	SAGE BRUSH	SUB-ALPINE FIR	FORB/ GRAM	TOTAL
Panel F*	267.8	26.3	22.6	0.0	2.2	0.5	40.8	149.4	5.5	515
Panel F Haul Rd.	47.4	0.0	0.0	0.0	0.0	0.7	6.6	12.0	0.0	67
Panel F TOTAL	315.2	26.3	22.6	0.0	2.2	1.2	47.4	161.4	5.5	582
Panel G*	160.9	121.1	0.0	0.0	7.2	0.4	30.1	189.6	3.7	513
Panel G W. Haul Rd**.	64.8	4.8	0.0	0.0	2.1	0.8	1.7	133.8	8.6	217
Panel G TOTAL	225.7	125.9	0.0	0.0	9.3	1.2	31.8	323.4	12.2	730
Powerline****	16.9	0.6	0.9	0.0	4.4	0.3	2.3	2.3	0.0	28
Proposed Action TOTAL	558	153	23	0	16	3	82	487	18	1,340

* Includes soil stockpiles for pits, settling ponds, and ditches.
**Includes soil stockpiles for haul road.
***Delineated wetland impacts are described in **Section 4.6**
****Assuming disturbance within entire ROW area; actual disturbance is expected to be approximately three acres.

All vegetation would be removed from acres disturbed by the Proposed Action. This direct impact would be predominately long-term (i.e., in forest, mixed forest/brush, and shrub communities), but in some cases short-term (i.e., for grasses and forbs), site-specific, and major. Most species used for revegetation are similar to those now existing in the area, although upon regeneration the exact composition of reclaimed vegetation communities would be different as they follow a unique succession process. Native bunch grasses and forbs (see **Table 2.4-4**) would be planted throughout reclaimed areas initially, then other native forbs, shrubs, and trees would be seeded or planted in clusters where they are most likely to establish. Over the long-term, forest and mountain brush species may also encroach naturally into reclaimed areas from undisturbed sites adjacent to the mine.

Indirect impacts to vegetation may occur via competition with noxious weeds and/or selenium accumulation, particularly for invasive plants located on top of temporarily uncovered seleniferous waste overburden sites. These impacts, if they occurred, would be short-term, site-specific, and negligible to moderate (see page 4-1 for definitions). Environmental protection measures (**Section 2.5.4**) have been designed to minimize the potential for these impacts. Capping areas of seleniferous overburden should minimize the potential selenium accumulation for reclamation vegetation. See “Selenium Issues with Vegetation” section (below) for further discussion.

Below, environmental effects have been broken out by components of the Proposed Action. Effects within each mine panel (F and G) and within each haul road footprint are discussed separately.

Panel F, Including Lease Modifications
The new disturbance resulting from mining Panel F, including the open pits, North and South Lease Modifications, external overburden fills, and topsoil stockpiles, would disturb 515 acres of vegetation (**Table 4.5-1**). Over 80 percent of the total disturbance would occur within aspen (267.8 acres) and subalpine fir (149.4 acres) cover types. A 38-acre portion of Panel F would not be backfilled or reclaimed. Two remaining hanging walls would be left exposed, one 2,200 feet long with a maximum height of 250 feet, and the other 2,600 feet long with a maximum height of 175 feet. A portion of the footwall, 400 feet high and 1,000 feet long, would also remain exposed. The hanging walls would be benched, offering areas where natural vegetation could establish.

Panel F Haul/Access Road
The Panel F Haul/Access Road would remove 67 acres of vegetation; with the majority of disturbance occurring within aspen (47.4 acres) and subalpine fir (12.0 acres; **Table 4.5-1**). The road would cross an intermittent channel of South Fork Sage Creek with a 230-foot culvert, disturbing less than one (0.7) acre of riparian shrub/wet meadow. Approximately four acres of the haul road would not be reclaimed due to the steepness of the cut slopes.

Panel G
The new disturbance resulting from mining Panel G, including the open pit, external overburden fill, and topsoil stockpiles, would disturb 513 acres of vegetation (**Table 4.5-1**). The majority of disturbance would occur within aspen (160.9 acres) and subalpine fir (189.6 acres). An 8-acre portion of Panel G would not be reclaimed. One remaining highwall, 2,600 feet long with a maximum height of 250 feet, would be left exposed. This highwall would be benched, offering areas where natural vegetation could establish.

Panel G West Haul/Access Road
The Panel G West Haul/Access Road would remove 217 acres of vegetation; with the majority of disturbance occurring within aspen (64.8 acres) and subalpine fir (133.8 acres; **Table 4.5-1**). The road would cross the perennial Deer and South Fork Deer Creeks with culverts 280 and 260 feet long, respectively, disturbing less than one (0.8) acre of riparian shrub/wet meadow. Approximately 21 acres of the haul road would not be reclaimed due to the steepness of the cut slopes.

Power Line Between Panels F and G
Installation of the powerline could disturb a maximum corridor of approximately 50 feet wide by 4.5 miles long (28 acres). Most disturbances would occur in mountain shrub habitat (snowberry/sagebrush; **Table 4.5-1**). Trees within the corridor having the potential to grow or fall into the power line would be removed or trimmed. Actual ground surface disturbance from the installation of the power line would be much less than 27 acres because helicopters would be used for pole installation outside of lease areas. Assuming a 25-foot radius of disturbance around each pole, total ground disturbance outside of lease areas would be 3.0 acres (74 poles x 0.045 acres disturbance per pole).

Special Status Plant Species

There would be no impacts to any Threatened, Endangered, Proposed, or Candidate plant species. The Proposed Action would also have no impact on potential habitat for the Payson's bladderpod or Cache penstemon. The Panel G West Haul Road would impact unoccupied but suitable habitat for the Forest Sensitive species, starveling milkvetch (5.4 acres). This figure represents <0.5 percent of the mapped potential habitat for this species within the Study Area. Potential impacts to starveling milkvetch would be site-specific, short-term, and minor. The Proposed Action complies with RFP standard #1 for plant species diversity (USFS 2003a:3-23).

Noxious Weeds

Potential indirect impacts from the Proposed Action would include an increase in disturbed soils, including an increase in disturbed areas located adjacent to roads. These types of areas are susceptible to weed invasion. In total, the Proposed Action would result in 1,340 acres of new surface disturbance, including 10.4 miles of new roads. Vehicles offer an effective means of transport of weed seeds that are not wind-dispersed, and the risk of infestation increases with traffic volume. Other sources of weed infestation include the use of topsoil that already contains weed seed and the potential use of contaminated hay bales for erosion control and mulch material used for reclamation. Environmental protection measures have been designed to minimize the potential for the establishment of noxious weeds, such as treating any established noxious weeds upon initial discovery. Impacts from noxious weed infestation would be site-specific, short-term, and minor.

Selenium Issues with Vegetation

A potential indirect impact from the Proposed Action exists in the increased uptake of selenium by plants growing on reclaimed areas of Panels F and G. Selenium control measures would be used to reduce the potential for this impact. The proposed cap over the seleniferous overburden, for example, would consist of four feet of hard chert material that would lie underneath 1-2 feet of topsoil. The Rex Chert and Wells Limestone, overburden from mining activities found in the Phosphoria formation, are low in selenium and other trace-element contaminants than the overburden shales (Mackowiak et al. 2004, Maxim 2004b). Separation of the vegetation roots from the seleniferous overburden by this 5 to 6-foot thick cap would help prevent selenium uptake in vegetation. Any plants with rooting depths that extend beyond the layer of chert may be exposed to the seleniferous overburden. However, species selected for revegetation include a mix of grasses, forbs, and woody vegetation with an emphasis on native species and those with a low potential for selenium uptake (see Mackowiak et al. 2004 for discussion). In addition, the majority of the roots for these species would not extend much below the layer of topsoil or upper part of the chert cap and thus would have minimal contact with the seleniferous overburden (Nobel 1991, Stone and Kalisz 1991, Canadell et al. 1996; see **Section 3.5.6**). As a result, the potential indirect impact of selenium accumulation in future tree and shrub communities growing on the reclaimed areas would be minimal. If accumulation were to occur, the impact to vegetation itself would be local, long-term, and negligible.

4.5.1.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications

Relative to the Proposed Action, impacts to vegetation would be reduced if both components (North and South Lease Modifications) of Alternative A were adopted. In total 161 acres predominantly within aspen and sagebrush would be left undisturbed (**Table 4.5-2**). In addition, the remaining hanging walls would be reduced from 4,800 feet (under the Proposed Action) to 2,400 feet long under Alternative A and relocated from Pit Four (Proposed Action) to between Pits One and Two (Alternative A).

No Panel F North Lease Modification

Under this alternative, there would be no mining outside of Lease I-027512 boundaries. If Transportation Alternative 1 were also selected, there would be 23 acres less disturbance than the Proposed Action **Table 2.6-1**). If the North Lease Modification were not approved and the Proposed Action Panel F Haul/Access Road were approved through a SUA, there would be no change in the acreage disturbed by roads under this alternative. Under this alternative, the Panel F North Lease Modification pit would not disturb two acres of subalpine fir outside of Lease I-027512 boundaries (**Table 4.5-2**).

No Panel F South Lease Modification

If this alternative were selected, there would be no mining outside of Lease I-027512 boundaries on the south end of Panel F, resulting in an overall reduction of 138 acres of disturbance (**Table 4.5-2**). The majority of the reduction would occur in aspen (**Table 4.5-2**).

Mining Alternative B – No External Seleniferous Overburden Fills

Alternative B would have the same initial disturbance footprint as the Proposed Action (**Table 4.5-2**) as external overburden fill areas would still be needed for temporary storage of overburden. The Panel G hanging wall would be reduced from 2,600 feet long and 250 feet high under the Proposed Action to about 1,100 feet long and 150 feet high under Alternative B. The unreclaimed area of Panel G would be one acre under Alternative B, compared to eight acres under the Proposed Action.

Mining Alternative C – No External Overburden Fills at All

Alternative C would have the same initial disturbance footprint as the Proposed Action (**Table 4.5-2**) as external overburden fill areas would still be needed for temporary storage of overburden. All proposed hanging walls would be backfilled under this alternative, as more overburden would be relocated to the pits where it would be used to completely bury them. The final Panel G reclamation configuration would be different from Alternative B in that the east external overburden fill would be eliminated during reclamation, and the top and bottom of the pit backfill would receive more overburden.

Mining Alternative D – Infiltration Barriers on Overburden Fills

Under Alternative D, Dinwoody material would be excavated in order to construct a low-permeability, infiltration barrier over all areas of seleniferous overburden fills. Alternative D would increase the direct impact to vegetation relative to the Proposed Action by disturbing areas containing Dinwoody adjacent to open pits. Dinwoody mining areas in addition to associated stockpiles would disturb an additional maximum of 137 acres under Alternative D, mostly within aspen and subalpine fir (**Table 4.5-2**).

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

Alternative E would reduce the overall vegetation disturbance of the Proposed Action by approximately 28 acres (although actual ground surface disturbance would be less), predominately within the aspen cover type (**Table 4.5-2**).

Mining Alternative F – Electrical Generators at Panel G

Alternative F would reduce the overall vegetation disturbance of the Proposed Action by approximately 28 acres (although actual ground disturbance would be less), predominately within the aspen cover type (**Table 4.5-2**).

TABLE 4.5-2 CHANGE IN ACRES OF VEGETATION DISTURBED BY THE MINING ALTERNATIVES RELATIVE TO THE PROPOSED ACTION

PROPOSED ACTION & ALTERNATIVES	ASPEN	ASPEN/ CONIFER	DOUGLAS -FIR	MOUNTAIN MAHOGANY	MT. SNOW-BERRY/ SAGE BRUSH	RIPARIAN SHRUB/ WETLANDS	SAGE BRUSH	SUB-ALPINE FIR	FORB/ GRAM	TOTAL
Proposed Action	**558**	**153**	**23**	**0**	**16**	**3**	**82**	**487**	**18**	**1,340**
Alternative A North lease	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-1.9	0.0	-2
Alternative A South lease	-100.6	-16.7	-0.4	0.0	0.0	-0.5	-19.9	0.0	0.0	-138
Alternative B	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alternative C	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Alternative D	+93.7	+8.5	+12.0	0.0	0.0	+0.4	+2.4	+19.4	0.0	+137
Alternative E	-16.9	-0.6	-0.9	0.0	-4.4	-0.3	-2.3	-2.3	0.0	-28
Alternative F	-16.9	-0.6	-0.9	0.0	-4.4	-0.3	-2.3	-2.3	0.0	-28

(+) indicates an increase over the Proposed Action, (-) indicates a decrease

<u>Special Status Plant Species</u>
There are no differences between the Proposed Action and mining alternatives with regards to potential impacts to TEPCS species. Impacts to suitable habitat for starveling milkvetch (5.4 acres) would be identical to those described under the Proposed Action.

<u>Noxious Weeds</u>
Potential noxious weed impacts are described above under the Proposed Action. For Mining Alternatives that result in more (i.e., Alternative D) or less ground disturbance, the extent of potential noxious weed establishment would increase or decrease, respectively.

<u>Selenium Issues with Vegetation</u>
Risks of selenium uptake to vegetation resources in the Project Area depend on the effectiveness of selenium control measures. Alternative D would result in a thicker chert cap than the Proposed Action and would therefore lower the potential for root penetration into seleniferous overburden fills. Differences between all other Mining Alternatives and the Proposed Action, although some modify the method of seleniferous overburden disposal, are negligible in terms of the risk to vegetation resources. Selenium control measures (capping) would be implemented under any Mining Alternative.

4.5.1.3 Transportation Alternatives

Transportation Alternative 1 – Alternate Panel F Haul/Access Road
Alternative 1 would remove approximately 46 acres of vegetation, predominantly within aspen and subalpine fir cover types (**Table 4.5-3**). This is a reduction of 21 acres when compared to the Proposed Action Panel F Haul/Access Road. Approximately five acres of the disturbed area under this Alternative would not be reclaimed, as compared to four acres under the Proposed Action Panel F Haul/Access Road.

Transportation Alternative 2 – East Haul/Access Road

Alternative 2 (**Table 2.6-2**) would disturb one fewer acre than the Proposed Action Panel G West Haul/Access Road. A large reduction in disturbance would occur within subalpine fir; increases in disturbance would occur within sagebrush, aspen/conifer, and aspen (**Table 4.5-3**). Approximately seven acres of the disturbed area under this Alternative would not be reclaimed, as compared to 21 acres under the Proposed Action Panel G West Haul/Access Road.

Transportation Alternative 3 – Modified East Haul/Access Road

Alternative 3 (**Table 2.6-2**) would disturb approximately 59 more acres than the Proposed Action Panel G West Haul/Access Road, the largest increase of any transportation alternative. A large decrease in disturbance would occur in subalpine fir; the largest increase would occur within sagebrush (**Table 4.5-3**). Alternative 3 would require a longer culvert across Deer Creek (390 feet, relative to 280 feet under the Proposed Action Panel G West Haul/Access Road), but would not result in greater disturbance in riparian vegetation than the Proposed Action Panel G West Haul/Access Road. Road cuts and fills in Deer Creek Canyon under this alternative would be more difficult to fully reclaim than the Proposed Action Panel G West Haul/Access Road. Approximately 21 acres of the disturbed area under this Alternative would not be reclaimed, the same as the Proposed Action Panel G West Haul/Access Road.

Transportation Alternative 4 – Middle Haul/Access Road

Alternative 4 (**Table 2.6-2**) would disturb approximately 25 fewer acres than the Proposed Action Panel G West Haul/Access Road. Most of the reduction in disturbance would occur in subalpine fir; the largest increase would occur in aspen (**Table 4.5-3**). Alternative 4 would require large road fills and longer culverts than the Proposed Action Panel G West Haul/Access Road to cross the main and south forks of Deer Creek (440 and 510 feet, respectively), but actual disturbance in the riparian/wetland vegetation would be approximately one acre less than under the Proposed Action Panel G West Haul/Access Road. Like Alternative 3, road cuts and fills under this alternative would be more difficult to fully reclaim than the Proposed Action Panel G West Haul/Access Road. Approximately 34 acres of the disturbed area under this Alternative would not be reclaimed, as compared to 21 acres under the Proposed Action Panel G West Haul/Access Road.

Transportation Alternative 5 – Alternate Panel G West Haul/Access Road

Alternative 5 (**Table 2.6-2**) would disturb approximately nine more acres of vegetation than the Proposed Action Panel G West Haul/Access Road. A large reduction would occur in subalpine fir; the largest increases would occur in aspen and mountain snowberry/sagebrush (**Table 4.5-3**). Approximately 28 acres of the disturbed area under this Alternative would not be reclaimed, as compared to 21 acres under the Proposed Action Panel G West Haul/Access Road.

Transportation Alternatives 6 – Conveyor from Panel G to Mill

Alternative 6 (**Table 2.6-2**) would disturb approximately 156 fewer acres of vegetation than the Proposed Action Panel G West Haul/Access Road. A large reduction would occur in subalpine fir, and a moderate reduction would occur in aspen (**Table 4.5-3**).

Transportation 7 – Crow Creek/Wells Canyon Access Road

Alternative 7 would require upgrading 15 miles of the existing Crow Creek Road. Disturbances from Alternative 7 would total 114 acres (**Table 2.6-2**), approximately 103 fewer acres than the Proposed Action Panel G West Haul/Access Road. A large reduction in disturbance would occur in subalpine fir and a moderate reduction would occur in aspen; the largest increase would occur in sagebrush (74 acres; **Table 4.5-3**). Alternative 7 would also require 25 acres of additional disturbance in the Crow Creek and Wells Canyon riparian/wet meadow vegetation.

Transportation 8 – Middle Access Road
Alternative 8 would require building an access road from Panel G northward across South Fork Deer Creek, Deer Creek, and North Fork Deer Creek to enter Panel F on its south end. Disturbances from Alternative 8 would total 99 acres (**Table 2.6-2**), approximately 119 fewer acres than the Proposed Action Panel G West Haul/Access Road. The largest reduction in disturbance would occur in the subalpine fir; a moderate increase would occur in mountain shrub habitat (**Table 4.5-3**). Alternative 8 would avoid the impacts to riparian/wet meadow associated with Crow Creek and Wells Canyon drainage; riparian habitat disturbance would be similar to the Proposed Action Panel G West Haul/Access Road.

TABLE 4.5-3 CHANGE IN ACRES OF VEGETATION DISTURBED UNDER THE TRANSPORTATION ALTERNATIVES RELATIVE TO THE PROPOSED ACTION

	ASPEN	ASPEN/ CONIFER	DOUGLAS-FIR	MOUNTAIN MAHOGANY	MT. SNOW-BERRY/SAGE BRUSH	RIPARIAN SHRUB/ WETLANDS	SAGE BRUSH	SUB-ALPINE FIR	FORB/ GRAM	TOTAL
Panel F Haul Rd.	**47.4**	**0.0**	**0.0**	**0.0**	**0.0**	**0.7**	**6.6**	**12.0**	**0.0**	**67**
Alternative 1	-12.2	0.0	0.0	0.0	0.0	0.0	-5.2	-3.3	0.0	-21
Panel G Haul Rd.	**64.8**	**4.8**	**0.0**	**0.0**	**2.1**	**0.8**	**1.7**	**133.8**	**8.6**	**217**
Alternative 2	+29.6	+15.6	+3.9	+2.1	+9.0	+1.1	+53.3	-113.7	-2.1	-1.3
Alternative 3	+38.8	+20.4	+2.3	+20.9	+13.3	0.0	+59.2	-94.3	-2.1	+59
Alternative 4	+49.2	+2.7	0.0	0.0	+24.9	-0.8	+10.1	-103.0	-8.6	-25
Alternative 5	+24.0	+1.8	0.0	0.0	+25.7	0.0	+1.8	-44.5	0.0	+9
Alternative 6	-41.5	-3.7	+2.7	0.0	+0.5	+0.7**	+5.1	-112.0	-8.2	-156
Alternative 7*	-56.5	-4.8	0.0	0.0	-2.1	+23.2	+73.8	-133.4	-8.6	-103
Alternative 8	-8.2	+4.0	0.0	0.0	+15.5	-0.2	+3.4	-124.8	-8.6	-119

*Includes 4.7 acres in Wyoming not shown within vegetation types.
**Assuming disturbance within entire ROW area; no disturbance in riparian habitat is expected.

<u>Special Status Plant Species</u>
Under the Proposed Action Panel F Haul Road and Transportation Alternative 1 there would be no disturbance to starveling milkvetch habitat. Regarding alternatives to the Proposed Action Panel G West Haul/Access Road, Transportation Alternatives 2 and 3 would involve 13.3 and 35.5 more acres of disturbance within starveling milkvetch habitat, respectively. Transportation Alternatives 4, 5, 7, and 8 would disturb the same amount of starveling milkvetch habitat as the Proposed Action Panel G West Haul/Access Road, whereas Alternative 6 would disturb five acres fewer.

Noxious Weeds

Potential noxious weed impacts are described above under the Proposed Action. For Transportation Alternatives that result in more ground disturbance (i.e., Alternatives 3 and 5) and/or are longer in length (i.e., Alternatives 2, 3, 5, and 7), the potential for noxious weed invasions to occur and the extent of subsequent weed invasions would increase.

Selenium Issues with Vegetation

Road construction itself would not noticeably increase the potential for selenium uptake by vegetation over the existing condition. In areas where road cuts would expose seleniferous material, the seleniferous material would be at depths where the vegetation in the area would already be exposed to the source. Differences between Transportation Alternatives and the Proposed Action are negligible in terms of the risk of selenium uptake by vegetation. Selenium control measures would be implemented identically under any Transportation Alternative and the Proposed Action.

4.5.1.4 No Action Alternative

Under the No Action Alternative, disturbance of currently undisturbed vegetation would not occur, thus eliminating the impacts to vegetation and TEPCS plants discussed above. In addition, overburden containing elevated concentrations of selenium would not be excavated, and further potential bioaccumulation of selenium in flora within the Study Area would not be a risk. Lastly, reclamation in Panel E would not be completed, as overburden from Pit 1 in Panel F would not be generated and thus used to backfill the Panel E-0 pit.

4.5.2 Mitigation Measures

Vegetation monitoring to determine reclamation success on reclaimed sites shall be conducted annually and reported to the CTNF by Simplot until reclamation is accepted and the reclamation bond is released (RFP standard under Prescription 8.2.2). The timing, level, and type of monitoring would be conducted in accordance with the requirements of the Record of Decision, agency conditions for release, and an agency-approved plan.

Simplot would use the most adapted and genetically appropriate plant material available for all seeding and planting activities. If feasible, collection of plant material (i.e. seed, transplants, roots) should be practiced to ensure an optimal match between plant material used and site conditions - increasing the likelihood of success.

Records would be kept of items such as seed or tree source, seeding methods, tree planting methods, species used, substrate, date of seeding or planting, etc. The boundaries of seeding or planting areas would be mapped in enough detail so they can be easily located again in the future. Accurate record keeping is necessary in order to determine if revegetation methods have been successful and cost effective, or if changes should be made.

The measurement of selenium and other COPCs in forage is required for any decisions on range management and the ultimate release of mined lands back to multiple use. Sampling would be conducted in accordance with the requirements of the Record of Decision, agency conditions for release, and an agency-approved plan.

Simplot would continue their program of monitoring and controlling noxious weed infestations. Only certified weed-free seed, mulch, straw bales, etc. would be used. Simplot would develop a plan for annual noxious weed treatment.

4.5.3 Unavoidable (Residual) Adverse Impacts

Unreclaimed areas would constitute an unavoidable adverse impact to vegetation resources. When vegetation encroaches naturally into unreclaimed areas, it is likely that some colonizing species would be noxious weeds. Unreclaimed areas would be exposed until vegetation spreads naturally to these areas, creating a longer window of opportunity and space for noxious weed seeds to invade and establish relative to sites that are reclaimed.

4.5.4 Relationship of Short-Term Uses and Long-Term Productivity

The Proposed Action and Alternatives would implement ground-disturbing activities that would produce short- and long-term effects to vegetation while providing the short-term benefits of phosphate resources and productive employment.

4.5.5 Irreversible and Irretrievable Commitments of Resources

The Proposed Action and Alternatives would result in the removal of currently undisturbed vegetation, depending on the alternative chosen. The loss of timber would be an irreversible commitment of resources. Even with the re-planting of these disturbed areas, conifer forests in particular would not recover to their current stature and complexity for at least 200 years (see **Section 4.7.1.1** for further discussion).

Under the Proposed Action, portions of Panel F and G would not be backfilled, leaving parts of pit footwalls and hanging walls exposed. Portions of haul roads would also not be reclaimed under the Proposed Action due to steepness of cut slopes. The footprints of these walls and unreclaimed areas of haul roads (a total of 71 acres) would represent irretrievable losses of vegetation.

4.6 Wetlands

Issue:
Construction of mine facilities and other disturbances may directly affect wetlands and waters of the U.S. and could include increased metal and sediment loading in surface waters and/or changes in water quality/quantity in both surface waters and groundwater supporting waters of the U.S.

Indicators:
The number of wetland acres disturbed by mining activities and related facilities;

The number of Waters of the U.S. crossings and lengths disturbed by mining and new transportation corridors;

Change in function and value of all wetlands disturbed by the mine and related facilities.

4.6.1 Direct and Indirect Impacts

Disturbance to wetlands and waters of the U.S. that occurs as a result of pit excavation or external overburden fill development can be considered a permanent impact. Disturbance that results from road construction would be reclaimed at the completion of mining except for a 20-foot wide section of the Panel G West Haul/Access Road between Panel G and the summit between Deer Creek and Diamond Creek that would be left in place at the request of the USFS.

Indirect impacts could include increased metal and sediment loading in surface waters and/or changes in water quality/quantity in both surface waters and groundwater supporting waters of the U.S. These potential impacts are discussed in detail in **Section 4.3** (Water Resources) of this document.

Aquatic Influence Zones (AIZs)
RFP Management Prescription 2.8.3, for AIZs, states that management emphasis is to restore and maintain the health of AIZs. Minerals and Geology Guidelines in the RFP state that new structures, support facilities, and roads be constructed outside of AIZs except where no alternative exists (USFS 2003a: 4-49). Where no alternatives exist, facilities should be sited such that impacts to AIZs are avoided or minimized, and that roads should be constructed such that disturbance to these sites is held to the minimum required for the approved mineral activity. Since development of ore deposits is dependant on the location of those deposits, no alternative (other than pit configuration modification) exists regarding the location of mine pits. Impacts to AIZs are discussed in more detail in **Section 4.8**, **Fisheries and Aquatics**.

4.6.1.1 Proposed Action

<u>Panel F, including lease modifications</u>
Under the Proposed Action, a total of approximately 7,650 linear feet of ephemeral channels within the Panel F lease area would be removed by the development of the Panel F Pit or covered by associated external overburden fills. This total includes a short reach of the upper Manning Creek headwaters area (approximately 665 feet) and almost the entire jurisdictional length (i.e. the length/area of channel or wetland regulated by the USACE under the Clean Water Act) of an unnamed tributary (measuring 6,985 feet) to the South Fork of Sage Creek within northern Panel F (**Figures 2.4-1 and 3.6-1; Table 4.6.1**). **Section 2.5** and associated BMPs described in this document and appendices, detail plans for managing runon and runoff water that was formerly conveyed by these channels.

Wetlands located within the Panel F Lease area include two jurisdictional wetlands and a single isolated wetland. The two jurisdictional sites are developed spring sources and are identified as palustrine emergent (PEM) wetlands (**Section 3.6.4**). Each of these sites received a total functional points score of 2.6, out of a possible 7 points (Maxim 2003b and Berglund 1999). The isolated site is identified as a fen (an area of peat that is fed by groundwater). This latter site is small but is identified as a high-value wetland site, rating a total functional points score of 5 out of a possible 7 points (Maxim 2003b). A total of 0.03 acre of wetlands associated with these sites would be impacted by the development of the Panel F Pit.

Under the Proposed Action, approximately 1,100 linear feet on the upper reaches of one ephemeral channel in the South Lease Modification Area would be removed by the development of the Panel F. Six jurisdictional wetland areas associated with this channel would be impacted by pit development (**Figures 2.4-1 and 3.6-1**). Five of these six wetlands are on an ephemeral channel (i.e., bank seeps, seasonal wetlands, ponded areas supporting hydrophytic vegetation). One, the largest wetland that would be impacted, is a fen that is an elk wallow. This later site was rated high in wetland functions and values (rating a total functional points score of 5 out of a possible 7 points, Maxim 2003b), as defined in **Section 3.6.2, Wetland Functions and Values**. A total of 0.57 acre of wetlands would be impacted by pit development within the South Lease Modification Area. **Section 2.5** and associated BMPs described in this document detail plans for managing water that was formerly conveyed by affected channels. Impacts to wetlands and waters of the U.S. that would result from the Proposed Action are summarized in **Table 4.6-1**.

Panel F Haul/Access Road

The Panel F Haul/Access Road would connect Panel F to the existing Smoky Canyon Mine facilities via a haul/access road to Panel E. Under the Proposed Action, the Panel F Haul Road would cross an intermittent reach of South Fork Sage Creek at a single location (**Figures 2.4-1** and **3.6-1**). Construction of the Panel F Haul Road over the creek would require the placement of a 230-foot long culvert in South Fork Sage Creek. The majority of the South Fork Sage Creek at this location is identified as other waters of the U.S. (i.e., jurisdictional waters that are not wetlands) with a few small "islands" of hydrophytic vegetation (Maxim 2004h). A total of 0.14 acre of wetlands (in the form of "islands" of hydrophytic vegetation) would be affected at this crossing (**Table 4.6-1**). The U.S. Army Corps of Engineers has already issued Simplot a permit for this crossing if the proposed Project is approved (USACE, October 21, 2004). Potential mitigation for impacts to wetlands and waters of the U.S. is discussed below in **Section 4.6.2**.

Panel G

Under the Proposed Action, approximately 2,775 linear feet of an intermittent, unnamed tributary to South Fork Deer Creek would be excavated during development of the Panel G Pit, and a short reach of a defined intermittent channel (approximately 75 feet), that is tributary to Deer Creek would be covered by the Panel G East Overburden Fill (**Figure 3.6-1**). The main South Fork Deer Creek channel passes through the northwestern corner of the Panel G lease area.

The uppermost reaches of the Wells Canyon drainage, above any defined channel (i.e., a non-jurisdictional reach of the drainage), would be covered by the Panel G South External Overburden Fill. The development of this overburden fill would not impact defined (jurisdictional) waters within the Wells Canyon drainage (**Table 4.6-1**).

Five jurisdictional and one isolated wetland area would be impacted by construction of the Panel G Pit. The five jurisdictional wetlands, including a total of approximately 0.4 acre of jurisdictional area, are located on the unnamed tributary to South Fork Deer Creek that would be disrupted by the mining. A total of 0.33 acre of this total area would be excavated during pit development. Another 0.06 acre would be covered by the Panel G South Overburden Fill. These wetlands are riverine wetlands on an ephemeral channel and did not receive high functions and values ratings. Each of these wetlands received a score of 3.7 out of 12 possible points (Maxim 2003b). The isolated wetland, which is 0.34 acre in size, is located near the northeastern corner of the Panel G Pit. This wetland is a fen and received a moderately high functions and values rating (8.6 out of 12, or 72 percent of the total possible functional points, Maxim 2003b).

Panel G West Haul/Access Road

A small wetland area near the headwaters of South Fork Sage Creek is located near the Proposed Action Panel G West Haul/Access Road alignment. This wetland would not be disturbed by construction of the haul/access road, but an undefined (non-jurisdictional) tributary east of this wetland would be crossed by the road (**Figure 3.6-1**).

Under the Proposed Action, the Panel G West Haul/Access Road would cross a perennial reach of Deer Creek over a 280-foot long culvert. This crossing would be located just below the confluence of Deer Creek and an unnamed tributary that enters Deer Creek from the west (**Figures 2.4-1** and **3.6-1**). Construction of this segment of the haul road would disturb a palustrine scrub-shrub (PSS) wetland on Deer Creek, as well as the upper reaches of a seep area to the south of the confluence (**Figure 3.6-1**). Wetlands associated with the upper reaches of the seep would be covered by fill during development of the haul/access road (**Figure 3.6-1**). The uppermost reaches of a finger of wetlands associated with an unnamed tributary channel north of Deer Creek would also be disturbed by the Panel G West/Haul Road (**Figure 3.6-1**). These wetlands are generally identified as riverine features on perennial stream reaches and received 7.5 out of a possible 12 functions and values points (Maxim 2003b).

The Panel G West Haul/Access Road would cross a perennial reach of South Fork Deer Creek below its confluence with an unnamed tributary from the south (**Figure 3.6-1**). A 260-foot long culvert would be installed in South Fork Deer Creek at this crossing. The unnamed tributary from the south would not be affected, but 0.01 acre of a high value (scoring 9 out of 12 possible functional points) PEM/PSS wetland bordering South Fork Deer Creek would be covered by fill during construction of this haul road.

In total, the Panel G West Haul/Access Road alignment would disturb approximately 1.43 acres of potentially jurisdictional wetlands (**Table 4.6-1**). (These wetlands are identified as "potentially" jurisdictional because the Corps has not yet verified the Panel G delineation.) The installation of two culverts would disturb approximately 540 feet of defined channel (waters of the U.S.) at two crossing locations (one on Deer Creek and one on South Fork Deer Creek).

Power Line Between Panels F and G

A 25 kV power line would be constructed between Panels F and G. Construction of this direct power line alignment would require tree removal within a 50-foot wide corridor along the proposed alignment. The alignment would cross the North Fork and Main Fork of Deer Creek, but all creeks would be spanned, avoiding impacts to these waters. While the power line would cross approximately 0.32 acre of wetland and approximately 1,215 linear feet of channel, construction of this alignment would result in no dredge or fill impacts to jurisdictional waters. A 50-foot corridor (25 feet on either side of the center of the power line) would be maintained in order to prevent trees from falling on the line. This corridor would be maintained as needed across AIZs. Only large (tall) trees within this corridor that have the potential to fall into the line would be felled, but understory vegetation would not be removed.

TABLE 4.6-1 PROPOSED ACTION DISTURBANCE TO WETLANDS AND WATERS OF THE U.S.

FEATURE OF THE PROPOSED ACTION	WATERS OF THE U.S. IMPACTS	WETLAND IMPACTS
Panel F (on lease)	7,650 linear feet	0.03 acre
Panel F South Lease Modification	1,100 linear feet	0.57 acre
Panel F North lease Modification	0 linear feet	0 acre
Panel F Haul/Access Road	230 linear feet	0.14 acre
Panel G	2,850 linear feet	0.39 acre (+ 0.343 acre non-jurisdictional wetland)
Panel G West Haul/Access Road	540 linear feet	1.43 acres
Total Proposed Action Disturbance	12,370 linear feet	1.96 acres (+ 0.343 acre non-jurisdictional wetland)

4.6.1.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications

No Panel F South Lease Modification

Under the No Panel F South Lease Modification Alternative, the two channels and six wetland areas located on two tributary channels to North Fork Deer Creek would not be disturbed by mine development. These six wetlands include a total of 0.57 acre. Impacts to 1,100 linear feet of jurisdictional channel would also not occur. **Table 4.6-2** summarizes wetlands and waters of the U.S. impacts that would result from the various mining alternatives.

No Panel F North Lease Modification

Under this alternative, impacts to waters and wetlands would be the same as described under the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills

Because the full external overburden fill disturbance area would be needed to temporarily store seleniferous overburden (which would then be relocated to a pit during the final stages of mining), this alternative would have the same footprint as the Proposed Action. Impacts to wetlands and waters of the U.S. would be the same as described under the Proposed Action.

Mining Alternative C – No External Overburden Fills at All

Because the full external overburden fill disturbance area would be needed to temporarily store overburden (which would then be relocated to a pit during the final stages of mining), this alternative would have the same footprint as the Proposed Action. Impacts to wetlands and waters of the U.S. would be the same as described under the Proposed Action.

Mining Alternative D – Infiltration Barriers on Overburden Fills

In this alternative, the lower member of the Dinwoody formation would be utilized to form an infiltration barrier over external seleniferous overburden fill areas. Sufficient amounts of Dinwoody formation required to cap the seleniferous overburden generated during mining of the Panel F pits may be available within the non-seleniferous overburden proposed for removal from these pits. If additional Dinwoody formation is required to cap seleniferous overburden fill areas generated during mining of the Panel F pits, another 86 acres of this material has been identified immediately west of the pit highwall (**Figure 2.6-6**). This additional source of Dinwoody formation could be obtained by laying back the proposed high walls in this area. Excavation of Dinwoody from the area immediately west of the Panel F pits would impact another approximately 0.1 acre of wetland and 205 linear feet of the ephemeral upper reaches of Manning Creek (**Figure 2.6-6**).

Dinwoody formation that would be used for capping seleniferous overburden fill areas generated during mining of the Panel G pit would be obtained from non-seleniferous pit overburden excavated from within the pit and from two borrow pits that would disturb an additional 25 acres. These two borrow areas are located to the south and west of the proposed pit (**Figure 2.6-6**). Construction of the Dinwoody formation borrow pit west of the Panel G pit would disturb 665 linear feet of defined channel and 0.3 acre of wetland (**Table 4.6-2**).

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

This alternative would involve constructing a 25kV power line route between Panels F and G within the footprint of the approved haul/access road. Selection of this alternative would result in no change in impacts to jurisdictional waters of the U.S., relative to the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G
This alternative would result in no additional impacts to jurisdictional waters of the U.S., relative to the Proposed Action.

TABLE 4.6-2 MINING ALTERNATIVES DISTURBANCE TO WETLANDS AND WATERS OF THE U.S.

MINING ALTERNATIVE	WATERS OF THE U.S. IMPACTS	WETLAND IMPACTS
Alternative A, No Panel F South Lease Modification	11,270 linear feet	1.39 acres (+ 0.343 acre non-jurisdictional wetland)
Alternative A, No Panel F North Lease Modification	12,370 linear feet	1.96 acres (+ 0.343 acre non-jurisdictional wetland)
Alternative B, No Seleniferous External Overburden Fills	12,370 linear feet	1.96 acres (+ 0.343 acre non-jurisdictional wetland)
Alternative C, No External Overburden Fills At All	12,370 linear feet	1.96 acres (+ 0.343 acre non-jurisdictional wetland)
Alternative D, Infiltration Barriers on Overburden Fills	13,240 linear feet	2.36 acres (+ 0.343 acre non-jurisdictional wetland)
Alternative E, Power Line Connection from Panel F to Panel G Along Haul/Access Road	12,370 linear feet	1.96 acres (+ 0.343 acre non-jurisdictional wetland)
Alternative F, Electrical Generators an Panel G	12,370 linear feet	1.96 acres (+ 0.343 acre non-jurisdictional wetland)

4.6.1.3 Transportation Alternatives

Aquatic Influence Zones
The haul/access roads for the Proposed Action (above) and all transportation alternatives would involve the construction of roads over drainage channels. These crossings would be constructed with culverts placed in stream channels at the road crossing locations. As described above, the Minerals and Geology Guidelines in the RFP state that new structures, support facilities, and roads be constructed outside of AIZs except where no alternative exists. Where no alternatives exist, facilities should be sited such that impacts to AIZs are avoided or minimized, and roads should be constructed such that disturbance to these sites is held to the minimum required for the approved mineral activity (USFS 2003a:4-49). Simplot has redesigned initially proposed road crossings to minimize impacts to AIZs.

Because a method of conveying phosphate ore from Panels F and G to the existing Smoky Canyon Mine is a requirement of the Proposed Action, selection of either the Proposed Action Transportation Alternative or one of the other transportation alternatives is required. Impacts to

AIZs at road crossings would be unavoidable. Impacts to AIZs are discussed in more detail in **Section 4.8, Fisheries and Aquatics**. Impacts to wetlands and waters of the U.S. that would result from these transportation alternatives are summarized in **Table 4.6-3**.

Alternative 1 – Alternate Panel F Haul/Access Road

The Alternate Panel F Haul/Access Road (**Figure 3.6-1**) would cross South Fork Sage Creek at the same location as the Proposed Action Panel F Haul Road. As described for the Proposed Action, a 230-foot long culvert would be required at this crossing, and a total of 0.14 acre of wetlands would be affected by construction of this crossing. No changes in wetland and waters of the U.S. impacts would occur under this transportation alternative when compared to the Proposed Action Panel F Haul/Access Road.

Alternative 2 – East Haul/Access Road

The East Haul/Access Road Alternative (**Figure 3.6-1)** would cross an undefined (non-jurisdictional) tributary to Wells Creek just east of the southern portion of Panel G, then turn east and cross an undefined reach of channel in Nate Canyon. The East Haul/Access Road would then cross the lower reaches of Deer Creek above (west of) the Crow Creek Road and above Deer Creek's confluence with Crow Creek. This crossing would include the placement of a 300-foot long culvert in Deer Creek and would affect 0.62 acre of wetlands on Deer Creek. Wetlands in the Deer Creek drainage affected by this alternative are identified as PSS/PEM wetlands, with a functions and value score of 8.6 out of a possible 12 points (Maxim 2003b).

North of Deer Creek, the East Haul/Access Road would cross six undefined (non-jurisdictional) drainages, including Quakie Hollow and the undefined Manning Creek channel (**Figure 3.6-1**). Culvert placement would also be required at these latter two crossings. The East Haul/Access Road would cross two non-perennial channels east of the northern end of Panel F. This alternative would include a crossing of the perennial reach of the South Fork Sage Creek at the same location as the Proposed Action Panel F Haul Road (**Figure 3.6-1**).

Alternative 3 – Modified East Haul/Access Road

This alternative would involve modifying the alignment of the East Haul/Access Road to avoid private land near the mouth of Deer Creek (**Figure 3.6-1**). Selection of this alternative would require the construction of switchbacks into and out of the lower Deer Creek drainage. This alignment would cross Deer Creek approximately one mile upstream of the point the Crow Creek Road crosses Deer Creek. Under this alternative, a 390-foot long culvert would be required to cross Deer Creek, and approximately 0.67 acre of wetland would be covered by road fill at this crossing (**Figure 3.6-1**). Wetlands in the Deer Creek drainage affected by this alternative are identified as an extension of the PSS/PEM wetland type found at the mouth of Deer Creek, with a functions and value score of 8.6 out of a possible 12 points (Maxim 2003b).

Alternative 4 – Middle Haul/Access Road

This alternative would connect Panels F and G with a haul/access road along the eastern slope of Snowdrift Mountain in the middle Deer Creek watershed area (**Figure 3.6-1**). This alternative would require large cuts and fills (**Figure 2.6-8b**). Road fills and culverts would be required over Deer Creek and South Fork Deer Creek. The upper reaches of the perennial North Fork of Deer Creek would also be crossed with fills.

TABLE 4.6-3 TRANSPORTATION ALTERNATIVES DISTURBANCE TO WETLANDS AND WATERS OF THE U.S.

TRANSPORTATION PROPOSED ACTION AND ALTERNATIVES–HAUL/ACCESS ROADS	WATERS OF THE U.S. IMPACTS	WETLAND IMPACTS
Panel F Haul/Access Road	230 linear feet	0.14 acre
Panel G West Haul/Access Road	540 linear feet	1.43 acres
Alt. 1, Alternate Panel F Haul/Access Road	230 linear feet	0.14 acre
Alt. 2, East Haul/Access Road	300 linear feet	0.62 acre
Alt. 3, Modified East Haul/Access Road	390 linear feet	0.67 acre
Alt. 4, Middle Haul/Access Road	1,200 linear feet	0.07 acre
Alt. 5, Alternate Panel G West Haul/Access Road	490 linear feet	1.43 acre
Alt. 6, Conveyor from Panel G to Mill[1]	0 linear feet	0 acre
Alt. 7, Crow Creek/Wells Canyon Access Road	162 linear feet	approximately 20 acres[2]
Alt. 8, Middle Access Road	940 linear feet	0.62 acres

[1] All waters of the U.S. and wetlands would be spanned by the conveyor. However, selection of this alternative would require implementation of either the Wells Canyon/Crow Creek access road (Alternative 7) or the Middle Access Road (Alternative 8) in order to transport equipment to Panel G and to allow for employee, supply, and vendor access.
[2] Impacts to wetlands that would result from selection of Alternative 7 have been estimated from National Wetland Inventory (NWI) maps.

The Middle Haul/Access Road would cross a defined (jurisdictional) but non-perennial reach of South Fork Deer Creek in the northwestern portion of Panel G. An unnamed tributary to South Fork Deer Creek would also be crossed by the alignment in the northwestern Panel G area. To the west-northwest, the alignment would cross a defined but non-perennial reach of Deer Creek north of Panel G. This reach of Deer Creek is above a large wetland complex. Approximately 1,200 linear feet of jurisdictional channel and 0.07 acre of wetland would be filled by construction of this haul/access road. Between Deer Creek and North Fork Deer Creek, the haul/access road would cross five non-perennial, undefined channels tributary to Deer Creek and North Fork Deer Creek. At its northern end, the Middle Haul/Access Road would cross a defined channel in the upper reaches of the North Fork Deer Creek watershed (**Figure 3.6-1**). The alignment would also cross the upper reaches of three North Fork Deer Creek tributaries within the Panel F South Lease Modification Area. All three of the drainages would be crossed above the start of channel definition (i.e., in non-jurisdictional segments) (Maxim 2003b).

Alternative 5 – Alternate Panel G West Haul/Access Road

This haul/access road alternative would cross the upper reaches of the same three North Fork Deer Creek tributaries that would be crossed by the northern portion of the Alternative 4 alignment (**Figure 3.6-1**). All three of the drainages would be crossed above the start of channel definition (Maxim 2003b).

When combined with the remainder of the Proposed Action Panel G West Haul/Access Road, this alternative would disturb a total of 1.43 acres of wetlands and approximately 490 linear feet of waters of the U.S.

Alternative 6 – Conveyor from Panel G to Mill
This alternative would eliminate the need for a haul road connecting Panels F and G. Ore would be transported by conveyor from a staging area in Panel G, down the west edge of the Panel G Pit then across Deer Creek via a structure that would span the creek. The conveyor route would continue north out of the Deer Creek drainage and run along the east side of Panel F. The conveyor would cross South Fork Sage Creek via a structure that would span the creek (**Figure 3.6-1**). A service road would be constructed parallel to the conveyor. The road would not cross Deer Creek or South Fork Sage Creek but would terminate on either side of these streams. The conveyor would span all waters and wetlands along its route, resulting in no impacts to these features.

Selection of this alternative would eliminate the need for a haul road between Panels F and G, but would require implementation of either the Wells Canyon/Crow Creek Access Road (Alternative 7) or the Middle Access Road (Alternative 8) in order to transport equipment to Panel G and to allow for regular employee, supply, and vendor access.

Alternative 7 – Crow Creek/Wells Canyon Access Road
Selection of the Conveyor Alternative (Alternative 6) would require either construction of this alternative or Alternative 8. The Crow Creek/Wells Canyon Access Road alternative would involve upgrading the existing Crow Creek county road from the mouth of Crow Creek Valley near Fairview, Wyoming, to the mouth of Wells Canyon, a distance of approximately 15 miles. Upgrading the Crow Creek Road would involve grading, widening and straightening the existing road. The improved alignment would be 30 feet wide and surfaced with crushed non-seleniferous rock for all weather use. A new 30-foot wide access road would be built from the Crow Canyon Road up Wells Canyon to the Panel G staging area. This new road would be constructed on the north side of the canyon above the ephemeral stream channel in the canyon bottom (**Figure 3.6-1**).

The new Wells Canyon Road would cross a single undefined (non-jurisdictional) drainage tributary to Wells Canyon south of the Panel G Lease area. Widening and straightening the Crow Canyon Road would require improvements on seven existing channel crossings and would impact wetlands at multiple locations (**Figure 3.6-1**). From south to north, these channel crossings are: a ditch north of Wells Canyon, Deer Creek, Quakie Hollow, Sage Creek, an unnamed tributary to Crow Creek, Herdmane Hollow, and a second unnamed tributary to Crow Creek. Wetlands that would be impacted by this alternative border Crow Creek and extend westward toward the Crow Creek Road alignment (**Figure 3.6-1**). A total of approximately 20 acres of wetlands and 162 linear feet of waters of the U.S. would be disturbed if this alternative were selected. Because many of the wetland areas that may be impacted by this alternative are on private land, the extent of wetland impacts has been calculated from National Wetland Inventory mapping, rather than field surveys. Accordingly, the estimate of wetland impacts that would result from this alternative is approximate.

Alternative 8 – Middle Access Road
Selection of the conveyor (Alternative 6) would require either construction of the Middle Access Road or Alternative 7. The Middle Access Road would extend from Panel G north across South Fork Deer Creek, Deer Creek, and North Fork Deer Creek to enter Panel F near its southern end (**Figure 3.6-1**). Selection of this alternative would impact drainages in the Deer Creek watershed. Under this alternative, a total of 0.62 acre of wetlands would be disturbed.

Specifically, construction of the Middle Access Road would cross two channels in the upper reaches of the unnamed tributary to South Fork Deer Creek. This road would then cross South Fork Deer Creek, and a 360-foot long culvert would be installed at this crossing. All these channels have been identified as waters of the U.S. (Maxim 2003b). Continuing to the north, the road would cross Deer Creek in an area that supports adjacent wetlands. A 580-foot culvert would be installed at this Deer Creek crossing. North of Deer Creek, the Middle Access Road would cross an undefined, non-jurisdictional channel, then would join the route of the Middle Haul/Access Road. This segment of the road would cross six drainages above the start of definition of the channels (**Figure 3.6-1**). The alignment would also cross the upper reaches of three North Fork Deer Creek tributaries within and just west of the Panel F South Lease Modification Area. All three of the drainages would be crossed above the start of channel definition (Maxim 2003b).

4.6.1.4 No Action Alternative

Under the No Action Alternative, Panels F and G would not be developed. Phosphate ore in these areas would not be mined. The impacts to wetlands and waters of the U.S. in the Project Area would not occur. Impacts to AIZ's would likewise not occur. In order to meet demand for the Don Plant, Simplot would seek other sources of phosphate in southeast Idaho. Development of these other sources of phosphate would have its own impacts on wetlands, waters of the U.S., and possibly on AIZs.

4.6.2 Mitigation Measures

Project design features, BMPs, and the proposed Reclamation Plan (described in Chapter 2) are elements of the Proposed Action designed to reduce environmental impacts to wetland resources. Impacts to jurisdictional waters, including waters of the U.S. and wetlands, would be avoided or minimized to the extent possible by design. BMPs that would be used to minimize impacts to wetlands and waters of the U.S. include the construction of surface runoff management ditches, culverts, settling ponds and sediment traps. Management practices would follow Simplot's Smoky Canyon Mine Storm Water Pollution Prevention Plan (SWPPP).

Simplot would prepare a Corps permit application for required dredge or fill activities and submit this document to the Corps. This application would include a discussion of measures taken to avoid or minimize impacts to wetlands. Jurisdictional channels and wetlands affected by temporary impacts that can be reclaimed would be restored to their approximate pre-construction conditions as mining or use of affected areas is completed. Any waters and wetlands that would be permanently impacted would be mitigated on- or off-site. The Corps may also require mitigation for wetlands temporarily impacted by the development of mine facilities. The type and amount of mitigation required would be determined in consultation with the Corps. In general, however, the goal of mitigation is to replace the functions and values of wetlands or waters of the U.S. temporarily or permanently lost to project development. The Corps prefers that replacement (mitigation) wetlands be located in the same general area as wetlands that have been lost due to project development, and that the wetlands be similar in type to the wetlands that were dredged or filled. Mitigation wetlands meeting these criteria are referred to as "onsite" and "in-kind." If either of both of these criteria cannot be met, the Corps may accept "off-site" and/or "out-of-kind" mitigation. The Corps may, for example, accept a riparian enhancement program as mitigation for impacts to a wetland, but will generally request that the mitigation include a higher ratio of mitigation acreage relative to the affected wetland acreage.

As a part of any wetland mitigation project, the Corps requires monitoring to demonstrate that created (mitigation) wetlands have been successfully constructed. Specific success criteria (such as percent cover and species composition) are stipulated in the mitigation plan. These criteria are referred to as mitigation targets. In general, before the Corps will certify the mitigation as successful, the created wetland must meet these mitigation targets. The wetland must be shown to function as a self-sustaining wetland without artificial support, such as irrigation. Irrigation may be used to first establish the mitigation wetland, but after this initial period, the created site must be able to function as a self-maintaining wetland system. Details of wetland mitigation and monitoring would be a part of the permit that Simplot would seek from the Corps for the disturbance that would result from implementation of the Proposed Action or alternatives.

4.6.3 Unavoidable (Residual) Adverse Impacts

Unavoidable (residual) adverse impacts are those that would continue after implementation of mitigation measures and/or final reclamation. The success and location of Simplot's wetland mitigation measures and reclamation following completion of the Project would determine the extent of residual impacts in the local area.

Wetlands and waters of the U.S. physically disturbed by pit and overburden fills in Panels F and G could not reasonably be re-established through reclamation activities. Permanently impacted wetlands would require mitigation on- or off-site. The amount and type of mitigation would be determined in consultation with the Corps, and in consultation with the USFS and the BLM. Former AIZ’s adjacent to these waters and wetlands would no longer influence aquatic habitats.

Wetlands and waters of the U.S. impacted by road crossings could potentially be restored when these sites are reclaimed at the end of the useful life of the roads. Similarly, AIZs impacted by road construction would be reclaimed to the extent feasible. Wetland disturbance along a portion of the Panel G West Haul/Access Road from Panel G to the pass between Deer Creek and Diamond Creek would only be partially reclaimed as this road would be narrowed and retained as a permanent USFS road. Cuts and fills on steep slopes, in particular, may require extended periods of time to successfully reclaim. **Figure 2.6-8b** shows the locations of road cuts identified as being too steep to reclaim. Erosion from these unreclaimed cuts and fills has the potential to increase sediment delivery to wetlands, stream channels (waters of the U.S.) and to AIZs. As **Figure 2.6-8b** shows, construction of the Middle Haul Access Road (Alternative 4) or the Modified East Haul/Access Road (Alternative 3) would create the largest extents of non-reclaimable cuts.

4.6.4 Relationship of Short-Term Uses and Long-Term Productivity

Approximately 1.96 acres of wetlands and 12,370 linear feet of channel would be impacted by the Proposed Action. Since the majority of these sites would be lost to excavation of the pits or covered by overburden fills, the wetlands would be lost as wildlife habitat, sites of flood attenuation and sediment/nutrient/toxicant retention, as well as other wetland functions and values.

During the life of the Project, BMPs, including surface runoff management ditches, culverts, settling ponds and sediment traps, would be used to convey runoff and surface water discharge, and to trap sediment, nutrients, and COCs. Overburden handing practices would be designed to minimize or prevent the release of COCs. Over the longer term, reclamation and mitigation would be used to restore or replace the functions and values of impacted wetlands and waters of the U.S.

4.6.5 Irreversible and Irretrievable Commitments of Resources

Wetlands and waters of the U.S. physically disturbed by pit and overburden fill development would be lost and could not reasonably be reclaimed. These sites would however, be mitigated on- or off-site. The function of AIZ's adjacent to these wetlands would change, as these sites would no longer influence aquatic habitats.

4.7 Wildlife Resources

Issue:
The mining operations and related transportation facilities may physically affect terrestrial wildlife, including Threatened, Endangered, Proposed, Candidate, and Sensitive (TEPCS) and Management Indicator Species (MIS), through direct disturbance and fragmentation of their habitat.

Indicators:
Compliance with the applicable RFP Standards and Guidelines;

Acres of different wildlife habitats physically disturbed and the juxtaposition of that disturbed habitat over the life of proposed mining activities;

Acres of disturbance to and the proximity of the proposed operations to high value habitats such as: TEPCS species habitats, crucial and or high value big game ranges, wetlands, and seep and spring areas;

Increased uptake by wildlife of contaminants of concern in mining disturbed areas and areas that are reclaimed;

Increased use of existing wildlife habitat for recreational purposes;

Increase in mining and transportation-related noise levels in wildlife habitat;

Increase in vehicle traffic in the Project Area and potential for increased wildlife mortality through accidents.

4.7.1 Direct and Indirect Impacts

4.7.1.1 Proposed Action

Over an approximately 16-year period, the Proposed Action would disturb 1,340 acres in a variety of habitats (**Table 4.5-1**) that are currently utilized by TEPCS species and other wildlife. The remaining, undisturbed parts of the Study Area (20,462 total acres) would continue to provide habitat, cover, and movement routes for wildlife during the Project. In all, Project disturbances would remove 10 percent of the forest habitat (8 percent of the aspen, 10 percent of the aspen/conifer, 5 percent of the Douglas-fir, 16 percent of the subalpine fir), 1 percent of the sagebrush habitat, and less than 0.2 percent of the riparian/wet meadow habitat within the Study Area over the course of the Proposed Action.

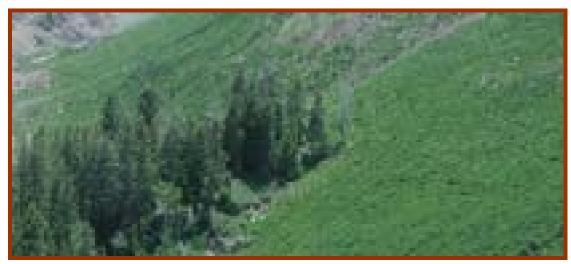
The disturbance of forest would occur within potential habitat for the following TEPCS and other wildlife species (described below): gray wolf, wolverine, boreal owl, flammulated owl, great gray owl and other raptors, goshawk, northern three-toed woodpecker and other woodpeckers, sharp-tailed grouse (winter foraging areas), and other upland game birds. The disturbance of shrub communities would reduce marginal habitat for the sharp-tailed grouse and greater sage-grouse. Riparian/wet meadow disturbance would reduce potential habitat for amphibians, moose, and bats (foraging areas). Depending on the slope of the disturbed area, disturbances could pose physical barriers to larger mammals. All wildlife crossing roads would be at risk from vehicle collisions and predators due to a lack of hiding cover.

All vegetation (largely mid- to late- seral trees; **Figure 4.7-1a**) would be removed from acres disturbed by the Proposed Action and replaced initially by grasses and forbs as reclamation activities follow mining (see **Table 2.4-4** for species used in reclamation). Most plant species used in reclamation are similar to those now existing in the area, although the exact composition of reclaimed communities would be different as they follow a unique succession process. Reclamation in Panels F and G would begin approximately two years following initial disturbance in each area. After native bunch grasses and forbs are seeded initially, other native forbs, shrubs, and trees would be seeded or planted in clusters where they are most likely to establish. **Figure 4.7-1b** shows a recently reclaimed area with vegetation similar to what could potentially exist in a previously forested area several years after reclamation. Over the long-term, forest and mountain brush species may also encroach naturally into reclaimed areas.

Figure 4.7-1 View of Mature Forest and Recently Reclaimed Area

a)

b)



Habitat losses in forb/graminoid habitats would be short-term. Disturbances in most habitats (i.e., conifer and aspen forest, mixed forest/brush, and shrub communities) would constitute long-term habitat losses, as forests in particular would not be expected to begin re-establishing for at least 50-100 years. Older stands would not return to their former state (mature, mid- to late-seral trees, snags, and downed dead wood) for at least 150-200 years.

Below is a summary of impacts under all components of the Proposed Action (combined). Impacts under each component are discussed separately in **Section 4.7.1.1.2**.

4.7.1.1.1 Proposed Action (all components combined)

Threatened, Endangered, Proposed, and Candidate Wildlife Species

Gray Wolf

The Study Area contains suitable habitat for the gray wolf and its prey, but wolves are known only as transient visitors to the area. The Study Area does not contain any known den or rendezvous sites; thus the Proposed Action is in compliance with RFP Standards that restrict human disturbances within one mile of such areas (USFS 2003a:3-30). In the event that wolves should pass through the Project Area during mining-related activities, noise, including blasting, and increased human presence could cause wolves to alter their normal movement patterns, as they tend to avoid such disturbances (Thurber et al. 1994). Corridors of undisturbed habitat within the Study Area outside the immediate vicinity of mining activities would provide alternate routes and would assist wolves in circumventing Project-related noise and activity. Overall, 1,340 acres containing suitable foraging and movement areas for wolves would be lost, leaving 93 percent of suitable habitat for wolves in the Study Area undisturbed. Impacts to transient wolves would be site-specific (limited to the area of disturbance), short-term (for the duration of the Proposed Action), and minor (see page 4-1 for definitions).

Canada Lynx

Habitat suitable for lynx in the Project Area, while not continuous enough for resident lynx, provides important linkage habitat between the Greater Yellowstone Ecosystem and the high Uinta Mountains. Moving lynx prefer undisturbed forest, thus disturbance of 10 percent of the forest habitat in the Study Area (1,221 acres, including all forest cover types) may impede east-west lynx movement across the Project Area for the long-term. In the event that lynx should pass through the Project Area during mining, noise and increased human presence may cause lynx to alter their normal movement patterns, although lynx appear to be relatively tolerant of humans (Ruediger et al. 2000). Standards and Guidelines designed to maintain linkage habitat are related to vegetation (**Section 4.5**) and lands (**Section 4.10**) management; these involve the maintenance of forest diversity in species composition and age class as well as the improvement of habitat connectivity for wildlife (USFS 2003a:3-29). Movement north and south through the Study Area would still be possible through undisturbed aspen and conifer forest to the west and shrub-steppe to the east of Project activities. Impacts to transient lynx would be site-specific, short-term, and minor.

Bald Eagle

No bald eagle nests occur within 2.5 miles of the Project Area; the Proposed Action is thus in compliance with RFP Standards and Guidelines related to bald eagle nest management (USFS 2003a:3-28 to 3-29). The Project is also in compliance with the RFP Guideline regarding winter foraging and roosting habitat (USFS 2003a:3-30) because activities would not occur near the heavily used Crow Creek wintering area. The Proposed Action would result in the removal of potential roost trees located away from Crow Creek; however, large roost trees are not a limiting factor in the area, and bald eagles would still have many roost trees available to them. A maximum of 1,221 acres of forest containing potential roost trees for bald eagles would be lost under the Proposed Action, leaving 90 percent of the forest in the Study Area undisturbed. Project-related noise and activities have the potential to displace wintering bald eagles into adjacent suitable habitat. Impacts to bald eagles are expected to be site-specific, short-term, and negligible.

Sensitive Wildlife Species

Spotted Bat
The Study Area does not provide suitable habitat (i.e., canyon walls and cliffs) for spotted bats, nor was the species detected during baseline surveys. The Proposed Action would thus have no negative effects on this species. Post-reclamation, the remaining hanging walls could provide potential habitat for spotted bats. Should spotted bats colonize this area, implementation of the Proposed Action would result in a site-specific, long-term, moderate benefit to this species.

Wolverine
No known wolverine populations or den sites occur within the Study Area. The Proposed Action would thus comply with the RFP Guideline for wolverine (USFS 2003a:3-34). Potential habitat for wolverines within the proposed disturbance area would be eliminated (487 acres of subalpine fir; 16 percent of subalpine fir in the Study Area), preventing colonization in the immediate vicinity of the Project Area for the long-term. Because wolverines prefer remote habitat, the Project would also decrease the suitability of surrounding, undisturbed forest within approximately 1,640 feet of the Project Area boundary over the short-term (Magoun et al. 2005). Should wolverines travel through the area during Project activities, human disturbance would have a moderate impact on these individuals. Potential impacts to wolverines would be site-specific, short to long-term, and minor to major.

Townsend's Big-Eared Bat
The Proposed Action would not affect any known big-eared bat populations or maternity colonies, and the species was not detected during baseline surveys. Preferred habitat (e.g., caves) for big-eared bats was not found in the Project Area, and the possibility that caves or other potential roost or hibernacula sites exist in the area is low. Any undetected caves that might exist within the disturbance footprint would be lost or would be unsuitable for roosting during mining. Due to the limited amount of preferred habitat for Townsend's big-eared bat in the Project Area, implementation of the Proposed Action is not expected to impact this species.

Boreal Owl
The Study Area does not provide preferred habitat (e.g., mature spruce-fir forest) for boreal owls, nor was the species detected during baseline surveys. Marginal unoccupied habitat for boreal owls (511 acres, including Douglas-fir and subalpine fir) within the Project disturbance area would be reduced for the long-term (at least 150-200 years), leaving 84 percent of the subalpine fir and 95 percent of the Douglas-fir in the Study Area undisturbed. The RFP Guideline regarding boreal owl habitat calls for maintaining 40 percent of the forested acres in mature or old age classes within a 3,600-acre area around nest sites (USFS 2003a:3-32). Following Project activities, 92 percent of the forested acres within the mature-forest habitat evaluation area would be mature (see **Table 4.7-1**). Surveys for active boreal owl nests would be conducted prior to mining activities, and if discovered, the CTNF would determine the feasibility of potentially rescheduling the activity until the birds have fledged. The Proposed Action is not expected to impact boreal owls.

Columbian Sharp-Tailed Grouse
No Columbian sharp-tailed grouse are known to occur within the Study Area, thus the Proposed Action would comply with RFP Standards and Guidelines for this species (USFS 2003a:3-33). Potential marginal habitat (82 acres of sagebrush and 16 acres of mountain shrub) for sharp-

tailed grouse would be eliminated for the short-term. This figure does not represent an appreciable decrease (-1 percent) in sagebrush habitat within the Study Area. Potential winter foraging habitat for this species (558 acres of aspen) would be absent for the long-term. However, 92 percent of the aspen in the Study Area would remain undisturbed, thus meeting the RFP Guideline (USFS 2003a:3-33). The majority of suitable habitat for sharp-tailed grouse in the Study Area, along Deer and Crow Creek drainages, would not be disturbed. Impacts related to the loss of sharp-tailed grouse habitat would be site-specific, short to long-term, and minor.

Peregrine Falcon

Neither peregrine falcon individuals nor suitable habitat for this species are known to occur within the Study Area. No known peregrine falcon nests occur within 15 miles of the Project Area, thus the Proposed Action would comply with RFP Standards and Guidelines for this species (USFS 2003a:3-30). The Proposed Action would have no impacts on peregrine falcon.

Flammulated Owl

Although no flammulated owl nests were found during 2003 baseline surveys, call responses were heard near or within dry, mature Douglas-fir patches in the northern portion of the proposed Panel F footprint. The Proposed Action would eliminate 734 acres of suitable habitat (including aspen, aspen/conifer, and Douglas-fir) for the long-term, leaving 92 percent of the aspen, 90 percent of the aspen/conifer, and 95 percent of the Douglas-fir in the Study Area undisturbed. An unknown number of individuals would be displaced into suitable adjacent habitat as a result of the Proposed Action. The RFP Guideline regarding flammulated owl habitat, which recommends against timber harvest activities within a 30-acre area around known nest sites (USFS 2003a:3-32), would be met because surveys for active flammulated owl nests would be conducted prior to mining activities, and if discovered, the CTNF would determine the feasibility of potentially rescheduling the activity until the birds have fledged. Impacts to flammulated owls inhabiting the Project Area would be site-specific, long-term, and moderate.

Northern Three-Toed Woodpecker

Most three-toed woodpeckers detected during surveys were located in the vicinity of Panel F and in the northeastern region of the Study Area. An unknown number of individuals would be displaced into suitable adjacent habitat as a result of the Proposed Action, and up to 10 percent of suitable woodpecker habitat in the Study Area (1,221 acres, including all forest types) would be eliminated for the long-term. Three-toed woodpeckers may not find disturbed areas suitable until mature forest stands that contain suitable snags and cavities are reestablished (at least 150-200 years). Under RFP Prescription 8.2.2(g), "snag habitat for woodpeckers shall not be a management consideration"; thus RFP Standards and Guidelines for this species would be met (USFS 2003a:4-84). Impacts to three-toed woodpeckers would be site-specific, short to long-term, and moderate.

Great Gray Owl

During baseline surveys, a great gray owl pair was observed within the Panel G footprint. A follow-up survey in 2005 heard multiple responses in the same location. The Proposed Action would eliminate 10 percent of the potential suitable habitat for great gray owls in the Study Area (1,221 acres, including all forest cover types) for the long-term, and 5 percent of suitable foraging areas (5.5 acres of forb/graminoid cover) for the short-term. An unknown number of individuals would be displaced into suitable adjacent habitat as a result of the Proposed Action.

The RFP Guideline regarding great gray owl habitat calls for maintaining 40 percent of the forested acres in mature or old age classes within a 1,600-acre area around nest sites (USFS 2003a:3-32). Following Project activities, 92 percent of the forested acres in the mature-forest habitat evaluation area would be mature (see **Table 4.7-1**) and the RFP Guideline for this species would be met. Surveys for active great gray owl nests would be conducted prior to mining activities, and if a nest were discovered, the CTNF would determine the feasibility of potentially rescheduling the activity until the birds have fledged. Impacts to great gray owls would be site-specific, short to long-term, and moderate.

Greater Sage-Grouse

All greater sage-grouse individuals observed during baseline surveys were outside the Project Area, and no active or historic sage-grouse leks were identified. Some suitable habitat (82 acres of sagebrush and 18 acres of forb/graminoid habitat) for sage-grouse would be eliminated for at least the short-term, which includes brood rearing habitat (high-elevation sagebrush). This reduction would result in a minor (5 percent) decrease in forb/graminoid habitat, but not an appreciable decrease (one percent) in sagebrush habitat within the Study Area. Any sage-grouse individuals in the Project Area would be displaced, and noise or increased human presence may cause moderate impacts to birds in the vicinity for the duration of the Proposed Action. Impacts to sage-grouse are expected to be site-specific, short to long-term, and minor to moderate, depending on how many individuals are displaced.

Concerning the RFP Guideline (USFS 2003a:3-33) related to not exceeding more than 20 percent of the sagebrush within 10 miles of a lek in an early seral stage (Connelly et al. 2000), the Proposed Action would impact 81.5 acres of sagebrush within 10 miles of five leks. However, the Proposed Action would not have the largest impact on sagebrush; the Proposed Action with Mining Alternative D and Transportation Alternatives 6 and 7 would impact 163 acres of sagebrush. The evaluation area for sagebrush habitat was thus defined as the area within 10 miles from disturbances associated with the above-described combination of alternatives. Under this combination, the Project would impact sagebrush within 10 miles of four leks. The amount of sagebrush habitat within this 388,724-acre evaluation area is not known; however, the amount of sagebrush within the Study Area is known, and, since the Study Area likely has a smaller proportion of sagebrush than the evaluation area on a whole, and since most of the sagebrush within the Study Area is not as good quality habitat (i.e., smaller blocks and higher elevation) for sage grouse as other areas (e.g., Star Valley, Slug Creek, Tygee Creek, Preuss/Dry Creek) within the evaluation area, the Study Area would serve as a conservative approximation of sagebrush habitat within the larger evaluation area. The Study Area contains 5,666 acres of sagebrush habitat, which does not include mountain brush, which has a sagebrush component. Thus, under the worst-case combination of alternatives, the Project would impact no more than 2.9 percent of the sagebrush habitat within 10 miles of a lek over an approximate 16-year period. The Proposed Action or any alternatives would thus be within RFP guidelines.

Northern Goshawk

Five goshawk responses were heard within the Study Area during baseline surveys. Although no nests were found, it is likely that at least one active goshawk nest would occur within or near the Project Area and that much of the Study Area is used for foraging. The RFP Guideline regarding northern goshawk habitat calls for maintaining ≥30 percent of the forested acres within the evaluation area in mature or old age classes (USFS 2003a:3-32). Following Project activities, 92 percent of the forested acres in the mature-forest habitat evaluation area would be mature (see **Table 4.7-1**). Surveys for active goshawk nests would be conducted prior to mining activities and if discovered, the CTNF would determine the feasibility of potentially rescheduling the activity until the birds have fledged.

Guidelines for goshawk habitat are more restrictive than those of any other raptor species discussed in this section, thus RFP Guidelines for forested acres met under goshawk would also be met for all other raptors. RFP Guidelines for goshawk were evaluated under Alternative D because this alternative involves more disturbance than the Proposed Action as well as the most disturbance of any mining or transportation alternative. RFP Guidelines met under Alternative D, therefore, would also be met under the Proposed Action or any other alternative.

Most forested stands that occur in the evaluation area for goshawk are classified as mature (>50 years old; see **Table 3.7-3**). Following mining, the percent of varying forest size classes would be within RFP Guidelines, which recommend that at least 30 percent of the forested acres after mining consist of mature stands and that no other size class is present in greater proportion than 25 percent (**Table 4.7-1**). The Proposed Action would not comply with the RFP Guideline which recommends against creating forest openings greater than 40 acres. The 10 percent of disturbed forest habitat in the Study Area (1,221 acres, including all forest cover types) may not be suitable for goshawk nesting in the future until mature forest is restored (150-200 years). The Proposed Action would eliminate potential nesting habitat for goshawk for the long-term (within forest habitat), while areas that could be used for foraging would be eliminated for the short-term. Impacts to goshawk are expected to be site-specific, long-term, and moderate.

TABLE 4.7-1 TREE SIZE-CLASS DISTRIBUTION FOR FORESTED ACRES WITHIN THE GOSHAWK EVALUATION AREA FOLLOWING IMPLEMENTATION OF MINING ALTERNATIVE D

SIZE CLASS	ACRES AFTER MINING	PERCENT AFTER MINING	RFP GUIDELINE (USFS 2003A:3-31)
Nonstocked/Seedling (<5 years old)	1,325	4	<25 percent
Sapling (5-20 years old)	300	1	<25 percent
Pole (20-50 years old)	900	3	<25 percent
Mature/Old (>50 years old)	28,695	92	>30 percent
Total	31,220	-	-

Management Indicator Species

The three MIS Species: greater sage-grouse, Columbia sharp-tailed grouse, and northern goshawk, are discussed above as Sensitive species.

Migratory Birds

The Proposed Action would affect migratory birds, including Neotropical landbirds, by eliminating 644 acres within Priority A habitats identified in the Coordinated Implementation Plan for Bird Conservation in Idaho (IWJV 2005). Specifically, three acres of riparian habitat, one acre of non-riverine wetland, 82 acres of sagebrush, and 558 acres of aspen woodland would be eliminated for the long-term. Although most of these reductions do not represent appreciable decreases in habitat within the Study Area, the objectives of the Idaho Bird Conservation Plan include no net loss of Priority A habitats, this objective would thus not be met in the short-term. Over the long-term (>50 years), these habitats would reestablish within disturbed areas at approximately equal acreages. The habitat area avoided by some migratory birds may be larger than the area of disturbance if Project-related noise makes adjacent areas unattractive for nesting. An unknown number of active nests would be destroyed by ground-clearing activities. Impacts to migratory birds, including Neotropical landbirds, would be site-specific (e.g., loss of an active nest), short-term (1 year during actual ground clearing activities), and moderate to major.

Big Game
In general, big game species (mule deer, elk, and moose) roam through most of the Study Area year-round. The Proposed Action would remove 1,340 acres (seven percent of the Study Area) of vegetation currently providing space to move, thermal and hiding cover, and foraging areas for big game over the course of the Project. Project activities would displace big game individuals into the remaining, adjacent, suitable habitat. Regarding riparian areas utilized by moose, the Proposed Action would disturb three acres of riparian habitat, which does not represent an appreciable decrease (<0.5 percent) in riparian habitat within the Study Area.

During baseline surveys in winter, elk and mule deer were commonly observed outside of the Project Area footprint, on a wide corridor along Crow Creek. However, no critical winter range habitat for mule deer, elk, or moose occurs in the Study Area. The Proposed Action would remove 225 acres (one percent) of the vegetation within an 18,230-acre non-critical big game winter range area that intersects the Study Area (**Section 3.7.5**). Actual lost winter range may be larger if big game individuals avoid portions of undisturbed suitable habitat immediately adjacent to the Project Area. Corridors of undisturbed habitat within the Study Area would provide routes for big game individuals to circumvent Project disturbances. Diversions from preferred routes in winter during active mining operations, if longer in length than preferred routes, may stress the energy reserves of some individuals. Movements of big game individuals are most likely to be hindered during periods of high snowfall (Merrill et al. 1994), if at all.

Direct impacts to big game individuals may occur by collisions on Project roads and from mine-related personnel traveling to and from the mine area on roads located away from the site. Overall impacts to big game are expected to be site-specific, short to long-term, and minor to moderate.

Other Wildlife Species

Predators
The Proposed Action would eliminate a maximum of 1,340 acres of habitat for predators over the course of the Project, leaving 93 percent of the habitat within the Study Area undisturbed. Larger predators (e.g., mountain lions, black bears, bobcats, and coyotes) in the Study Area would be displaced, potentially causing adverse population effects (e.g., decreased reproductive rates, increased mortality) in adjacent habitat, depending on the predator species, its behavior, and relative population densities. Ground-clearing activities would likely displace or kill all or most smaller (or slow-moving) predators (e.g., long-tailed weasels). Noise and increased human presence would cause minor, short-term impacts to predator individuals forced to alter their normal movement patterns. Prey availability and foraging would be reduced for the short-term by the loss of habitat and loss of prey individuals during ground-clearing activities. Impacts to predators would be site-specific, short-term, and moderate.

Bats
Bats within the Project Area footprint would be displaced. The site with the highest species richness of bats, near the intersection of Wells Canyon and Crow Creek Road, would not be directly disturbed by Project activities. Bats roosting just outside the Project Area are likely to be affected by noise and increased human presence for the duration of the Project. Vibrations associated with blasts may cause short-term, moderate impacts to nearby bats. Snag roosting habitat in the Project Area would be eliminated for the long-term, while foraging habitat for bats (i.e., ponds and other riparian areas) would be impacted minimally (less than three acres disturbed). The unreclaimed hanging walls could serve as potential new roosting habitat for bats following mining. Impacts to bats in the Study Area would be site-specific, short-term, and moderate.

Raptors
Most raptor species found in the Study Area rely on undisturbed, mature forest stands for nesting. Ten percent of the forest habitat in the Study Area (1,221 acres, including all forest cover types) would be eliminated for the long-term; mature stands (containing snags and dead-topped trees) may not regenerate for 150-200 years. Due to noise and increased human presence, undisturbed forest adjacent to the Project Area, particularly within 0.5 miles, may also be unsuitable to nesting raptors for the short-term. Habitat that supports the prey base for many raptors, such as sagebrush (82 acres; not an appreciable decrease within the Study Area) and tall forb communities (18 acres; a 5 percent decrease within the Study Area) would be eliminated for the short-term. Raptor surveys would be conducted prior to the start of ground-clearing activities. If active raptor nests were found, the CTNF would determine the feasibility of potentially rescheduling the activity until the birds have fledged. Impacts to raptors within the Study Area are expected to be site-specific, short-term, and moderate.

Upland Game Birds
Greater sage-grouse (sensitive, MIS species) have previously been discussed as a sensitive species. Regarding blue grouse and ruffed grouse (forest species), 10 percent of the potential suitable habitat in the Study Area (1,221 acres of forest) would be eliminated for the long-term. Eggs and pre-fledged game birds would be susceptible to direct impacts (mortality) from ground-clearing activities. Fledglings and mature birds in the Project Area would be displaced, and noise or increased human presence may cause moderate stress to birds in the vicinity of the Project Area for the short-term. Any blue or ruffed grouse individuals displaced by Project activities may cause increased mortality or decreased reproductive rates in adjacent populations, depending on the behavior, relative population densities, and the size and juxtaposition of suitable habitat and established territories. Impacts to upland game birds are expected to be site-specific, short-term, and minor to moderate, depending on how many individuals are displaced, injured, or killed.

Woodpeckers
The Proposed Action would eliminate up to 10 percent of the snag habitat in the Study Area (maximum of 1,221 forested acres) for the long-term. Woodpeckers may not find disturbed areas suitable until mature forest stands are established that contain mid- to late-seral trees, snags, and downed dead wood (150-200 years). Given the availability of adjacent suitable habitat, this impact would be site-specific, long-term, and moderate. Under RFP Prescription 8.2.2(g), “snag habitat for woodpeckers shall not be a management consideration.” Three-toed woodpeckers have previously been discussed as a sensitive species.

Amphibians and Reptiles

Four species of amphibians (tiger salamander, boreal chorus frog, pacific chorus frog, boreal toad) and one reptile (terrestrial garter snake) were detected in the Study Area during baseline surveys, primarily in riparian areas and AIZs along water courses. Ground clearing activities would cause direct impacts (injury, mortality, or displacement) to any amphibians or reptiles in these areas.

The Proposed Action would affect amphibians by eliminating 2.8 acres of riparian/wetland habitat for the long-term. Although considered a permanent impact, this reduction is not an appreciable decrease (<0.5 percent) in riparian habitat within the Study Area. The Proposed Action would also impact habitat for the boreal toad after a known breeding site for boreal toads was discovered in Sage Meadows. An approximately 450-acre area within the reported potential boreal toad migration distance (1.5 mile or 2.5 kilometer) would be disturbed (see **Figure 3.7-2**). The Proposed Action would also disturb 475 feet of perennial stream (<0.5 percent of the perennial stream in the Study Area) and 21,030 feet of intermittent channel (approximately 8 percent of the intermittent channel in the Study Area; **Table 4.8-1**). The two culverts installed in perennial streams and five of the six culverts installed across intermittent channels under the Proposed Action would be left in place. The overall lengths of these culverts would be shortened and portions of the channels restored following mining (see **Appendix 2B**). Pipes, placed adjacent to installed culverts, would also be installed for the passage of amphibians.

Although surface runoff would be managed by implementation of the SWPPP, small amounts of sedimentation into North Fork Deer Creek and South Fork Sage Creek due to road construction (see **Section 4.3**, **Section 4.4**; and **Appendix 4A**) could temporarily degrade riparian habitat in the Study Area that is used by amphibians and reptiles. Sedimentation may also occur in Sage Meadows, which contains the most suitable habitat and the highest diversity of amphibians, including boreal toads. Sedimentation impacts to amphibian populations, if they occurred, would be long-term, site-specific, and major.

Traffic on haul/access roads would increase the potential for direct mortalities/injuries and could fragment suitable habitats for amphibians and reptiles. (Mining disturbances alone could also lead to fragmentation). Impacts of fragmentation include decreased gene flow and a resultant susceptibility of fragmented populations to stochastic events that could lead to local population extinctions. Specifically, fragmented populations may not be large enough to provide living space and opportunities for dispersal, or they may be at greater risk from biotic (e.g., pressure from predators) or abiotic (e.g., changed light and moisture conditions) edge effects (Fahrig 2003). Fragmentation impacts to amphibian and reptile populations would be short-term (for the life of the Project), site-specific, and moderate.

Selenium Issues with Wildlife

Selenium poisoning is most common in animals that consume seleniferous vegetation directly (see **Section 3.7.7**). The possibility of selenium accumulation by herbivores (e.g., big game) would thus exist if individuals routinely consume vegetation containing elevated levels of selenium. Higher-level bioaccumulation would then be possible in larger predators (e.g., gray wolf) that consume these herbivores. Adverse impacts of selenium accumulation in Panels F and G are unlikely, as the Proposed Action includes Project design features intended to reduce the potential for selenium uptake in reclamation vegetation on overburden disposal areas. According to a recent assessment by NewFields (2005), risk from selenium in vegetation in the

Smoky Canyon Mine area appears to be primarily restricted to sections of overburden disposal areas that are not fully reclaimed or were reclaimed prior to more recently developed reclamation practices that involve covering seleniferous overburden with a cap of low-selenium chert and topsoil. Among vegetation samples from reclaimed areas of Smoky Canyon Mine Panels A, D, and E, forage exceeded IDEQ removal action levels only at Panel A. Selenium concentrations in the more extensively reclaimed D Panel samples were lower than or approximately equal to the removal action level (NewFields 2005; see **Section 3.7.7**). Project design features (i.e., chert cap) not present during the mining and reclamation of Panels A, D, and E would be implemented for Panels F and G. Although considered unlikely, if selenium accumulation were to occur on reclaimed areas of Panel F and G, the impacts on big game and large predators would be site-specific, potentially long-term, and minor to major.

Small herbivorous mammals sampled from reclaimed areas within Smoky Canyon Mine Panels A, D, and E were found to have elevated levels of selenium (**Section 3.7.7**), but as for vegetation, accumulation of selenium would be minimized by reclamation measures implemented for Panels F and G. As a result, impacts to predators, owls, and other raptors that consume these animals would be minimized. Impacts to small mammals and birds of prey from selenium poisoning, if they occurred, would be site-specific, long-term, and minor.

As described in **Section 4.3**, the potential for increasing selenium levels in riparian and wetland areas and subsequently amphibians would be limited to lower South Fork Sage Creek and lower Deer Creek near its confluence with Crow Creek and areas downstream of these locations. This would limit the extent of potential impacts from increased selenium levels in the Project Area. Riparian vegetation at Mine Panels A, D, and E contained selenium concentrations below the removal action level (5 mg/Kg dry weight; NewFields 2005), thus riparian areas reclaimed within Panels F and G are unlikely to accumulate selenium above this threshold. Some salamanders in the Smoky Canyon Mine area, however, are known to have elevated levels of selenium (see **Section 3.7.7**), indicating that selenium accumulation may be occurring naturally (see **Section 3.3.2**). Impacts to amphibians from uptake of ingested or water-borne selenium are not well studied, but could include larval deformities similar to those found in affected fish. Impacts to amphibian populations resulting from further selenium increases in the Study Area would be site-specific, long-term, and moderate.

4.7.1.1.2 Proposed Action (individual components)

Below, environmental effects have been broken out by components of the Proposed Action. Effects within each mine panel (F and G), within each haul road footprint, and within the power line corridor are discussed separately. The components of the Proposed Action would have similar impacts to wildlife (e.g., habitat loss, noise disturbance, potential for contaminant uptake, etc.) as the entire Proposed Action, but to a lesser degree. No habitat disturbances within individual components of the Proposed Action represent appreciable decreases (>5 percent) relative to the undisturbed habitat in the Study Area. Impacts discussed below concentrate on significant differences between components and between components and the Proposed Action. Impact determinations are discussed only under the combined impacts section (above), as impacts would not be more severe under any component of the Project than under the whole. Compliance with RFP Standards and Guidelines are also discussed under the combined impacts section and not under each component.

Panel F, including lease modifications

The mining of Panel F (including North and South Lease Modifications) would disturb 515 acres of wildlife habitat, including 466 acres of forest, 41 acres of sagebrush, and 0.5 acre of riparian/wet meadow (**Table 4.5-1**), as well as 12,187 feet of intermittent channel (**Table 4.8-1**). Within and adjacent to the Panel F footprint, one observed fall use area for elk occurs (adjacent to the South Lease Modification Area). This area may be unsuitable for elk due to direct disturbance and noise for at least the duration of Panel F mining (6-7 years). Some non-critical winter range (219 acres) for big game would be disturbed by the mining of Panel F. Responses from goshawk, flammulated owl, and three-toed woodpecker were heard within or near the footprint of Panel F. Within this area, any raptors would be displaced, and any unknown nests could be destroyed despite surveys prior to ground-clearing activities. Although, no amphibians were detected at six surveys sites within Panel F, a known breeding site for boreal toads was discovered in Sage Meadows. An approximately 320-acre area within the reported potential boreal toad migration distance of 1.5 miles (Keinath and McGee 2005) would be disturbed (see **Figure 3.7-2**) from Panel F mining activities. This disturbance would represent approximately 6 percent of the available acreage within this area.

Panel F Haul/Access Road

The construction of the Panel F Haul/Access Road would disturb 67 acres of wildlife habitat, including 59 acres of forest, 6.5 acres of sagebrush, and 0.7 acre of riparian/wet meadow (**Table 4.5-1**). In addition, 230 feet of intermittent channel would be disturbed by the installation of a culvert across South Fork Sage Creek. Culverts would be designed for the passage of fish (**Appendix 2B**). Pipes would also be installed adjacent to culverts to allow passage of amphibians. No winter range or breeding areas for big game would be disturbed by road construction, and no sensitive raptors or amphibians were detected within the road footprint during baseline surveys. Any raptors in this area would be displaced, and any unknown nests could be destroyed despite surveys prior to ground-clearing activities. Collisions with wildlife on the Panel F Haul/Access Road may occur during mining activities and may contribute to fragmentation effects, particularly in amphibian populations. No disturbance would occur within the reported boreal toad migration distance area from this component of the Proposed Action.

Panel G

The mining of Panel G would disturb 513 acres of wildlife habitat, including 472 acres of forest, 30 acres of sagebrush, and 0.4 acre of riparian/wet meadow (**Table 4.5-1**), as well as 5,443 feet of intermittent channel. Several year-round use areas for moose were noted during baseline surveys within or near the Panel G footprint. These areas would be unsuitable for moose due to direct disturbance and mining noise for at least the duration of mining in Panel G (8 years). No winter range or breeding areas for big game would be disturbed by mining in Panel G. One great gray owl pair was observed, and goshawk responses were heard within the Panel G footprint. Any raptors in this area would be displaced, and any unknown nests could be destroyed despite surveys prior to ground-clearing activities. No amphibians were detected at one survey site within Panel G. No disturbance would occur within the reported boreal toad migration distance area from this component of the Proposed Action.

Panel G West Haul/Access Road

The construction of the Panel G West Haul/Access Road would disturb 217 acres of wildlife habitat, including 203 acres of forest, 1.7 acres of sagebrush, and 0.8 acre of riparian/wet meadow (**Table 4.5-1**), as well as 450 feet of intermittent channel. In addition, 475 feet of perennial stream would be disturbed by the installation of culverts across Deer Creek (280 feet) and South Fork Deer Creek (260 feet). Culverts would be designed for the passage of fish (**Appendix 2B**). Pipes would also be installed adjacent to culverts to allow passage of amphibians. No winter range for big game would be disturbed by construction of the Panel G West Haul/Access Road. However, the risk of collisions on the Panel G West Haul/Access Road may be particularly high for big game where the South Fork Sage Creek drainage intersects the road, which is a known movement route for mule deer. Regarding calving areas, the southwest portion of a known spring calving ground for elk at Sage Meadows may be disturbed by noise due to its proximity to the Panel G West Haul/Access Road. One controlled study of the effects of mine disturbance on elk calves in southeast Idaho found that cow/calf pairs remained together but abandoned their traditional calf-rearing area when exposed to human and simulated mine disturbance (Kuck et al. 1985), thus Sage Meadows may become unsuitable for elk calving for at least the duration of mining.

One goshawk response was heard within the Panel G West Haul/Access Road footprint. Any raptors in this area would be displaced, and any unknown nests within the road footprint could be destroyed. The Sage Meadows area near the road footprint also contains high-quality amphibian habitat that is known to support a breeding site for boreal toads. Although unlikely due to implementation of the SWPPP, sedimentation into Sage Meadows may decrease the suitability of this habitat for amphibians, including boreal toads. An approximately 120-acre area (including topsoil stockpiles) within the reported potential boreal toad migration distance (1.5 mile or 2.5 kilometer) would be disturbed (see **Figure 3.7-2**) from construction of the Panel G West Haul/Access Road. This disturbance would represent approximately 2 percent of the available acreage within this area.

<u>Power Line Between Panels F and G</u>

The ROW for the power line would measure 28 acres; however, actual ground surface disturbance would actually be much less because helicopters would be used for pole installation outside of lease areas. Assuming a 25-foot radius of disturbance around each pole, total ground disturbance associated with pole installation outside of lease areas would be 3.0 acres. Within the power line ROW, some additional vegetation clearing/trimming (i.e., felling of taller trees that could contact power lines) may be required in some areas. These disturbances would be small in comparison to other Project-related activities. The power line ROW falls within 6.2 acres of big game winter range; however, big game movements would not be affected by the power line. Poles would typically be placed in upland areas (out of AIZs), thus streams and riparian habitat also would not be affected. Power poles would be designed to be raptor safe, thus the power line would not pose an additional hazard to migratory birds, bald eagles, or other raptors. New poles would provide raptor perch sites; however, that may increase predation on some wildlife species (e.g., sage-grouse). An approximately 9-acre area within the reported potential boreal toad migration distance (1.5 mile or 2.5 kilometer) would be disturbed (see **Figure 3.7-2**) within the power line corridor. This disturbance would represent less than one percent of the available acreage within this area.

4.7.1.2 Mining Alternatives

Mining Alternatives A, D, E, and F have different disturbance footprints than the Proposed Action, and therefore affect different amounts of wildlife habitat. Alternatives A south component, A north component, E, and F would create less disturbances (138, 1.9, 27.8, and 27.8, respectively) while Alternative D would create more (137 acres). **Table 4.5-2** compares the acreages of disturbance in different habitat types among the mining alternatives and the Proposed Action. Most changes under the mining alternatives would result in increased or decreased disturbance in aspen habitat, and consequently would disproportionately affect the wildlife associated with these areas (e.g., bats, raptors, woodpeckers, sharp-tailed grouse in winter, etc.; see **Section 4.7.1.1**). In general, impacts to wildlife would be fewer under the alternatives where less habitat disturbance occurs. However, no appreciable increases or decreases (>5 percent) in habitat disturbance would occur under any mining alternative. Mining alternatives situated outside the reported potential boreal toad migration distance area (**Figure 3.7-2**) would have no impact to this area, thus where applicable it is not discussed under each alternative below.

Mining Alternative A – No South and/or North Panel F Lease Modifications

Relative to the Proposed Action, habitat losses would be reduced if both components (North + South Lease Modifications) of Alternative A were adopted. Approximately 140 acres, predominantly in aspen and sagebrush habitats, would be left undisturbed.

<u>No North Lease Modification</u>

Eliminating only the North Lease modification would reduce subalpine fir habitat losses by 1.9 acres (**Table 4.5-2**). This alternative may include the implementation of Transportation Alternative 1 (Alternative Panel F Haul/Access Road) in place of the Proposed Action Panel F Haul/Access Road, which would further reduce habitat disturbance by 21 acres (**Table 2.6-1**).

<u>No South Lease Modification</u>

Eliminating only the South Lease modification would result in 138 fewer acres of disturbance than the Proposed Action, mainly in aspen and sagebrush (**Table 4.5-2**), and completely within non-critical big game winter range habitat (138 acres). Eliminating the South Lease modification would avoid impacting the observed fall use area for elk. It would result in the reduction of approximately 138 acres of disturbance within the potential boreal toad migration distance area. In addition, the remaining hanging wall under the Proposed Action would be reduced 50 percent in length under Alternative A. This modification would create less potential habitat for bats than the Proposed Action post reclamation, although the change in beneficial impact to bats would be negligible.

Mining Alternative B – No External Seleniferous Overburden Fills

The footprint of initial disturbance would be the same under Mining Alternative B as under the Proposed Action, so disturbance effects to wildlife habitat would be the same. The duration of mining operations would be slightly longer than the Proposed Action, creating more noise and risk of vehicle collisions. The hanging wall in Panel G would be fully backfilled in this alternative, thus not creating any additional potential habitat for spotted bats.

Mining Alternative C – No External Overburden Fills at All

The footprint of initial disturbance would be the same under Mining Alternative C as under the Proposed Action, so disturbance effects to wildlife habitat would be the same. Unlike

Alternative B, no potential habitat for spotted bats would be created under Alternative C due to the burying of all hanging walls.

Mining Alternative D – Infiltration Barriers on Overburden Fills

Mining Alternative D would result in 137 more disturbed acres than the Proposed Action. Additional disturbance would occur mostly within aspen (93.7 acres) and subalpine fir (19.4 acres) habitats (**Table 4.5-2**) and within 24.5 acres of non-critical big game winter range. Alternative D would also disturb six acres within AIZs. Relative to the total disturbance under the Proposed Action, Alternative D would remove an additional 10 percent of the habitat available for wildlife. An approximately 77-acre area within the reported potential boreal toad migration distance (1.5 mile or 2.5 kilometer) would be disturbed (see **Figure 3.7-2**) under this alternative. This disturbance would represent approximately 1 percent of the available acreage within this area.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

Mining Alternative E would result in at least 3.0 fewer disturbed acres than the Proposed Action power line alternative (direct power line between Panels F and G), depending on how much vegetation removal within the ROW (e.g., tree trimming or removal) is necessary. The power line under Alternative E would be longer and would have more poles than the direct line under the Proposed Action. Relative to the Proposed Action power line, most (61 percent) of the habitat left undisturbed would occur in aspen (**Table 4.5-2**). Under Alternative E, the power line would be built along haul roads; this modification may increase the risk of collisions with migratory birds, bald eagles, and other raptors by the combined attraction of roadkill and power line perches along the roads. Increased perch sites along a longer power line may increase predation rates on some wildlife (i.e., sage-grouse).

Mining Alternative F – Electrical Generators at Panel G

The footprint of disturbance under Mining Alternative F would result in at least 3.0 fewer disturbed acres than the Proposed Action, depending on how much vegetation removal within the ROW (e.g., tree trimming or removal) is necessary. Relative to the Proposed Action, most (61 percent) of the habitat left undisturbed would occur in aspen (**Table 4.5-2**) and constant noise associated with the generator would be present in one location.

<u>Special Status Wildlife Species</u>

Given the number of acres of disturbed habitat under the Proposed Action, impacts to TEPCS species under each mining alternative would be similar to those described under the Proposed Action. The level of impact associated with Alternatives A and D may be slightly decreased, and increased, respectively, due to evident changes in disturbance acreage, but impacts associated with these Mining Alternatives would not change the overall impacts to TEPCS species made under the Proposed Action.

<u>Selenium Issues with Wildlife</u>

Alternative D would result in a thicker chert cap than the Proposed Action, and would therefore lower the potential for root penetration into seleniferous overburden fills, with consequently lower potential for selenium uptake by vegetation and browsing wildlife. Differences between all other Mining Alternatives and the Proposed Action, although some modify the method of seleniferous overburden disposal, are negligible in terms of the potential effects to wildlife because the area of the chert cap would be the same. Selenium control measures would be implemented identically under these Mining Alternatives as described under the Proposed Action, thus risks of selenium accumulation among alternatives (other than Alternative D) would be as described under the Proposed Action. Risks of selenium accumulation under Alternative D would be even less.

4.7.1.3 Transportation Alternatives

In general, Transportation Alternatives 1-8 would result in decreased disturbance in subalpine fir habitat and increased disturbance within aspen, sagebrush, and mountain shrub habitats. **Table 4.5-3** compares the acreages of disturbance in different habitat types among the transportation alternatives and the Proposed Action. Habitat disturbance changes under most transportation alternatives may reduce impacts to wildlife that utilize subalpine fir (e.g., wolverine, boreal owl, northern three-toed woodpecker, northern goshawk) while increasing impacts to aspen- or brush/shrub-dependent species (e.g., Columbian sharp-tailed grouse, greater sage-grouse, big game, migratory birds, bats). Except under Transportation Alternative 3 (mountain mahogany habitat), no changes in habitat disturbance under the transportation alternatives represent appreciable differences (>5 percent) relative to the undisturbed habitat in the Study Area. Compliance with RFP Standards and Guidelines would not change under any Transportation Alternative relative to the Proposed Action, with the possible exception of Transportation Alternative 7 (bald eagle). Impacts to wildlife, including TEPCS species, under any transportation alternative would be site-specific, short-term, and moderate (see page 4-1 for definition). Fragmentation impacts to big game and amphibian populations would differ among transportation alternatives; these are described below. Transportation alternatives situated outside the reported potential boreal toad migration distance area (**Figure 3.7-2**) would have no impact to this area, thus where applicable, it is not discussed under each alternative below.

Transportation Alternative 1 – Alternate Panel F Haul/Access Road
Alternative 1 would disturb 20.7 fewer acres than the Proposed Action Panel F Haul/Access Road. Most of the reduction would occur in aspen and sagebrush habitats (see **Table 4.5-3**), and one additional acre of AIZ habitat would be disturbed.

Transportation Alternative 2 – East Haul/Access Road
Alternative 2 would disturb one less acre than the Proposed Action Panel G West Haul/Access Road. The change in habitat disturbance would include a 114-acre decrease in subalpine fir and a 49-acre combined increase in aspen, aspen/conifer, and Douglas-fir (**Table 4.5-3**). This alternative would also result in a 1.1-acre increase in riparian/wet meadow disturbance relative to the Proposed Action Panel G West Haul/Access Road. Alternative 2 would require one 300-foot culvert on private land across Deer Creek, whereas the Proposed Action Panel G West Haul/Access Road would cross Deer Creek and South Fork Deer Creeks with two culverts (280 and 260 feet long, respectively). Alternative 2 occurs close to an area with a high abundance of tiger salamanders and may increase the potential for direct mortality to individuals or contribute to fragmentation if the road isolates segments of the population. Alternative 2 would avoid the Sage Meadows and North Fork Deer Creek areas but would be constructed near Crow Creek and lower Deer Creek. Avoiding Sage Meadows would decrease the potential for impacting boreal toads. Mule deer and elk are known to winter near these areas, and they may experience more frequent vehicle collisions or habitat fragmentation effects (i.e., if seasonal migrations are hindered) under Alternative 2. There has only been one big game fatality at Smoky Canyon Mine over the duration of operations.

Transportation Alternative 3 – Modified East Haul/Access Road
Alternative 3 follows an alignment similar to Alternative 2 and would disturb 59 more acres than the Proposed Action Panel G West Haul/Access Road. The change in habitat disturbance would include a 94-acre decrease in subalpine fir, 59-acre increase in sagebrush, and 39-acre increase in aspen (**Table 4.5-3**). Alternative 3 would also result in a 21-acre increase in mountain mahogany habitat disturbance (**Table 4.5-3**), which represents an 11 percent increase relative to the total mountain mahogany habitat in the Study Area. Riparian/wet meadow disturbance would remain the same under Alternative 3 as under the Proposed Action Panel G West Haul/Access Road. Alternative 3 would require one 390-foot culvert across Deer Creek, whereas the Proposed Action Panel G West Haul/Access Road would cross Deer Creek and South Fork Deer Creek with two culverts (280 and 260 feet long, respectively). Alternative 3 would be identical to Alternative 2 in all other potential effects to mule deer, elk, and amphibians by road mortality or habitat fragmentation.

Transportation Alternative 4 – Middle Haul/Access Road
Alternative 4 would disturb 25 fewer acres than the Proposed Action Panel G West Haul/Access Road. The change in habitat disturbance would include a 103-acre decrease in subalpine fir, a 49-acre increase in aspen, and 25-acre increase in mountain snowberry/sagebrush (**Table 4.5-3**). Alternative 4 would also result in a 0.8-acre decrease in riparian/wet meadow disturbance. Alternative 4 would require the instillation of culverts on Deer Creek (440 feet long) and South Fork Deer Creek (510 feet long) in the upper Deer Creek area, whereas the Proposed Action Panel G West Haul/Access Road would cross Deer Creek and South Fork Deer Creek with two culverts (280 and 260 feet long, respectively). Alternative 4 would occur close to North Fork Deer Creek where a large tiger salamander population exists as well as an observed fall use area for elk. In addition, Alternative 4 would disturb approximately 116 acres of the potential boreal toad migration area outside of Sage Meadows (see **Figure 3.7-2**). This disturbance would represent approximately 2 percent of the available acreage within this area. Collisions with salamanders or toads may increase under Alternative 4 and possibly isolate (and thus fragment) segments of these populations.

Transportation Alternative 5 – Alternate Panel G West Haul/Access Road
Alternative 5 would disturb 9 more acres than the Proposed Action Panel G West Haul/Access Road. The change in habitat disturbance under Alternative 5 would include a 45-acre decrease in subalpine fir, 24-acre increase in aspen, and 26-acre increase in mountain snowberry/sagebrush (**Table 4.5-3**). Riparian/wet meadow disturbance would be the same as under the Proposed Action Panel G West Haul/Access Road. Culvert installations under Alternative 5 would also be identical to those under the Proposed Action. Alternative 5 would follow a similar alignment as the Proposed Action Panel G West Haul/Access Road, but would not completely avoid the Sage Meadows area. Alternative 5 would intersect the potential boreal toad migration area outside of Sage Meadows, impacting approximately 119 acres (see **Figure 3.7-2**). This disturbance would represent approximately 2 percent of the available acreage within this area.

Transportation Alternative 6 – Conveyor from Panel G to Mill
The Panel G Conveyor Alternative (Transportation Alternative 6) requires a one-lane service road and either Transportation Alternative 7 (East Access Road via Crow Creek and Wells Canyon) or Transportation Alternative 8 (Middle Access Road).

Alternative 6, apart from the implementation of Alternatives 7 or 8, would require 156 fewer acres of disturbance than the Proposed Action Panel G West Haul/Access Road. The change in habitat disturbance would include a 112-acre decrease in subalpine fir and a 41-acre increase in aspen. Alternative 6 would not disturb riparian shrub/wet meadow habitat. However, it would impact approximately 14 acres within the potential boreal toad migration area outside of Sage Meadows (see **Figure 3.7-2**). This disturbance would represent less than 1 percent of the available acreage within this area. No perennial stream culverts would be required under Alternative 6. Due to low clearance of the conveyor, most upland areas between Panels F and G would be impassable for big game. Clearance of the conveyor over drainage areas and Forest Trails (404 and 402) may be greater, and big game may successfully pass through these areas on a regular basis. Blockage along most of the conveyor route may force some big game individuals to circumvent the entire mine area (Panels F and G) when migrating to or from Crow Creek.

Transportation Alternative 7 – Crow Creek/Wells Canyon Access Road

Alternative 7 would require 103 fewer acres of disturbance than the Proposed Action Panel G West Haul/Access Road, including a 133-acre decrease in subalpine fir, 57-acre decrease in aspen, and a 73-acre increase in sagebrush. Alternative 7 would also involve more riparian disturbance than any other transportation alternative, removing an additional 23 acres of riparian shrub/wet meadow habitat relative to the Proposed Action Panel G West Haul/Access Road. Construction for Alternative 7 along the existing Crow Creek and Wells Canyon Roads may increase sedimentation into Crow Creek as well as increase big game-vehicle collisions during winter (due to proximity to the wintering area for big game along the Crow Creek corridor) or lead to fragmentation of big game populations if seasonal migration routes are hindered. Bald eagles have been observed along Crow Creek and vicinity during winter, thus the RFP guideline requiring minimization of conflicts with bald eagle wintering habitat would not be met under Alternative 7 (USFS 2003a:3-29). In addition, ground-clearing activities under Alternative 7 may displace red foxes in the vicinity as well as disturb a red fox den that was observed along Crow Creek Road in 2003.

Transportation Alternative 8 – Middle Access Road

Alternative 8 would require 118 fewer acres of disturbance than the Proposed Action Panel G West Haul/Access Road, including a 125-acre decrease in subalpine fir. Disturbance in riparian shrub/wet meadow habitat under Alternative 8 would be similar to the Proposed Action Panel G West Haul/Access Road. Alternative 8 would avoid Crow Creek, but would require installation of culverts across Deer Creek (580 feet) and South Fork Deer Creek (360 feet). The Proposed Action Panel G West Haul/Access Road would cross these same creeks with culverts measuring 280 and 260 feet in length, respectively. Like Alternative 4, Alternative 8 would occur close to North Fork Deer Creek where a large tiger salamander population exists as well as an observed fall use area for elk. Alternative 8 would disturb approximately 72 acres of the potential boreal toad movement area outside of Sage Meadows (see **Figure 3.7-2**). This disturbance would represent approximately 1 percent of the available acreage within this area. Direct mortalities to salamanders or toads may increase under Alternative 8 and possibly isolate (and thus fragment) segments of these amphibian populations.

<u>Special Status Wildlife Species</u>

Relative to the Proposed Action Panel F Haul/Access road, Transportation Alternative 1 involves fewer disturbances in aspen habitat but would not change the overall impacts to TEPCS species described under the Proposed Action.

Relative to the Proposed Action Panel G West Haul/Access Road, any of the Transportation Alternatives (2-8) may reduce impacts to forest-dependent TEPCS species, particularly those utilizing subalpine fir (i.e., wolverine, boreal owl, northern three-toed woodpecker, northern goshawk). Most of these same alternatives also involve increased disturbances in aspen habitat (**Table 4.5-3**); however, the level of impacts to forest-dependent species in general would change only slightly (no TEPCS species utilize subalpine fir exclusively). Overall impacts to forest-dependent species described under the Proposed Action would be the same under Transportation Alternatives 2-8. Regarding sagebrush-dependent TEPCS species (i.e., greater sage-grouse, sharp-tailed grouse), Alternatives 2, 3, and 7 increase disturbance in marginal sagebrush habitat for these species (by 53 – 74 acres) but would not change the overall impacts made under the Proposed Action.

<u>Selenium Issues with Wildlife</u>
Road construction itself would not noticeably increase the potential for selenium uptake by wildlife over the existing condition. In areas where road cuts would expose seleniferous material, this material would be at shallow depths where the vegetation in the area would already be exposed to the source. Differences between Transportation Alternatives and the Proposed Action are negligible in terms of the risk of selenium uptake by wildlife. Selenium control measures would be implemented identically under any Transportation Alternative as under the Proposed Action.

4.7.1.4 No Action Alternative

Under the No Action Alternative, disturbance of currently undisturbed vegetation would not occur, eliminating the impacts to wildlife species discussed in **Section 4.7.1.1**. In addition, overburden containing elevated concentrations of selenium would not be excavated and the slight potential for further bioaccumulation of selenium in fauna within the Project Area would not be a risk. Lastly, reclamation in Panel E would not be completed, as overburden from Pit 1 in Panel F would not be generated and thus used to backfill the 29-acre E-0 pit of Panel E (BLM 1997).

4.7.2 Mitigation Measures

Raptor-nesting surveys would be conducted during the nesting/breeding season prior to any new disturbance during the season to ensure compliance with Executive Order 13186 (protection of migratory birds) and the RFP. Simplot would perform surveys for northern goshawks, flammulated owls, great gray owls, and other raptors prior to any new disturbance to ensure compliance with the RFP protection around nest guidelines. If an active nest(s) were discovered, the CTNF would determine the feasibility of potentially rescheduling the activity until after the birds have fledged.

Simplot would perform a survey to identify boreal toad populations in any potential toad habitat that would be disturbed, which has not yet been surveyed. This survey would be developed cooperatively by CTNF wildlife or fisheries biologists and Simplot. If boreal toads were discovered during these surveys, potential mitigation measures would be developed. In addition, in the event the West or Modified West Haul/Access Road was selected, Simplot would survey the area south of the known breeding site in Sage Meadows to determine whether gradient and topography make migration of toads into this area, including montane habitat south of these roads, possible.

If Transportation Alternative 6 (the conveyor) were selected, the Forest Service may require that additional crossings be provided with sufficient clearance for wildlife passage under the conveyor.

4.7.3 Unavoidable (Residual) Adverse Impacts

Under the Proposed Action or any mining or transportation alternative, undiscovered active bird nests could be destroyed; this potential impact would be unavoidable.

4.7.4 Relationship of Short-Term Uses and Long-Term Productivity

The Proposed Action and Alternatives would implement ground-disturbing activities that would produce short- and long-term effects to wildlife and TEPCS species. Species that depend on mid- and late-seral forested vegetation would be displaced for the long-term.

4.7.5 Irreversible and Irretrievable Commitments of Resources

Habitat disturbances may be irreversible if, following reclamation and time, vegetation does not return to its current state. Disturbed mature forest in particular may potentially be both irreversible and an irretrievable commitment of mature forest resources if these areas do not reestablish. The 46 acres of unreclaimed hanging walls would also be both irreversible and an irretrievable commitment of habitat within the hanging wall footprints.

4.8 Fisheries and Aquatics

Issue:
The Project may affect cutthroat trout, other native fishes, or aquatic resources in the Project Area.

Indicators:
The length of intermittent and perennial stream channels affected by road fill and associated culverts, and comparison with the undisturbed lengths of these stream channels in the Project Area;

Acres of aquatic influence zone (AIZ) habitat to be affected and comparison with undisturbed acreage of this habitat in the Project Area;

Quantities of suspended sediment and contaminants of concern in fishery resources in the area, with emphasis on compliance with applicable aquatic life water quality standards;

Compliance with the applicable RFP Standards and Guidelines.

4.8.1 Direct and Indirect Impacts

4.8.1.1 Proposed Action

Over an approximately 16-year period, the Project would directly disturb 475 feet of perennial stream channel, 21,030 feet of intermittent stream channel, and 65 acres of AIZs in the Study Area (**Table 4.8-1**). In all, the Project would directly disturb <0.5 percent of the perennial stream channels, 8 percent of the intermittent stream channels, and 5 percent of the AIZs in the Study Area over the course of the Proposed Action.

TABLE 4.8-1 FEET OF STREAM CHANNEL (INTERMITTENT AND PERENNIAL) AND ACRES OF AQUATIC INFLUENCE ZONES (AIZS) DISTURBED BY THE PROPOSED ACTION

	INTERMITTENT (FT)	PERENNIAL (FT)	STREAM TOTAL	AIZ (ACRES)
Panel F, including lease modifications	12,187	0.0	12,187	30.3
Panel F Haul/Access Road	230	0.0	230	0.7
Panel F TOTAL	12,417	0.0	12,417	31.0
Panel G	5,443	0.0	5,443	15.0
Panel G West Haul/Access Road	450	475	926	14.9
Panel G TOTAL	5,894	475	6,369	29.9
Power line*	2,719	0.0	2,719	4.5
Proposed Action TOTAL	**21,030**	**475**	**21,505**	**65.4**

* Includes entire 50-foot ROW, actual disturbance to stream channels and AIZs would most likely be zero.

Culverts would be installed at all perennial stream crossings and within intermittent drainage channels. Vegetation would be removed within intermittent channels and AIZs disturbed by the Proposed Action. Except for the portions of culverts on the sections of the Panel G West Haul/Access Road that are to be left as public roads, culverts would be removed after mining, intermittent channels would be restored, and AIZs would be reseeded (see **Table 2.4-4** for species used in reclamation). Because AIZs typically encompass riparian buffer strips, the removal of vegetation in AIZs may indirectly lead to: 1) increases in water temperature from the loss of shade, 2) decreases in natural sediment filtration capabilities and increases in substrate sedimentation, 3) potential changes in channel morphology resulting from the stream bank destabilization (also see **Section 4.3.2**), and 4) loss of potential instream wood recruitment. The loss of stream habitat and AIZ function would result in direct and indirect impacts to cutthroat trout and other native fishes that would be short-term, site-specific, and moderate (see page 4-1 for definitions).

Culvert construction across perennial streams would be designed to maintain natural flows (and conditions for fish passage; **Appendix 2B**), thus the Project would comply with the RFP standard requiring the maintenance of instream flows (USFS 2003a:4-49). Regarding native fishes, the displacement and erosion of sediment in the stream bank during culvert installation would create short-term pulses of turbidity that could cause temporary gill irritation to individual fish immediately downstream of the culvert. Sedimentation could also diminish the suitability of stream habitat for many aquatic organisms and native fishes, including spawning areas for cutthroat trout (**Section 3.8.3**). In general, streams with high-quality spawning habitat may not be diminished by small sediment increases (typical of those under the Proposed Action), whereas streams with low-quality spawning habitat may be rendered unsuitable by a similar disturbance. Major additional sedimentation into Project Area streams is not expected due to environmental protection measures and Project design features (**Section 2.5.7**, **Appendix 2B**). Moreover, considering estimated baseline sediment loading rates (**Appendix 4A**), predicted sedimentation increases under the Proposed Action would constitute less than 5 percent of current loading rates into any Study Area stream (**Table 4.3-20**). Indirect impacts to native fishes via sedimentation would be short-term, site-specific, and minor to moderate depending on the level of sedimentation (**Section 3.8.4** and **Section 4.3.2**).

Environmental protection measures are also designed to prevent the introduction of selenium in surface runoff from mining disturbances (**Section 2.5.5**, **Appendix 2C**). Increased selenium levels in riparian or wetland areas, if they occurred over established water quality criteria, would violate the RFP standard requiring watersheds to maintain progress toward beneficial use attainment for pollutants (USFS 2003a:4-50). Indirect impacts to native fishes via selenium accumulation, if they occurred, would be short to long-term, site-specific, and moderate to major depending on the level of accumulation. Further, as described in **Section 4.3**, the potential for increasing selenium levels in perennial streams would only occur in lower South Fork Sage Creek and lower Deer Creek near its confluence with Crow Creek and areas downstream of these locations, thus limiting the extent of potential impacts from increased selenium levels.

Concerning special status species, based on six parameters, the Palisades/Salt Yellowstone cutthroat trout metapopulation has been rated as being robust and having a "low risk" of extinction (USFS 2003b:D-209). This rating was made based upon the description in the RFP (4-103) that Simplot would continue mining their leases at the Smoky Canyon Mine, including their Manning Creek (Panel F) lease area through the RFP planning period. At the population level, there are no known isolated populations. Further, since there are minimal impacts predicted from AIZ disturbance, culvert installations and passage, and sedimentation, the Proposed Action would have both short and long-term, minor to moderate, and site-specific impacts to the Yellowstone cutthroat trout.

Below, environmental effects have been broken out by components (i.e., mine panels, haul roads, and power line) of the Proposed Action. The components would have similar impacts to native fishes as the entire Proposed Action (e.g., stream habitat loss, potential for contaminant uptake, etc.), but to a lesser degree.

<u>Panel F, including lease modifications</u>
New direct disturbances resulting from mining Panel F, including the North and South Lease Modifications, would total 12,187 feet of intermittent drainage channel and 30 acres of AIZs in the South Fork Sage Creek drainage (**Table 4.8-1**). No perennial stream channels would be disturbed by the mining of Panel F unless runoff from mining disturbance overflows sediment ponds during rainfall events and enters a stream (**Section 4.3.2**). Simplot's SWPPP would be followed in the design and maintenance of runoff/sediment ponds, such that all runoff events up to the 100-year, 24-hour rain (plus snow melt) would be contained (Simplot AgriBusiness 2004). Impacts to cutthroat trout and other native fishes from the loss of intermittent drainage channel and AIZs from mining Panel F would be short-term, site-specific, and minor.

<u>Panel F Haul/Access Road</u>
New direct disturbances resulting from construction of the Panel F Haul/Access Road would total 230 feet of intermittent drainage channel and 0.7 acre of AIZ in the South Fork Sage Creek drainage (**Table 4.8-1**). No perennial stream channels would be directly disturbed. Impacts to cutthroat trout and other native fishes from the loss of intermittent stream channel and AIZs would be short-term, site-specific, and minor.

The Panel F Haul/Access Road would discharge approximately 0.5 ton of sediment per year into South Fork Sage Creek (**Section 4.3.2, Appendix 4A**) in addition to the estimated baseline sediment loading rate of 155 tons per year (**Appendix 4A**). Introduced sediment is likely to remain in the local area until it discharges gradually downstream during snowmelt and rainfall events. South Fork Sage Creek could become less suitable for spawning in the perennial reaches below this crossing if sedimentation from road construction resulted in the filling of redd habitat. South Fork Sage Creek appears to be under environmental stress (**Section 3.8.2**), but currently contains relatively high quality spawning habitat and is likely to be resilient to the estimated small sediment increases (<0.5 percent of the baseline loading rate; **Section 3.8.4**, **Appendix 4A, Section 4.3.2**). Sedimentation impacts to cutthroat would be short-term, site-specific, and negligible.

Panel G

New direct disturbances resulting from mining Panel G would total approximately 5,443 feet of intermittent drainage channel and 15 acres of AIZs in the South Fork Deer Creek drainage (**Table 4.8-1**). No perennial stream channels would be disturbed by the mining of Panel G unless runoff from mining disturbance overflows sediment ponds during rainfall events and enters a stream (**Section 4.3.2**). Simplot's SWPPP would be followed in the design and maintenance of runoff/sediment ponds, such that all events up to the 100-year, 24-hour rain (plus snow melt) would be contained (Simplot AgriBusiness 2004). Impacts to cutthroat trout and other native fishes from the loss of intermittent stream channel and AIZs would be short-term, site-specific, and minor.

Panel G West Haul/Access Road

New direct disturbances resulting from construction of the Panel G West Haul/Access Road would total approximately 475 feet of perennial stream channel, 450 feet of intermittent drainage channel, and 15 acres of AIZs in the Deer Creek and South Fork Deer Creek drainages (**Table 4.8-1**). Impacts to cutthroat trout and other native fishes from the loss of perennial and intermittent channels and AIZs would be short-term, site-specific, and moderate.

The Panel G West Haul/Access Road would discharge approximately 8.3 tons of sediment per year into Deer Creek and a small amount (0.15 tons/year) into South Fork Deer Creek (**Section 4.3.2**, **Appendix 4A**) in addition to the estimated baseline sediment loading rate into Deer Creek (including the South Fork) of 308 tons per year (**Appendix 4A**). Introduced sediment is likely to remain in the local area until it discharges gradually downstream during snowmelt and rainfall events. The sampled reach of South Fork Deer Creek closest to the haul road footprint (SFDC-100) is low-quality spawning habitat, thus further sedimentation from road construction may result in the stream segment not providing any spawning habitat for cutthroat trout and other native fishes. North Fork Deer Creek should not be impacted by potential sedimentation increases. Streams with low quality spawning habitat and low fish populations, such as South Fork Deer Creek, may be particularly susceptible to the loss of trout production, thus the limited cutthroat trout population in South Fork Deer Creek may be vulnerable to collapse due to sediment increases related to this haul road. However, predicted sediment increases into this stream (0.15 tons per year) are likely to be negligible when compared to baseline sediment loading rates (<0.1 percent of the baseline rate; **Appendix 4A**). The upper sampled reach of Deer Creek (DC-100) is relatively high quality spawning habitat that appears to be degrading and/or under environmental stress (**Sections 3.8.2** and **3.8.4**), but would likely be resilient to an additional 8.3 tons of sediment per year (4 percent of the baseline loading rate; **Section 3.8.4**, **Appendix 4A, Section 4.3.2**). Considering the condition of most streams in the Study Area, sedimentation that fills redd habitat in the relatively high-quality area of Deer Creek would result in short-term, site-specific, moderate indirect impacts to cutthroat trout and other native fishes.

Power Line Between Panels F and G

The ROW for the power line would measure 28 acres; however, actual ground surface disturbance would be much less than 28 acres because helicopters would be used for pole installation outside of lease areas. In addition, poles would typically be placed in upland areas (out of AIZs) such that no aquatic habitat would be affected. No perennial stream channels would be directly disturbed by the power line, and no direct or indirect input to streams are expected as a result of power line construction. Direct and indirect impacts to cutthroat trout and other native fishes by construction of the power line would be negligible.

Selenium Issues with Fish

Although selenium control measures would be implemented (**Section 2.5.5**, **Appendix 2C**), the risk of selenium accumulation in aquatic habitat within the Study Area still exists. According to groundwater modeling (**Section 4.3.1**), Panel F mining would result in the IDEQ cold water aquatic criterion for selenium (0.005 mg/L) being exceeded during the summer/fall baseline period in South Fork Sage Creek, Sage Creek, and Crow Creek downstream of Sage Creek. These exceedances are anticipated to occur approximately 50 and 100 years following the completion of mining activities in Deer Creek and South Fork Sage Creek, respectively. Panel G mining would result in the aquatic criterion for selenium being exceeded during the summer/fall/winter baseline period in lower Deer Creek, but once Deer Creek flows are mixed with Crow Creek flows, Crow Creek would not exceed the criterion. Increases in selenium concentration in Study Area streams would increase the risk for selenium accumulation in native fishes. Several cutthroat trout in Deer Creek and its tributaries were found to have body tissue selenium levels above the biological effect threshold (**Section 3.8.5**), presumably from naturally occurring selenium in area springs (**Section 3.3.2**). High levels of selenium accumulation have been linked to reproductive failure and congenital deformities in other species of fish (e.g., Lemly 1999). Studies by Hardy (2003) showed that cutthroat trout grown for 44 weeks on a steady diet of selenomethionine (the form of selenium found in the aquatic food chain) exhibited no signs of toxicity, including cranial-facial deformities in fry, despite measured whole-body selenium levels of up to 12.5 mg/Kg. Indirect impacts to native fishes in the Study Area from further selenium accumulation, if they occurred, could be long-term, site-specific (within various reaches), and moderate to major.

4.8.1.2 Mining Alternatives

Mining Alternatives A, D, E, and F have different disturbance footprints than the Proposed Action, and therefore affect different amounts of aquatic habitat (length of intermittent stream channels and acres of AIZs). Alternative A south component, Alternative A north component, Alternative E, and Alternative F would create fewer disturbances in aquatic habitat while Alternative D would create more disturbances (**Table 4.8-2**). All mining alternatives would disturb the same amount of perennial stream channel as the Proposed Action (475 feet).

TABLE 4.8-2 FEET OF STREAM CHANNEL (INTERMITTENT AND PERENNIAL) AND ACRES OF AIZS DISTURBED BY THE MINING ALTERNATIVES RELATIVE TO THE PROPOSED ACTION

	INTERMITTENT (FT)	PERENNIAL (FT)	AIZ (ACRES)
Proposed Action	**21,030**	**475**	**65.4**
Alternative A: no North lease modification	-21	0	-0.1
Alternative A: no South lease modification	-3,148	0	-9.4
Alternative B	0	0	0.0
Alternative C	0	0	0.0
Alternative D	+1,889	0	+5.8
Alternative E	-2,719	0	-4.5
Alternative F	-2,719	0	-4.5

(+) indicates an increase over the Proposed Action, (-) indicates a decrease; 0 indicates no change

Although various mining alternatives would result in a 0-15 percent change in intermittent channel disturbance and from 0-14 percent change in AIZ disturbance relative to disturbances under the Proposed Action, there would be no changes to effects or impact determinations for cutthroat trout and other native fishes described under the Proposed Action due to habitat impacts. All mining alternatives would modify intermittent stream channel and disturb AIZs by 1 percent or less relative to the total amount of aquatic habitat in the Study Area. Alternative D would lower the potential for selenium accumulation (see "Selenium Issues with Fish," this section) in native fishes.

Mining Alternative A – No South and/or North Panel F Lease Modifications

Relative to the Proposed Action, aquatic habitat losses would be reduced if both components (North + South Lease Modifications) of Alternative A were adopted. Approximately 3,170 feet of intermittent drainage channel and 10 acres of AIZs would be left undisturbed.

No Panel F North Lease Modification

If the Panel F North Lease Modification were not approved, there would be no mining outside of Lease I-027512 boundaries to the north of Panel F. Intermittent drainage channel disturbance would measure 21,009 feet; 21 fewer feet of intermittent channel disturbance in the South Fork Sage Creek drainage than the Proposed Action (**Table 4.8-2**). This alternative may include the implementation of Transportation Alternative 1 (Alternative Panel F Haul/Access Road) in place of the Proposed Action Panel F Haul/Access Road, which would disturb 672 feet of intermittent stream channel (442 additional feet of intermittent stream channel than the Proposed Action; **Table 4.8-3**). The combination of this component of Alternative A and Transportation Alternative 1 would result in a net increase of 421 feet of intermittent stream channel and 0.9 acres of AIZ disturbance relative to the Proposed Action. Impacts to the relatively high quality spawning habitat in South Fork Sage Creek described under the Proposed Action would not change under this component of Alternative A.

No Panel F South Lease Modification

Under the No Panel F South Lease Modification alternative, there would be no mining outside of Lease I-027512 boundaries to the south of Panel F. Intermittent drainage channel disturbance would measure 17,882 feet, and AIZ disturbance would measure 56 acres which is 3,148 fewer feet of intermittent channel disturbance and nine fewer acres of AIZ disturbance in the North Fork Deer Creek drainage than under the Proposed Action (**Table 4.8-2**). North Fork Deer Creek contains marginal spawning habitat and is currently under environmental stress

(**Sections 3.8.2** and **3.8.4**), thus fewer disturbances in this drainage are not likely to change marginal value of this habitat for cutthroat trout and other native fishes.

Mining Alternative B – No External Seleniferous Overburden Fills
Alternative B would disturb the same amount of intermittent drainage channel (21,030 feet), perennial stream channel (475 feet), and AIZs (65.4 acres) as the Proposed Action (**Table 4.8-2**); impacts to aquatic resources would thus be the same.

Mining Alternative C – No External Overburden Fills at All
Alternative C would disturb the same amount of intermittent drainage channel (21,030 feet), perennial stream channel (475 feet), and AIZs (65.4 acres) as the Proposed Action (**Table 4.8-2**); impacts to aquatic resources would thus be the same.

Mining Alternative D – Infiltration Barriers on Overburden Fills
Alternative D would disturb 22,919 feet of intermittent drainage channel and 71.2 acres of AIZ (1,889 additional feet of intermittent stream channel and 5.8 additional acres of AIZ than under the Proposed Action; **Table 4.8-2**). The Panel F and Panel G Dinwoody borrow pits (areas to be disturbed) associated with Alternative D are located alongside the Panel F and G pit footprints (see **Figure 2.6-6**). The additional disturbances near Panel F would not occur near any perennial stream channels. Additional disturbances near Panel G that would occur near the South Fork Deer Creek, which contains low-quality spawning habitat, are unlikely to affect aquatic resources in this drainage. Changes in impacts to native fishes due to the implementation of a thicker chert cap under Alternative D are described below ("Selenium Issues with Fish").

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Roads
Alternative E would disturb 18,311 feet of intermittent drainage channel and 60.9 acres of AIZ, similar to the Proposed Action direct power line, which is unlikely to disturb more than three acres of non-aquatic habitat (due to pole installation by helicopter). Since installation of the direct power line under the Proposed Action is unlikely to impact aquatic habitat (**Section 4.8.1.1**), Alternative E would not lessen effects to cutthroat trout or other native fishes.

Mining Alternative F – Electrical Generators at Panel G
Like Alternative E, Alternative F would disturb 18,311 feet of intermittent drainage channel and 60.9 acres of AIZ. Since installation of the direct power line under the Proposed Action is unlikely to impact aquatic habitat (**Section 4.8.1.1**), Alternative F would not lessen effects to cutthroat trout or other native fishes.

<u>Selenium Issues with Fish</u>
The risks of selenium uptake by native fishes depend on the effectiveness of selenium control measures. According to groundwater modeling (**Section 4.3.1**), Alternative D would lower selenium concentrations such that they would be just below the IDEQ cold water aquatic criterion for selenium (0.005 mg/L) at the mouth of Deer Creek, the mouth of South Fork Sage Creek, and Crow Creek downstream of Sage Creek during the summer/fall baseline period. Fewer increases in selenium concentration in Study Area streams would lessen the risk of selenium accumulation in native fishes that could lead to adverse reproductive effects. Differences between all other Mining Alternatives (A-C, E, and F) and the Proposed Action are negligible in terms of selenium risks to cutthroat trout and other native fishes. Runoff selenium control measures would be implemented under any Mining Alternative as described under the Proposed Action.

4.8.1.3 Transportation Alternatives

Relative to Proposed Action haul/access roads, the transportation alternatives would result in additional disturbances within intermittent stream channels, reductions in disturbances within perennial stream channels, and reductions in disturbances within AIZs in the Study Area (**Table 4.8-3**).

TABLE 4.8-3 FEET OF STREAM CHANNEL (INTERMITTENT AND PERENNIAL) DIRECTLY DISTURBED, ACRES OF AIZS DISTURBED, AND PREDICTED CHANGES IN SEDIMENTATION UNDER THE TRANSPORTATION ALTERNATIVES RELATIVE TO THE PROPOSED ACTION

	INTERMITTENT (FT)	PERENNIAL (FT)	AIZ (ACRES)	SEDIMENTATION* (TONS PER YR)
Panel F Haul/Access Road	**230**	**0**	**0.7**	**0.5**
Alternative 1	+442	0	+1.0	+0.2
Panel G West Haul/Access	**450**	**475**	**14.9**	**8.5**
Alternative 2	+2,234	-185	-10.2	-4.0
Alternative 3	+2,401	-200	-4.8	-3.4
Alternative 4	+3,163	-475	-5.7	-0.7
Alternative 5	+212	0	+0.5	+2.2
Alternative 6	+1,232	-475	-8.7	-8.1
Alternative 7	+433	+1,611	-3.9	-7.5
Alternative 8	+2,252	-475	-5.2	-6.4

(+) indicates an increase over the Proposed Action, (-) indicates a decrease; 0 indicates no change
*See **Section 4.3.2** and **Appendix 4A** for complete data

As a result, most transportation alternatives, when compared to the Proposed Action, would reduce the risk of direct and indirect impacts to cutthroat trout and other native fishes. Most transportation alternatives would also decrease the risk of sedimentation into Study Area streams relative to the Proposed Action haul roads. Relative to the total amount of aquatic habitat in the Study Area, all transportation alternatives would impact the amount of intermittent stream channels, perennial stream channels, and AIZs by 1 percent or less. Changes to effects and impact determinations among transportation alternatives relative to the Proposed Action haul roads are described below.

Transportation Alternative 1 – Alternate Panel F Haul/Access Road
Alternative 1 would disturb 672 feet of intermittent drainage channel and 1.7 acres of AIZs (442 additional feet of intermittent stream channel disturbance and one additional acre of AIZ disturbance in the South Fork Sage Creek drainage than the Proposed Action; **Table 4.8-3**). A culvert would be installed within South Fork Sage Creek at the same location as the Proposed Action Panel F Haul/Access Road, and no direct impacts to perennial stream channels would occur. Predicted additional sedimentation into Sage Creek under Alternative 1 would be 0.2 tons per year more than under the Proposed Action (**Table 4.8-3**). Direct and indirect impacts to cutthroat trout and other native fishes would be slightly reduced when compared to the Proposed Action Panel F Haul/Access Road. However, these effects would still be short-term, site-specific and negligible to minor.

Transportation Alternative 2 – East Haul/Access Road
Alternative 2 would disturb 2,684 feet of intermittent drainage channel, 290 feet of perennial stream channel, and 4.7 acres of AIZs (2,234 additional feet of intermittent channel disturbance,

185 fewer feet of perennial stream channel disturbance, and 10.2 fewer acres of AIZ disturbance relative to the Proposed Action Panel G West Haul/Access Road; **Table 4.8-3**). One 300-foot culvert would be installed in Deer Creek on private land, near the confluence with Crow Creek. Upstream reaches of Deer Creek, South Fork Deer Creek, and North Fork Deer Creek would not be disturbed by road construction under Alternative 2. Predicted additional sedimentation into areas of Deer Creek downstream of the crossing and Crow Creek and tributaries under Alternative 2 would be four tons per year less than that into Deer Creek under the Proposed Action (**Table 4.8-3**). Crow Creek appears to be under environmental stress (**Section 3.8.2**), but currently contains relatively high quality spawning habitat and is likely to be resilient to small sediment increases (<0.5 percent of baseline sediment loading rate; **Section 3.8.4**, **Appendix 4A**). Although Alternative 2 would impact substantially more (+496 percent) intermittent channel, it would also impact noticeably less perennial stream channel (-39 percent) and AIZs (-68 percent) and would reduce sedimentation by approximately 47 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be slightly reduced when compared to the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and moderate.

Transportation Alternative 3 – Modified East Haul/Access Road

Alternative 3 would disturb 2,851 feet of intermittent drainage channel, 275 feet of perennial stream channel, and 10.1 acres of AIZs (additional 2,401 feet of intermittent channel disturbance, 200 fewer feet of perennial stream channel disturbance, and 4.8 fewer acres of AIZ disturbance relative to the Proposed Action Panel G West Haul/Access Road; **Table 4.8-3**). One 390-foot culvert would be installed in Deer Creek on CNF land under Alternative 3, and upstream reaches of Deer Creek, South Fork Deer Creek, and North Fork Deer Creek would not be disturbed. Like Alternative 2, predicted additional sedimentation into Crow Creek and tributaries under Alternative 3 would be four tons per year less than that into Deer Creek under the Proposed Action (**Table 4.8-3**) and is not likely to affect spawning habitat in Crow Creek. Although Alternative 3 would impact substantially more (+533 percent) intermittent channel, it would also impact noticeably less perennial stream channel (-42 percent) and AIZs (-32 percent) and would reduce sedimentation by approximately 47 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be slightly reduced when compared to those under the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and moderate.

Transportation Alternative 4 – Middle Haul/Access Road

Alternative 4 would disturb 3,613 feet of intermittent drainage channel and 9.2 acres of AIZs (3,163 additional feet of intermittent channel disturbance and 5.7 fewer acres of AIZ disturbance than the Proposed Action Panel G West Haul/Access Road; **Table 4.8-3**). Culverts across Deer Creek (440 feet) and South Fork Deer Creek (510 feet) would be longer than those under the Proposed Action but would occur within intermittent reaches, thus no direct impacts to perennial stream channels would occur under Alternative 4 (475 fewer feet of perennial stream channel disturbance than under the Proposed Action). Predicted additional sedimentation into Deer Creek and South Fork Deer Creek would decrease by two tons per year under Alternative 4 relative to the Proposed Action (**Table 4.8-3**). The upper reach of Deer Creek that contains high quality spawning habitat would not be affected. Although Alternative 4 would impact substantially more (+703 percent) intermittent channel, it would also impact noticeably less perennial stream channel (-100 percent) and AIZs (-38 percent) and would reduce sedimentation by approximately 24 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be slightly reduced when compared to the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and moderate.

Transportation Alternative 5 – Alternate Panel G West Haul/Access Road
Alternative 5 would disturb 662 feet of intermittent drainage channel and 15.4 acres of AIZs (an additional 212 feet of intermittent stream channel and 0.5 acre of AIZs disturbance relative to the Proposed Action; **Table 4.8-3**). Culverts and perennial stream channel disturbance would be the same. Predicted sedimentation into Deer Creek and South Fork Deer Creek would increase by one ton per year under Alternative 5 relative to the Proposed Action (**Table 4.8-3**). Alternative 5 would impact more intermittent channel (47 percent) and slightly more acres of AIZs (3 percent), and would increase sedimentation by approximately 12 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be to a slightly greater degree than those under the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and moderate.

Transportation Alternative 6 – Conveyor from Panel G to Mill
Alternative 6 requires a conveyor and one-lane service road in addition to either Transportation Alternative 7 or 8. Alternative 6 alone would disturb 1,682 feet of intermittent drainage channel and 6.2 acres of AIZs (1,232 additional feet of intermittent stream channel disturbance and 8.7 fewer acres of disturbance in AIZs than the Proposed Action Panel G West Haul/Access Road; **Table 4.8-3**). No culverts would be installed across perennial streams (475 fewer feet of perennial stream channel disturbance than under the Proposed Action). Predicted additional sedimentation into Deer Creek and South Fork Deer Creek would decrease by 8.1 tons per year under Alternative 6 relative to the Proposed Action (**Table 4.8-3**). Although Alternative 6 would impact substantially more (+274 percent) intermittent channel, it would also impact noticeably less perennial stream channel (-100 percent) and AIZs (-58 percent) and would reduce sedimentation by approximately 95 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be less than those under the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and minor.

Transportation Alternative 7 – Crow Creek/Wells Canyon Access Roads
Alternative 7 would disturb 883 feet of intermittent drainage channel, 2,086 feet of perennial stream channel, and 11 acres of AIZs (433 additional feet of disturbance in intermittent channels, 1,611 additional feet of disturbance in perennial stream channels, and 3.9 fewer acres of disturbance in AIZs relative to the Proposed Action Panel G West Haul/Access Road; **Table 4.8-3**). Existing culverts along Crow Creek and Wells Canyon Road would be replaced, enlarged, and lengthened, as needed under Alternative 7. Predicted additional sedimentation into Crow Creek would be 7.5 fewer tons per year than predicted sedimentation into Deer Creek and South Fork Deer Creek under the Proposed Action. Crow Creek appears to be under environmental stress (**Section 3.8.2**), but currently contains relatively high quality spawning habitat and is likely to be resilient to small sediment increases (0.5 percent of baseline sediment loading rate; **Section 3.8.4**, **Appendix 4A**). Although Alternative 7 would impact substantially more intermittent channel (+96 percent) and perennial stream channel (+339 percent), it would also impact less AIZs (-26 percent) and would reduce sedimentation by approximately 88 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be slightly reduced when compared to those under the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and moderate.

Transportation Alternative 8 – Middle Access Road

Alternative 8 would disturb 2,702 feet of intermittent drainage channel and 9.7 acres of AIZs (2,252 additional feet of intermittent stream channel disturbance and 5.2 fewer acres of AIZ disturbance than the Proposed Action Panel G West Haul/Access Road; **Table 4.8-3**). Culverts across Deer Creek (580 feet) and South Fork Deer Creek (360 feet) would be longer than under the Proposed Action but would occur across intermittent reaches, thus no direct impacts to perennial stream channels would occur under Alternative 8 (475 fewer feet of perennial stream channel disturbance than under the Proposed Action). Predicted additional sedimentation into Deer Creek and South Fork Deer Creek under the Proposed Action would decrease by 6.4 tons per year under Alternative 8 (**Table 4.8-3**), and the upper reach of Deer Creek that contains high quality spawning habitat would not be affected. Although Alternative 8 would impact substantially more (+500 percent) intermittent channel, it would also impact noticeably less perennial stream channel (-100 percent) and AIZs (-35 percent) and would reduce sedimentation by approximately 75 percent over the Proposed Action Panel G West Haul/Access Road. Impacts to cutthroat trout and other native fishes would be slightly reduced when compared to those under the Proposed Action Panel G West/Haul Access Road. These impacts would be short-term, site-specific and moderate.

<u>Selenium Issues with Fish</u>

Differences between Transportation Alternatives and the Proposed Action are negligible in terms of the risk to cutthroat trout and other native fishes of accumulating selenium. Selenium control measures would be implemented identically under any Transportation Alternative (1-8) as under the Proposed Action.

4.8.1.4 No Action Alternative

Under the No Action Alternative, mining in Panels F and G would not be approved. Impacts to stream channels and AIZs would not occur, eliminating Project-related impacts to cutthroat trout, other native fishes, and aquatic resources discussed in **Section 4.8.1.1**. In addition, overburden containing elevated concentrations of selenium would not be excavated and further potential for bioaccumulation of selenium in streams within the Study Area would not occur. Lastly, reclamation in Panel E would not be completed, as overburden from Pit 1 in Panel F would not be generated and thus used to backfill the Panel E-0 pit.

4.8.2 Mitigation Measures

Simplot would implement a monitoring program to evaluate impacts to aquatic resources. This program would be developed cooperatively by a CTNF fisheries biologist and Simplot, and would involve aquatic habitat and population monitoring in appropriate locations upstream and downstream of roads and active mining disturbances in fish-bearing streams.

4.8.3 Unavoidable (Residual) Adverse Impacts

With the exception of Alternative D, Panel F mining would result in the IDEQ cold water aquatic criterion for selenium (0.005 mg/L) being exceeded during the summer/fall baseline period in reaches of South Fork Sage Creek, Sage Creek, and Crow Creek downstream of Sage Creek. Panel G mining would result in the aquatic criterion for selenium being exceeded during the summer/fall/winter baseline period in lower Deer Creek, but once Deer Creek flows are mixed with Crow Creek flows, Crow Creek would not exceed the criterion. Impacts related to selenium accumulation would be unavoidable.

4.8.4 Relationship of Short-Term Uses and Long-Term Productivity

The Proposed Action and Alternatives would implement ground-disturbing activities that would produce short- and long-term effects to cutthroat trout and other native fishes. Specifically, long-term productivity effects related to cutthroat trout and other native fishes may be sacrificed through the bioaccumulation of selenium in Project Area streams (and eventually, the potential loss of reproductive function in resident fish).

4.8.5 Irreversible and Irretrievable Commitments of Resources

Because roads would be reclaimed and culverts would be removed from perennial and intermittent stream channels after completion of the Project, and since AIZ vegetation along perennial and intermittent stream channels would be restored over the short-term, there would be no irreversible and irretrievable commitments of aquatic resources under the Proposed Action or any Alternatives.

4.9 Grazing Management

Issue:
The Project may impact permitted livestock grazing within and adjacent to the Project Area.

Indicators:
Acres of suitable grazing foraging areas to be disturbed and the length of time livestock would be excluded from the mining areas, and comparison with undisturbed acres of grazing allotments in the Project Area;

Effects of relocation of grazing from directly impacted allotments to alternate allotments during active mining and reclamation;

Description of grazing allotment improvements and structures that would be disturbed;

Estimated concentrations of contaminants of concern in grazing water sources;

Change in suitable grazing acreage caused by increased COPCs in reclamation vegetation.

4.9.1 Direct and Indirect Impacts

4.9.1.1 Proposed Action

Where mining and associated disturbances are proposed on land that is currently considered suitable for livestock grazing, the land would be unsuitable for grazing during the time period associated with mining and reclamation. The RFP (USFS 2003a) requires that operations replace any surface water sources that are lost due to their mining activities. Implemented selenium management strategies are expected to control selenium releases to vegetation. For these reasons, the predicted loss of suitable acres for grazing would be confined to the disturbed area footprints. Once disturbed areas associated with mining have been reclaimed and their rangeland capability restored (as determined by the CNF via restoration criteria), they would again be suitable for livestock grazing.

Section 3.9 of this EIS describes how grazing suitability is determined by the CNF and how suitability determinations are then used in grazing management as one of several components in determining whether, when, and how a given area is grazed. Suitability in the following discussion is used as an indicator of potential impact and a means to contrast alternatives. The actual or projected level of suitability does not imply that the CNF is bound to any level, or type, of grazing on lands discussed in this EIS.

Table 4.9-1 shows the loss of suitable rangeland by allotment for components of the Proposed Action. The RFP (USFS 2003a) recognizes that the suitability of a given area can change over time and/or with management decisions based on multiple land uses that include mining, thus a reduction in suitable acres for grazing due to mining activities would not be in direct conflict with the RFP.

Over an approximately 16-year period, the Proposed Action would remove 1,340 acres of vegetation within grazing allotments (**Table 4.5-1**). Reclamation in Panel F and in Panel G, beginning with the planting of native bunch grasses and forbs (**Table 2.4-4**), would begin a few years following initial disturbance in specific areas. Reclamation would occur as described in **Section 2.3.7.** Reclaimed areas containing established native bunch grasses and forbs and meeting rangeland capability criteria (e.g., >60 percent ground cover, >200 lbs of forage per acre; Maxim 2004g) would be suitable for grazing. The exact composition of vegetation communities after reclamation would not resemble their original state as they follow a unique succession process. Grasses would be over-represented initially, and as a result, relatively more fodder may be available for livestock grazing after reclamation than before mining. Because of the cap on reclaimed overburden disposal areas and how reclamation treatments are implemented, elevated selenium levels in forage on reclaimed sites are not anticipated.

All vegetation would be removed from acreage on grazing allotments disturbed by the Proposed Action, and these areas would be temporarily unsuitable for grazing. A variety of grazing management options are available to the USFS to respond to decreased grazing areas on affected allotments caused by mining. The feasibility of relocating animals to alternate (i.e., unused or shared) allotments during mining to compensate for lost acreage would be determined on a case-by-case basis once the final decision on a preferred alternative is made. Other options include reducing stocking rates on affected allotments for the duration of the mining and reclamation or temporarily closing affected allotments. The indirect impact to grazing resources from the temporary loss of acreage within allotments would be both long-term (i.e., in forest, mixed forest/brush, and shrub communities, which take longer to regenerate) and short-term (i.e., for grasses and forbs), site-specific, and major. In addition, the trailing corridor along Rock Creek to Manning Creek (to access the Manning Creek and Deer Creek Allotments from the south) would be impassable for the duration of the Proposed Action.

TABLE 4.9-1 REDUCTION IN SUITABLE ACRES DUE TO MINING AND ALTERNATIVES

PROPOSED ACTION AND ALTERNATIVES	ALLOTMENT	DISTURBED AREA (ACRES) IN ALLOTMENT	SUITABLE ACRES	
			CATTLE	SHEEP
PA Panel F Pit	148 Manning Crk S&G*	337.29	228.71	267.02
PA Panel F North mod Pit	148 Manning Crk S&G	1.87	0.65	1.78
PA Panel F South mod Pit	148 Manning Crk S&G	137.81	69.36	93.01
PA Panel F O/B Fill	148 Manning Crk S&G	38.44	7.88	17.41
PA Panel F Haul Road	148 Manning Crk S&G	46.47	11.88	25.97
	136 Sage Valley C&H	20.05	11.22	11.22
PA Panel G Pit	144 Green Mtn S&G	257.51	51.74	62.79
	165 Wells Can S&G*	83.35	49.62	51.33
PA Panel G South O/B Fill	144 Green Mtn S&G	34.66	31.80	31.80
	165 Wells Can S&G	38.89	34.01	38.85
PA Panel G East O/B Fill	153 Deer Crk S&G*	53.37	32.43	32.43
	144 Green Mtn S&G	10.14	8.83	10.14
	165 Wells Can S&G	35.31	33.56	33.57
PA Panel G W Haul Road	144 Green Mtn S&G*	35.29	10.56	19.46
	146 Manning Crk S&G*	182.02	52.29	92.83
Alt. D Infiltration Barrier	144 Green Mtn S&G	23.50	21.71	21.84
	148 Manning Crk S&G	103.74	46.37	101.02
	165 Wells Can S&G	9.05	9.05	9.05
PA Power line between Panels F & G	153 Deer Crk S&G	4.38	2.59	4.39
	144 Green Mtn S&G	3.11	1.88	2.33
	148 Manning Crk S&G	18.11	13.94	19.72
	139 Sage Crk C&H	1.84	0.04	0.04
	136 Sage Valley C&H	0.36	0.00	0.00
Alt 1 Mod. Panel F Haul Road	148 Manning Crk S&G	29.77	13.44	28.89
	136 Sage Valley C&H	16.07	7.20	7.20
Alt 2 East Haul Road	153 Deer Crk S&G*	59.34	15.87	39.67
	148 Manning Crk S&G*	43.07	69.07	70.43
	136 Sage Valley C&H*	10.66	12.21	12.21
	165 Wells Can S&G	10.39	14.06	24.29
Alt 3 Mod. East Haul Road	153 Deer Crk S&G*	87.03	27.37	53.38
	148 Manning Crk S&G*	104.08	70.03	76.86
	136 Sage Valley C&H*	12.24	12.21	12.21
	165 Wells Can S&G	25.68	14.06	24.29
Alt 4 Middle Haul Road	153 Deer Crk S&G	65.56	19.44	49.06
	144 Green Mtn S&G	1.73	0.00	0.00
	148 Manning Crk S&G	124.67	23.03	48.47
Alt 5 Alternate West Haul Road	153 Deer Crk S&G	0.01	0.01	0.01
	144 Green Mtn S&G*	35.29	10.56	19.46
	148 Manning Crk S&G*	190.80	56.38	100.91
Alt 6 Conveyor	153 Deer Crk S&G	3.20	1.23	2.86
	144 Green Mtn S&G	13.15	2.50	2.50
	148 Manning Crk S&G	41.86	28.17	37.37
	139 Sage Crk S&G	2.02	0.18	0.18
	136 Sage Valley C&H	1.00	0.00	0.00
Alt 7 Crow Ck. Access Road	153 Deer Crk S&G	0.85	0.85	0.85
	152 Lower Crow Crk	1.62	1.55	1.62
	136 Sage Valley C&H	10.34	8.38	10.34
Alt 7 Wells Canyon Access Road	165 Wells Canyon S&G	24.53	3.51	18.65
Alt 8 Middle Access Road	153 Deer Crk S&G	37.93	12.42	29.89
	144 Green Mtn S&G	4.31	3.08	3.08
	148 Manning Crk S&G	56.42	16.63	33.31

* Disturbed and suitable acreage includes soil stockpile areas.

Panel F, including lease modifications

Mining Panel F would result in the removal of 515 acres within the Manning Creek Allotment (**Table 4.9-1**), which represents a five percent reduction in total acreage of the allotment.

Two range improvements in the Manning Creek Allotment (Nos. 344SC9 and 344SA9) are located within the Panel F mine area and would be eliminated by mining activities. These improvements are associated with Panther Spring and Little Basin Spring, respectively, to which the USFS has stock watering rights (Nos. 4054 and 4053), and consist of headboxes and troughs. Both the physical structures of these improvements and the water sources (springs) associated with them (**Section 4.3.1**) would be eliminated. In addition, five other springs (SP-UTSFSC-200, SP-UTNFDC-400, SP-UTNFDC-600, SP-UTNFDC-530, and SP-UTNFDC-540) may be affected by the mining of Panel F either through physical disruption or by potentially reduced up-gradient recharge (**Section 4.3.1**), although no range improvements or water rights are associated with these springs.

The water quality of other springs (SP-SFSC-750 and SP-UTSC-850) may be affected by seepage through overburden with elevated selenium concentrations. Stream reaches along lower South Fork Sage Creek, lower Sage Creek, and Crow Creek are also estimated to have elevated selenium concentrations due to the Proposed Action (**Table 4.3-15**) and are associated with water rights for stock grazing as are the two springs. The estimated concentrations of these streams do not exceed the IDEQ veterinary advisory level (0.05 mg/L), which applies to livestock. If any water sources become either temporarily or permanently unavailable for stock watering, the RFP requires Simplot to supply alternate water sources in sufficient quantity, quality, and location for continued use (USFS 2003a).

Mining Panel F also includes backfilling 29 acres of the existing Pit E-0 of Panel E. This pit area is encompassed in the boundaries of the Sage Creek Allotment, but is not counted within its suitable acres because of its status as an active mining area. Once this backfill is fully reclaimed, it may again become suitable for grazing. A 38-acre portion of Panel F would not be backfilled or reclaimed and would not be suitable for grazing in the future. Specifically, two remaining hanging walls would be left exposed. A portion of the footwall would also remain exposed. Although natural vegetation could establish on benched areas of the highwalls, it is unlikely that grazing could take place in these areas.

Impacts to livestock in the Manning Creek Allotment from the mining of Panel F would be site-specific, short- to long-term, and major (see page 4-1 for definitions).

Panel F Haul/Access Road

Constructing the Proposed Action Panel F Haul/Access Road would result in the removal of 67 acres within the Manning Creek and Sage Valley Allotments (**Table 4.9-1**), which represents one and four percent reductions in total acreage in each allotment area, respectively. No range improvements or water rights would be affected by construction of the Panel F Haul/Access Road. Livestock movements within the two allotments would be hindered by the road disturbance, but the road would not be fenced and livestock would be able to cross the road in many locations. Specifically, small areas within each allotment may become contained between the road footprint and disturbance associated with Panel F. If collisions with livestock occur on the Panel F Haul/Access Road due to mine traffic, and Simplot is responsible, they would pay fair market value for any livestock lost.

Impacts to livestock in the Manning Creek and Sage Valley Allotments from the construction and use of the Panel F Haul/Access Road would be site-specific, short- to long-term, and minor to major, depending on the capability of livestock to cross the haul road.

Panel G

Mining Panel G would result in the removal of approximately 460 acres within the Green Mountain and Wells Canyon Allotments (**Table 4.9-1**), which represents five and three percent reductions in total acreage in each allotment, respectively.

One range improvement (337A9) in the Wells Canyon Allotment is immediately downstream of the proposed Panel G South Overburden fill. This improvement consists of a headbox and troughs that are associated with a water right (No. 10505) held by the USFS for stock watering on a spring designated by Maxim as SP-WC-400. The spring itself would not be lost (**Section 4.3.1**), but its water quality may be affected by selenium due to the proposed Panel G South Overburden Fill. The Wells Canyon Allotment is currently vacant.

Four other springs in the Panel G area (SP-UTDC-700, SP-UTDC-800, SP-UTSFDC-500, and SP-UTWC-300) would be affected by the mining of Panel G either through physical disruption or by potentially reduced up-gradient recharge (**Section 4.3.1**), but there are no range improvements or water rights associated with these springs.

Water quality at Books Spring may be affected by seepage with elevated selenium concentrations and has a water right for stock watering. Stream reaches along lower Deer Creek and Crow Creek are predicted by groundwater modeling to have increased selenium concentrations after mining (**Section 4.3**) and are also associated with water rights for stock watering. The predicted selenium concentrations of Books Spring and these streams are well below the IDEQ veterinary advisory level (0.05 mg/L). If any water sources become either temporarily or permanently unavailable for stock watering, the RFP requires Simplot to supply alternate water sources in sufficient quantity, quality, and location for continued use (USFS 2003a).

An eight-acre portion of Panel G would not be backfilled or reclaimed and would not be suitable for grazing in the future. One remaining highwall, 2,600 feet long with a maximum height of 250 feet, would be left exposed. Although natural vegetation could establish on benched areas of the highwall, it is unlikely that grazing could take place there.

Impacts to livestock in the Green Mountain and Wells Canyon Allotments from the mining of Panel G would be site-specific, short- to long-term, and major.

Panel G West Haul/Access Road

Constructing the Panel G West Haul/Access Road would result in the removal of 217 acres within the Manning Creek and Green Mountain Allotments (**Table 4.9-1**), which represents three and one percent reductions in total acreage for each allotment area, respectively. No range improvements or water rights would be affected by the Panel G West Haul/Access Road. Livestock movements within the Manning Creek Allotment would be hindered by the road disturbance, but the road would not be fenced and livestock would be able to cross the road in many locations. If collisions with livestock occur on the Panel G West Haul/Access Road due to mine traffic, and Simplot is responsible, they would pay fair market value for any livestock lost.

Impacts to livestock in the Manning Creek and Green Mountain Allotments from the construction of the Panel G West Haul/Access Road would be site-specific, short- to long-term, and minor to major, depending on the capability of livestock to cross the haul road.

Power Line Between Panels F & G

Constructing the power line would result in the disturbance of approximately 28 acres of vegetation within the Manning Creek, Deer Creek, Sage Creek, Sage Valley, and Green Mountain Allotments (**Table 4.9-1**). Actual ground surface disturbance from the installation of the power line would be approximately three acres. The power line would not impact any range improvements or water rights.

Impacts to livestock in the Manning Creek, Deer Creek, Sage Creek, Sage Valley, and Green Mountain Allotments from the construction of the power line between Panels F and G would be site-specific, short-term, and negligible.

4.9.1.2 Mining Alternatives

Table 4.9-2 summarizes the Proposed Action and Mining Alternatives A-F with regard to acres disturbed within grazing allotments in the Study Area.

TABLE 4.9-2 DISTURBED AREA WITHIN GRAZING ALLOTMENTS BY THE MINING ALTERNATIVES AND PROPOSED ACTION (ACRES)

	148 MANNING CREEK	136 SAGE VALLEY	144 GREEN MTN.	165 WELLS CANYON	153 DEER CREEK	139 SAGE CREEK	TOTAL ALLOTMENT DISTURBANCE
Proposed Action	762	20.4	341	158	57.8	2	1,340
Alternative A – No North Lease	760	20.4	341	158	57.8	2	1,338
Alternative A – No South Lease	624	20.4	341	158	57.8	2	1,202
Alternative B	762	20.4	341	158	57.8	2	1,340
Alternative C	762	20.4	341	158	57.8	2	1,340
Alternative D	866	20.4	364	167	57.8	2	1,477
Alternative E	744	20	338	169	53.4	2	1,312
Alternative F	744	20	338	169	53.4	2	1,312

Mining Alternative A – No South and/or North Panel F Lease Modifications

Impacts to grazing resources would be reduced if Alternative A were adopted. In addition, the remaining hanging wall would be reduced from 4,800 feet (under the Proposed Action) to 2,400 feet long under Alternative A, and relocated from Pit Four (Proposed Action) to between Pits One and Two (Alternative A). The entire bottom of the Panel F open pit would be reclaimed under this alternative leaving a nine-acre highwall instead of the 38-acre open pit of the Proposed Action. Not mining either North or South Lease Modifications would shorten the mine life of Panel F by 2.3 years.

No Panel F North Lease Modification

If the North Lease Modification were not approved, approximately two acres of suitable grazing area in the Manning Creek Allotment would not be disturbed (**Tables 4.9-1, 4.9-2**). If Transportation Alternative 1 were also selected in conjunction, there would be 21 acres less disturbance of suitable grazing area than the Proposed Action Panel F Haul/Access Road (see **Table 4.9-3**). Impacts to range improvements and stock watering issues would be the same as under the Proposed Action.

No Panel F South Lease Modification

If the South Lease Modification were not approved, 138 acres of land within the Manning Creek Allotment would not be disturbed (**Table 4.9-1, 4.9-2**). This represents approximately two percent of the suitable grazing acreage within this allotment. Impacts to range improvements and stock watering would the same as under the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills

Under Alternative B, there would be the same initial impacts to suitable acres for grazing, range improvements, and stock watering as under the Proposed Action. The 8-acre highwall remaining in Panel G under the Proposed Action would be eliminated in this alternative. Relative to the Proposed Action, an additional 6.5 months of mine and reclamation activity would be necessary before grazing suitability could be established.

Mining Alternative C – No External Overburden Fills at All

Under Alternative C, there would be the same initial impacts to suitable acres for grazing, range improvements, and stock watering as under the Proposed Action. The 8-acre highwall in Panel G and the 38-acre open pit in Panel F proposed to remain under the Proposed Action would be fully reclaimed under this alternative. Relative to the Proposed Action, an additional 12.5 months of mine and reclamation activity would be necessary before grazing suitability could be established.

Mining Alternative D – Infiltration Barriers on Overburden Fills

Mining Alternative D would result in the additional removal of 137 acres within the Manning Creek, Green Mountain, and Wells Canyon Allotments (**Tables 4.9-1, 4.9-2**). Impacts to range improvements would be the same under Alternative D as under the Proposed Action. Selenium contamination in several water sources would be lower under this alternative, and the exceedances of surface water aquatic criterion from mining Panels F and G would be eliminated.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

Relative to the Proposed Action, Alternative E would disturb approximately 28 fewer acres of land within the Manning Creek, Green Mountain, Deer Creek, Sage Valley, and Sage Creek Allotments (**Tables 4.9-1, 4.9-2**). Impacts to range improvements would be the same under Alternative E as under the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G

Relative to the Proposed Action, Alternative F would disturb approximately 28 fewer acres of land within the Manning Creek, Green Mountain, Deer Creek, Sage Valley, and Sage Creek Allotments (**Tables 4.9-1, 4.9-2**). Impacts to range improvements would be the same under Alternative F as under the Proposed Action.

4.9.1.3 Transportation Alternatives

Each of the transportation alternatives has its own set of potential effects to grazing due to physical ground disturbance, hindering of livestock movement within the allotments, and reductions or removal of existing water sources. The haul/access roads would not be fenced, and livestock would be able to cross the roads in many locations. With the exception of Alternative 6, the impacts of the transportation alternatives on grazing are generally short-term, site-specific, and minor to moderate.

Table 4.9-3 summarizes the differences between the Proposed Action and Transportation Alternatives 1-8 in terms of acres disturbed within the six grazing allotments that intersect the Study Area.

TABLE 4.9-3 DISTURBED AREA WITHIN GRAZING ALLOTMENTS BY THE TRANSPORTATION ALTERNATIVES AND THE PROPOSED ACTION HAUL/ACCESS ROADS (ACRES)

	148 MANNING CREEK	136 SAGE VALLEY	144 GREEN MTN.	165 WELLS CYN	153 DEER CREEK	139 SAGE CREEK	152 CROW CREEK	TOTAL ALLOTMENT DISTURBANCE
PA Panel F Haul/Access Rd	46.5	20.1	0	0	0	0	0	66.5
Alternative 1	29.8	16.1	0	0	0	0	0	46
PA Panel G West Haul/Access Rd	182	0.00	35.3	0	0	0	0	217.3
Alternative 2	43.1	10.7	0	10.4	59.3	0	0	123.5
Alternative 3	104.1	12.2	0	25.6	87	0	0	229
Alternative 4	124.7	0	1.7	0	65.6	0	0	192
Alternative 5	190.8	0	35.3	0	0	0	0	226.1
Alternative 6	41.9	1	13.2	0	3.2	20	0	61.2
Alternative 7	0	10.3	0	24.5	0.9	0	1.6	37.3
Alternative 8	56.4	0	4.3	0	37.9	0	0	98.7

Alternative 1 – Alternate Panel F Haul/Access Road

Relative to the Proposed Action Panel F Haul/Access Road, Alternative 1 would disturb 21 fewer acres of land within the Manning Creek and Sage Valley Allotments (**Tables 4.9-1, 4.9-3**). Like the Proposed Action Panel F Haul/Access Road, livestock movements within these allotments would be hindered by the road disturbance such that acreage on the north and/or west side of the road may become contained between the road footprint and disturbance associated with Panel F. The risk of collisions on haul roads would be the same as under the Proposed Action Panel F Haul/Access Road. Likewise, Alternative 1 would not impact any range improvements or stock watering sources.

Alternative 2 – East Haul/Access Road

The East Haul/Access Road has approximately the same area of total disturbance as the Proposed Action Panel G West Haul/Access Road, but almost two miles of it are located on private and State lands, which do not contain federal grazing allotments. Relative to the Proposed Action Panel G West Haul/Access Road, Alternative 2 would disturb 94 fewer acres of federal grazing areas, mainly within the Manning Creek and Deer Creek Allotments (**Tables 4.9-1, 4.9-3**). Grazing would also be impacted on the private and State land disturbed by this alternative where grazing currently exists. Under Alternative 2, no disturbance would occur in the Green Mountain Allotment, and 141 fewer acres would be disturbed within the Manning Creek Allotment relative to the Proposed Action.

Two stock ponds (344RB9 and 318RF9) in the Manning Creek Allotment and one in the Deer Creek Allotment (335RA9) are in close proximity to the footprint of Alternative 2, but would not be affected by road construction. There would be no impacts to the small ephemeral tributaries that are associated with these three ponds and the associated surface water rights 7139, 10638, and 4049. Water rights 24-10657 and 24-7160, located on State land but held by the USFS, may be affected by road construction. Both rights are held on a single stock pond source that collects runoff but originally intercepted spring discharge. The USFS has requested that the State Engineer drop the right associated with the 24-7160 license number, but it will keep the decreed right under 24-10657 (USFS 2004d).

Livestock movements would be hindered within the Deer Creek Allotment and on the Manning Creek Allotment east of mine disturbance by the haul/access road. More water sources are located east of mine disturbance, thus the location of Alternative 2 is likely to have a greater impact in this regard than the Proposed Action. The risk of collisions on this haul road would be greater than on the Proposed Action Panel G West Haul/Access Road if livestock are required to cross the road relatively frequently to access water sources.

Alternative 3 – Modified East Haul/Access Road

Alternative 3 is purposely designed to avoid private land, but more than a mile of this alternative would be located on State land. This alternative is 0.6 mile longer and would disturb an additional 59 more acres than the Proposed Action Panel G West Haul/Access Road. Relative to the Proposed Action Panel G West Haul/Access Road, Alternative 3 would disturb 12 more acres of federal grazing areas, mainly within the Manning Creek, Deer Creek, and Wells Canyon Allotments (**Tables 4.9-1, 4.9-3**). Impacts to the State land grazing resources would also occur under this alternative. Under Alternative 3, no disturbance would occur in the Green Mountain Allotment, and 77 fewer acres would be disturbed within the Manning Creek Allotment relative to the Proposed Action Panel G West Haul/Access Road.

As under Alternative 2, two stock ponds (344RB9 and 318RF9) in the Manning Creek Allotment and one in the Deer Creek Allotment (335RA9) are adjacent to the footprint of Alternative 3, but would not be affected by road construction. Livestock access to these water sources may be hindered if livestock are unable to cross the haul road on a regular basis. The water rights located on State land, which may be impacted by road construction under Alternative 2, would not be impacted under Alternative 3.

Livestock movements would be hindered within the Deer Creek Allotment and on the Manning Creek Allotment east of mine disturbance by the haul/access road. As under Alternative 2, more water sources are located east of mine disturbance, thus the location of Alternative 3 is likely to have a greater impact in this regard than the Proposed Action. The risk of collisions on this haul road would be similar to Alternative 2.

Alternative 4 – Middle Haul/Access Road

Relative to the Proposed Action Panel G West Haul/Access Road, Alternative 4 would disturb 25 fewer acres of federal grazing area, mainly within the Manning Creek and Deer Creek Allotments (**Tables 4.9-1, 4.9-3**). Under Alternative 4, less than two acres of disturbance would occur in the Green Mountain Allotment, and 57 fewer acres would be disturbed within the Manning Creek Allotment relative to the Proposed Action Panel G West Haul/Access Road.

There are no range improvements or stock watering rights that would be affected by this road. One spring, not associated with a stock watering right (SP-NFDC-50), occurs beneath the road footprint.

Under Alternative 4, livestock movements would be less hindered within the Manning Creek Allotment than under the Proposed Action because less area would become contained between this haul road and Panel F mine disturbance. Movements within the Deer Creek Allotment would be affected to a larger extent than the Proposed Action because the west part of this allotment would be bisected by the haul road. The haul road under Alternative 4 also crosses several water sources, and access to these areas would be hindered if livestock were not able to cross the road on a regular basis. The risk of collisions with livestock on this haul road is likely to be greater than under the Proposed Action Panel G West Haul/Access Road because of the necessity of regular access to water across the haul road.

Alternative 5 – Alternate Panel G West Haul/Access Road

Relative to the Proposed Action Panel G West Haul/Access Road, Alternative 5 would disturb approximately nine more acres of federal grazing areas (**Tables 4.9-1, 4.9-3**). There are no range improvements or stockwatering rights that would be affected by this road.

Impacts to livestock in the affected allotments from the construction of this alternative would be site-specific, short- to long-term, and major.

Alternative 6 – Conveyor from Panel G to Mill

The Panel G Conveyor Alternative (Transportation Alternative 6) requires a one-lane service road and either Transportation Alternative 7 or 8 to provide employee and vendor access to Panel G.

Relative to the Proposed Action Panel G West Haul/Access Road, Alternative 6 would disturb 156 fewer acres of federal grazing area, mainly within the Manning Creek, Deer Creek, and Green Mountain Allotments (**Tables 4.9-1, 4.9-3**). Under Alternative 6, no disturbance would occur in the Wells Canyon Allotment, and 140 fewer acres would be disturbed within the Manning Creek Allotment relative to the Proposed Action Panel G West Haul/Access Road.

No range improvements or stock watering sources would be directly affected by Alternative 6. Fewer acres would be disturbed within the Deer Creek Allotment under Alternative 6 than under the Proposed Action. Livestock movement within this and the Manning Creek Allotment would be restricted to a few crossing points (where the conveyor crosses Deer Creek and South Fork Sage Creek) under the conveyor that contain suitable clearance. Other than these locations, and any others where sufficient clearance is available under the conveyor, livestock would be blocked from crossing under the conveyor along its entire length from Panel G to the Smoky Canyon mill. This would be a major, short-term, site-specific impact to grazing in these allotments.

Alternative 7 – Crow Creek/Wells Canyon Access Road

Relative to the Proposed Action Panel G West Haul/Access Road, this alternative would disturb 180 fewer acres of federal grazing area, mainly within the Wells Canyon and Sage Valley Allotments (**Tables 4.9-1, 4.9-3**). Under Alternative 7 no disturbance would occur in the Green Mountain or Manning Creek Allotments. The majority of grazing resources impacts would occur on private land.

No public range improvements would be affected by Alternative 7. Due to widening of Crow Creek and Wells Canyon Roads, livestock movements may be hindered slightly more than if these roads were not improved. Livestock are currently controlled from crossing much of the existing Crow Creek road because of existing right-of-way fences and cattle guards along the road. This is also expected to be the case for Alternative 7, although the fences and cattle guards would have to be relocated. Fences and cattle guards may also be installed as necessary to protect traffic on the new Wells Canyon road under this alternative.

Alternative 8 – Middle Access Road

Under Alternative 8, less than five acres of disturbance would occur in the Green Mountain Allotment, and 126 fewer acres would be disturbed within the Manning Creek Allotment relative to the Proposed Action Panel G West Haul/Access Road (**Tables 4.9-1, 4.9-3**). Alternative 8 would disturb almost 38 acres in the Deer Creek Allotment as opposed to zero acres under the Proposed Action Panel G West Haul/Access Road.

There are no range improvements or stockwatering rights that would be affected by this road. Two springs not associated with stock watering rights (SP-NFDS-50 and SP-DC-350) occur beneath the road footprint.

Like Alternative 4, livestock movements would be less hindered within the Manning Creek Allotment than under the Proposed Action Panel G West Haul/Access Road because less area would become contained between this haul road and Panel F mine disturbance. Likewise, movements within the Deer Creek Allotment would be affected to a larger extent than the Proposed Action because the allotment would be bisected by the haul road. The access road under Alternative 8 crosses several water sources, and access to these areas would be hindered if livestock were not able to cross the road on a regular basis. The risk of collisions with livestock on this haul road is likely to be greater than under the Proposed Action Panel G West Haul/Access Road (similar to Alternative 4) because of the necessity of regular access to water.

4.9.1.4 No Action Alternative

Under the No Action Alternative, disturbance of vegetation within grazing allotments would not occur, thus eliminating the effects to grazing resources discussed above. Reclamation in Panel E would not be completed, as overburden from Pit 1 in Panel F would not be generated and thus used to backfill the Panel E-0 pit. As a result, this area would not be available for grazing in the future.

4.9.2 Mitigation Measures

Water Sources - In the case of springs that are currently used as water sources for grazing livestock, Simplot would establish mitigation protocols satisfactory to the CNF on a case-by-case basis. These protocols may involve hauling or pumping water from outside sources until construction of new stock ponds or improvements of nearby springs can be made.

Trailing - Where haul roads cross existing Forest Trails used for driving livestock, trails up and over any road fills or cuts would be constructed by Simplot to allow safe passage for livestock at these locations across the haul road. In the case of the conveyor, sufficient ground clearance would be constructed where the conveyor crosses designated Forest Trails that would allow locations for livestock passage. If Transportation Alternative 6 (the conveyor) were selected, the CNF may require that additional crossings be provided with sufficient clearance for livestock passage under the conveyor.

Livestock would be prevented from grazing on reclaimed mine disturbances until these areas are accepted for grazing management by the CNF.

4.9.3 Unavoidable (Residual) Adverse Impacts

Unreclaimed areas would constitute an unavoidable adverse impact to grazing resources. When vegetation encroaches naturally into unreclaimed areas, it is likely that some colonizing species would be noxious weeds. Soils would be exposed until vegetation spreads naturally to these areas, creating a longer window of opportunity and space for noxious weed seeds to invade and establish relative to sites that are reclaimed. Noxious weed invasions would adversely impact the quality of reclaimed sites for grazing.

4.9.4 Relationship of Short-Term Uses and Long-Term Productivity

The Proposed Action and Alternatives would implement ground-disturbing activities that would produce short- and long-term effects to grazing resources while providing the short-term benefits of phosphate resources and productive employment.

4.9.5 Irreversible and Irretrievable Commitments of Resources

The Proposed Action and Alternatives would result in the removal of currently undisturbed vegetation within grazing allotments. Portions of Panel F and G would not be backfilled, leaving parts of pit footwalls and hanging walls exposed. Portions of haul roads would also not be reclaimed under the Proposed Action due to steepness of cut slopes. The footprints of these walls and unreclaimed areas of haul roads would represent irretrievable losses of vegetation within grazing allotments, and these areas would not be available for grazing in the future.

4.10 Recreation and Land Use

Issue:
Recreational use and change in public access to the Project Area may be limited or prevented by mining activities and could impact adjacent private lands.

Indicators:
Number of acres of active mine area temporarily closed to public use;

Number of recreational access points temporarily closed to public use;

Acres of recreational areas temporarily blocked from public access;

Locations or primary access roads blocked or closed by mining activities.

Issue:
Impacts may occur from unauthorized Off-Highway Vehicle (OHV) and All-Terrain Vehicle (ATV) use on reclaimed and closed roads.

Indicators:
Predicted use of recreational vehicles on reclaimed area or roads considering methods used to prevent OHV and ATV use.

4.10.1 Recreation – Direct and Indirect Impacts

The acres temporarily lost to recreation access would generally be the acres developed for mining and transportation under any of the action alternatives. No developed campgrounds or recreation areas would be affected by the Proposed Action. Impacts to dispersed recreation from the Proposed Action would be localized, minor to moderate, and last for the duration of mining and reclamation activities (see page 4-1 for definitions).

4.10.1.1 Proposed Action

<u>Panel F, Including Lease Modifications</u>
The development of Panel F, including lease modifications, would disturb nearly 500 acres in the semi-primitive motorized (SPM) Recreational Opportunity Spectrum (ROS) area (**Figure 3.10-1**). Development of Panel F would increase the extension of mining lands into the block of SPM designated in this area, which comprises approximately 14,890 acres. About 3.3 percent of this block would be disturbed by Panel F. This would be a moderate, localized impact to SPM lands in the area. The large SPM block in this area would essentially be divided into two smaller blocks, which could affect the management of recreation opportunities in the area.

The SPM values that would be affected in this area include: probability of solitude that is likely to decrease, predominantly natural-appearing environment changing to predominantly altered mining lands; and few, widely dispersed vegetation alterations that are visually subordinate changing to major vegetation alterations that affect a large area and are visually evident. These impacts range from negligible to major.

The current non-public road access in the Panel F area, which connects to the Manning Canyon Road (FR 740) would be eliminated as Panel F is developed.

Big game hunting would be unavailable in the disturbed portion of Hunt Area 76 until mining is complete in this area. Big game habitat would be reduced, and game movement through the area would be interrupted by development of the mine panel. Reclamation of this open area would produce a grass/shrub mix that would encourage big game foraging, especially near the edges close to forest cover, such that these ‘edge’ areas may be good hunting sites.

Non-motorized public access through the proposed mine panels and across haul/access roads would be allowed during mining, except in specific areas where mining operations and active mining facilities would present a potential safety hazard to the public. Motorized public access would not be allowed in the mine panels or on the haul/access roads during mining operations, except for designated grade crossings where public access across certain haul/access roads would be by design.

Approximately 1/2 mile of Trail 402 along Manning Creek would be disrupted during active mining in this immediate area, temporarily interrupting the continuous route between the Crow Creek side of Manning Creek, and Sage Meadows. Non-motorized access through this area would be restored when it is safe to do so. The entire two-mile segment of Trail 401 connecting the South Fork Sage Creek Trail 092 and the Manning Creek Trail 402 would be disrupted by Panel F development. Trails 401 and 402 would be re-established during reclamation of the mine panel.

Development of Panel F would decrease opportunities for snowmobile use in the area for the life of mining in Panel F.

Panel F Haul/Access Road

The Panel F Haul/Access Road would disturb approximately 67 acres of SPM lands in a narrow strip and would cut off motorized public access into the CNF on FR 179 in South Fork Sage Creek Canyon. This access would be unavailable for the life of mining in Panels F and G and would be re-established during reclamation of the haul/access road. Non-motorized public access along FR 179 across the haul/access road would be allowed during mining operations. Hikers and others using FR 179 in lower South Fork Sage Creek Canyon would likely experience haul truck noise from the haul/access road. Trail 405 would also be interrupted by the haul/access road.

Panel G

The development of Panel G would disturb approximately 748 acres of an area that is part Roaded Modified (RM) (Wells Canyon Road corridor) and part SPM.

Big game habitat and hunting opportunities within Hunt Area 76 would be reduced by the area disturbed by mining.

Snowmobile use would be restricted in the active mine area.

Trail 404, connecting the Wells Canyon Road (FR 146) with the Deer Creek Trail (093), would be disrupted by Panel G.

Panel G West Haul/Access Road

This haul/access road would disturb approximately 217 acres in RM and SPM ROS areas. Visitors in the area may be delayed at the locations where FR 146 crosses the haul/access road at the Panel G operations area and at the west mouth of South Fork Deer Creek Canyon. FR 146 is also utilized as a snowmobile route during the winter; therefore, snow plowing of the haul road would have an impact to snowmobiles using this route. Persons using the Diamond Creek Road (FR 1102) and visiting the areas adjacent to this road in the upper Deer Creek watershed would notice the road disturbances and traffic along the haul/access road in this area.

Trails 092, 093, 102, 402, and 403 would be cut by this haul/access road. Non-motorized public access across the haul/access road in these locations would be allowed.

When the portion of FR 1102 in the Deer Creek watershed is relocated onto the haul/access road during reclamation, the current Forest Route in this area would be abandoned and reclaimed. Public access to Deer Creek in this area, would be more difficult from the new FR 1102 because it would be located upslope from the creek, whereas the existing road is in the drainage bottom.

Traffic on the nearby Diamond Creek Road would not be hindered by the haul/access road, so that primary north-south Forest access would remain unaffected during mining.

Power Line Between Panels F and G

The 28-acre power line corridor would occur within both SPM and RM ROS areas, although actual new surface disturbance should be limited to approximately three acres. Impacts to dispersed recreation activities during the installation of the power line would occur temporarily while the helicopter was being used for the construction activities. All trails outside of the mine disturbance areas would be spanned by the overhead power line. Impacts from this component of the Proposed Action should be short-term and negligible.

4.10.1.2 Mining Alternatives

No campgrounds or developed recreation areas would be affected under any of the mining alternatives. Impacts to dispersed recreation from the mining alternatives would be localized, minor to moderate, and last for the duration of mining and reclamation activities.

Mining Alternative A – No South and/or North Panel F Lease Modifications

No Panel F North Lease Modification

Without the North Lease Modification, there would be 23 fewer acres of SPM ROS lands disturbed. Access to FR 179 in the South Fork Sage Creek Canyon would be cut off in the same location as under the Proposed Action because both the Proposed Action Panel F Haul/Access Road and the Alternate Panel F Haul/Access Road both cross FR 179 in the same location and manner.

No South Lease Modification

There would be 138 less acres of SPM ROS areas disturbed with the smaller scale development of Panel F. Access to FR 179 in the South Fork Sage Creek Canyon would be cut off in the same location as under the Proposed Action. However, since overall mine life would be shorter by approximately two years, this access would be returned sooner than under the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills

This alternative would affect recreation the same as the Proposed Action. Reclamation activities would be delayed (by 6 to 7 months) at the end of mining.

Mining Alternative C – No External Overburden Fills at All

The alternative would affect recreation the same as the Proposed Action, and reclamation activities would be delayed (by just over 12 months) at the end of mining. Final topography would be gentler and more similar to original topography, since no highwalls would be exposed.

Mining Alternative D – Infiltration Barriers on Overburden Fills

This alternative would affect recreation the same as the Proposed Action. The potential expansion of the Panel F disturbance to obtain additional Dinwoody formation and temporarily store it would disturb an additional 104 acres in the SPM ROS area. The potential expansion of the disturbed area for Panel G would disturb an additional 33 acres of an area that is part RM (Wells Canyon Road corridor) and part SPM.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

This alternative would affect recreation the same as the Proposed Action but would eliminate the 28 acres of a direct power line corridor and the temporary use of a helicopter.

Mining Alternative F – Electrical Generators at Panel G

This alternative would affect recreation the same as the Proposed Action but would eliminate the 28 acres of a direct power line corridor and the temporary use of a helicopter.

4.10.1.3 Transportation Alternatives

No campgrounds or developed recreation areas would be affected under any of the transportation alternatives. Except for Alternative 6, impacts to dispersed recreation from the transportation alternatives would be localized, minor to moderate, and last for the duration of mining and reclamation activities.

Alternative 1 – Alternate Panel F Haul/Access Road
The Alternate Panel F Haul/Access Road would disturb approximately 46 acres of SPM lands. It would affect access to the CNF along FR 179 in the same manner as the Proposed Action Panel F Haul/Access Road and also impact Trail 405.

Alternative 2 – East Haul/Access Road
This alternative route would disturb 216 acres including SPM ROS lands, a small segment of RM lands in the Crow Creek road corridor, and private and State lands. Manning Creek and Deer Creek trails (402 and 093) would both be crossed by this road. Non-motorized access across the haul/access road would continue during mine operations. This haul road would be in closer proximity to residents along Crow Creek Road than the Proposed Action Panel G West Haul/Access Road and would be closer to the dispersed recreation such as hiking, horseback riding, and snowmobile riding that takes place along the Crow Creek Road.

The more remote areas on the western side of Freeman Ridge as well as the upper areas of South Fork Sage Creek drainage would not be affected by haul roads under this alternative. Big game use and hunting opportunities would likely be affected less than under the Proposed Action Panel G West Haul/Access Road because upper elevation cover and foraging habitats would remain intact, and elk in particular may not yet be moving down into the lower areas (East Haul/Access Road location) during hunting season.

Alternative 3 – Modified East Haul/Access Road
This alternative would disturb 276 acres of SPM ROS lands. Effects would be similar to transportation Alternative 2; however, private lands would not be disturbed, and the haul road would not be as close to Crow Creek Road. The haul/access road would cross Trail 093 about one mile further up Deer Creek Canyon than Alternative 2. Fishing or other recreation in Deer Creek drainage in this area would be more affected by noise and the presence of the haul road on both sides of this steep drainage compared to Alternative 2.

Alternative 4 – Middle Haul/Access Road
This alternative would disturb 192 acres of SPM ROS lands and would cut trails 093, 102, 402, 403, and 404. The overall recreation experience in the upper parts of Deer Creek watershed would be affected by the presence of large road cuts/fills and haul truck traffic through this currently undisturbed area.

Alternative 5 – Alternate Panel G West Haul/Access Road
This alternative would disturb 226 acres in RM and SPM ROS areas. Effects would be similar to the Proposed Action Panel G West Haul/Access Road except that the recreation experience in South Fork Sage Creek drainage would not be affected in the lower, eastern portions of the drainage.

Alternative 6 – Conveyor from Panel G to Mill
The conveyor alternative would disturb 61 acres of SPM ROS lands in a narrow, strip from Panel G to the southern end of the existing mining operations. Transportation of ore on the

conveyor from Panel G would be less noticeable to visitors in the CNF than on any of the haul/access roads. The conveyor structure would be 6 feet wide and 7 feet tall. The clearance between the bottom of the conveyor structure and the ground surface would typically be about 2 feet, except where short topographic dips and small drainages are spanned by the conveyor and clearance would be greater. The conveyor would effectively block motorized access, big game, pedestrian and equestrian access across the conveyor corridor except for specific places where there would be sufficient clearance under the conveyor. The conveyor would be present at crossings of Deer Creek (Trail 093) and South Fork Sage Creek (FR 179), but there would be sufficient clearance under the conveyor at these locations for game, pedestrian, and equestrian access under the conveyor; this would have minor impacts to the recreation experience. Trails 404 and 402 would also be crossed by the conveyor and could be blocked unless suitable crossings were built at these locations.

The conveyor would produce a major, site-specific impact on dispersed recreation off existing FS trails and along the conveyor corridor due to it blocking pedestrian and equestrian access from the east side of the CNF toward the west in this area. On a larger geographic scale, the conveyor would produce a moderate impact to recreation in the area west of the conveyor, which could still be accessed from other existing trails west of the mine panels. The duration of these effects would be for the length of operation of the conveyor.

Alternative 7 – Crow Creek/Wells Canyon Access Road

This alternative would disturb 114 acres of RM land in the Crow Creek/Wells Canyon road corridor. Dispersed recreation and hunting along the existing Wells Canyon Road would be affected by noise from the new road upslope; however, this disturbance would be access traffic rather than haul truck traffic. At the end of mining, the new access road would remain, and the existing FR 146 would be decommissioned and reclaimed. The Wells Canyon Access Road as designed under this alternative, to the north and upslope of the current FR 146, would bring road and recreation use out of the drainage bottom, but on to the steeper slope, which would be too narrow to accommodate camping areas. At the time the existing FR 146 would be decommissioned and reclaimed, access to existing pull-out areas along the existing Wells Canyon Road would be eliminated, unless this access was re-established from the new FR 146 route.

Increased access to the area via the upgraded Crow Creek and Wells Canyon roads is likely to add to the dispersed recreation use in the area, both in winter and snow-free seasons. Winter snowmobile traffic would be affected on the section of the Crow Creek Road that would be plowed. However, this use could also depend upon development and growth in surrounding communities. The upgraded Crow Creek Road would provide safe and reliable year-round access to the homes and ranches in the area.

An additional right-of-way would be needed for the portion of the Wells Canyon Access Road east of the Forest Boundary. The CNF has an easement for this section of the existing road across private land, but it is only 25 feet wide.

Alternative 8 – Middle Access Road

This alternative would disturb 99 acres of SPM ROS lands and would cut Trails 093, 102, 402, 403, and 404. The overall recreation experience in the upper parts of Deer Creek watershed would be affected by the presence of large road cuts/fills and access road traffic.

4.10.1.4 No Action Alternative

Under the No Action Alternative, the proposed mining effects to SPM or RM ROS lands in the Project Area would not occur. The types of recreation uses on the CNF in this area would likely continue similar to present uses; however, the level of use would depend upon development and growth in surrounding communities and in the region.

4.10.2 Land Use – Direct and Indirect Impacts

4.10.2.1 Proposed Action

The Proposed Action would disturb a total of 1,340 acres of the CNF. Visitors to the forest would locally see and hear increased activity including vehicles, mining equipment, and temporary structures. Pits and overburden disposal sites may be visible from forest roads or trails during mining. Special use authorizations would be needed for 314 acres. Although private lands would not be directly affected by the Proposed Action, adjacent private land values could be indirectly affected by the changes to area resources discussed in the various resource sections. Existing special use permits in the Study Area would not be affected by the Proposed Action.

The management of CNF lands in the area would be affected by the conversion of this area to mining. The big game range and timber management practices currently in place for the areas to be mined would generally not apply for the duration of mining and reclamation. AIZ's would be impacted as described in **Sections 4.6 and 4.8**. The CNF area utilized for phosphate mining would increase.

The mining of phosphate under the Proposed Action would produce the maximum amount of economically recoverable ore, helping to maintain the economic base of the area and the reserves of phosphate fertilizer for local, regional, and national use.

4.10.2.2 Mining Alternatives

Effects to land use from the mining alternatives would generally be similar to the Proposed Action because the disturbed areas are similar. Effects of the change in land use for the specific areas disturbed by each mining alternative would be minor and site-specific for the duration of the mining activities (see page 4-1 for definitions).

Mining Alternative A – South and/or North Panel F Lease Modifications

<u>No Panel F North Lease Modification</u>

Without the North Lease Modification and using the Alternate Panel F Haul/Access Road, there would be 23 fewer acres of Forest land converted from present land uses to mining.

<u>No Panel F South Lease Modification</u>

There would be 138 fewer acres of Forest land changed from current land uses to mining under this alternative.

Mining Alternative B – No External Seleniferous Overburden Fills

This alternative would affect land use the same as the Proposed Action. Reclamation activities would be delayed (by 6 to 7 months) at the end of mining.

Mining Alternative C – No External Overburden Fills at All
The alternative would affect land use the same as the Proposed Action, and reclamation activities would be delayed (by just over 12 months) at the end of mining.

Mining Alternative D – Infiltration Barriers on Overburden Fills
The potential expansion of the Panel F disturbance to obtain additional Dinwoody formation and temporarily store it, would change land use for an additional 104 acres compared to the Proposed Action. The potential expansion of the disturbed area for Panel G would change land use on an additional 33 acres compared to the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road
This alternative would affect land use the same as the Proposed Action, minus the 28 acres for the power line corridor.

Mining Alternative F – Electrical Generators at Panel G
This alternative would affect land use the same as the Proposed Action, minus the 28 acres for the power line corridor.

4.10.2.3 Transportation Alternatives

The construction of any of the transportation haul/access road alternatives would convert the current land uses of the property disturbed by the road corridor to a restricted access mining road corridor for the duration of the mining operations. For Alternative 7 (Crow Creek/Wells Canyon Access Road) the current land uses affected by the road would be converted to a public road use. Environmental effects on recreation are described above. Effects on timber resources and grazing are described in **Sections 4.5** and **4.9**, respectively. Except for the conveyor (Alternative 6), the effects of the change in land use for the specific areas disturbed by each transportation alternative would be minor and site-specific.

Alternative 1 – Alternate Panel F Haul/Access Road
The Alternate Panel F Haul/Access Road would change current land use of approximately 46 acres of CNF lands to mining use as a restricted access transportation corridor.

Alternative 2 – East Haul/Access Road
This alternative route would change the current land uses of 216 acres of Forest, private and State lands to mining use as a restricted access transportation corridor. Easements or rights-of-way for encroachment of this road on private or State lands would be required.

Alternative 3 – Modified East Haul/Access Road
This alternative would change the current land uses of 276 acres of Forest and State lands to mining use as a restricted access transportation corridor. A right-of-way for encroachment of this road on State lands would be required.

Alternative 4 – Middle Haul/Access Road
This alternative would change the current land uses of 192 acres of Forest lands to mining use as a restricted access transportation corridor.

Alternative 5 – Alternate Panel G West Haul/Access Road
This alternative would change the current land uses of 226 acres of Forest Lands to mining use as a restricted access transportation corridor.

Alternative 6 – Conveyor from Panel G to Mill
The conveyor alternative would change the current land uses of 61 acres of Forest lands to mining uses as a restricted access transportation corridor.

The conveyor would produce a major, site-specific impact on recreation and grazing land uses along the conveyor corridor due to the blocking of dispersed (off existing FS trails) pedestrian, equestrian, and livestock access from the east side of the CNF toward the west in this area. On a larger geographic scale, the conveyor would produce a moderate impact to recreation and grazing land use in the area west of the conveyor, which could still be accessed from other existing trails west of the mine panels. The duration of these effects would be for the length of operation of the conveyor.

Alternative 7 – Crow Creek/Wells Canyon Access Road
This alternative would change the current land use of 114 acres of federal (USFS and BLM), State and private land along the road corridor to use as a public road. Easements or rights-of-way for encroachment of this road construction on private or public lands would be required.

Alternative 8 – Middle Access Road
This alternative would change the current land use of 99 acres of private and Forest lands along the road corridor to use as a restricted access road.

4.10.2.4 No Action Alternative

Under the No Action Alternative, there would be no mining impacts to SPM or RM ROS lands in the Project Area. Current land uses would continue, and changes to land uses in the future would vary according to resource demands, forest planning, and growth in the region.

4.10.3 Mitigation Measures

Where forest trails are disrupted by mining operations, Simplot would post signs along the trails at the margins of the mining areas informing hikers about the mining activities and potential hazards within the mine area. If mine activities were such that travel through the mine area on the trail is not safe, the trail would be posted with signs indicating the trail is temporarily closed.

Trails would be re-established through mine areas as soon as practicable and would be well marked by Simplot to indicate the location of the designated trails through the mine disturbance. At locations where haul/access roads cut existing forest trails, trails for non-motorized access would be built across the haul/access roads by Simplot to allow convenient and safe, non-motorized crossing of the haul/access roads. Signs would be posted at these crossings warning visitors how to cross the haul/access roads safely and to avoid lingering or moving along the length of the haul/access roads. Signs would be posted on the haul/access roads at these crossings warning drivers on the haul/access roads to exercise caution.

Where established Forest Trails are crossed by the conveyor in Transportation Alternative 6, hiking, equestrian, and livestock access across the conveyor corridor would be maintained by Simplot with underpasses beneath the conveyor. If Transportation Alternative 6 (the conveyor) were selected, the Forest Service may require that additional crossings be provided with sufficient clearance for passage under the conveyor.

Forest Trail 404 connecting the Wells Canyon Road (FR 146) and the Deer Creek Trail 093 would be rebuilt by Simplot during initial mine development of Panel G a safe distance away from the disturbance limits of Panel G.

4.10.4 Unavoidable (Residual) Adverse Impacts

Residual adverse impacts to recreation and land use would include the temporary loss of dispersed recreation and other current land uses on the area disturbed by the proposed mining and transportation activities. These land uses would largely be re-established on these areas following cessation of mining and reclamation activities. Additional impacts to access across active mining areas, imposed for public safety, would also occur. Established snowmobile routes would be affected. These adverse impacts would be minor with regard to non-motorized access over most of the Proposed Action and Alternatives. In the case of Alternative 6, the CNF lands west of the conveyor corridor would be blocked for recreational and grazing access from east of the conveyor, except for existing FS trails where localized access under the conveyor was possible. Blockage of existing trails would be eliminated by construction of underpasses for the trails where they are crossed by the conveyor. Access to the CNF lands west of the conveyor would still be possible by existing trails west of the mine panels.

4.10.5 Relationship of Short-Term Uses and Long-Term Productivity

The use of this area for recovery of phosphate resources provides economic support for the local economy of southeast Idaho. In the long-term, once reclamation is established, the area would be expected to provide the same types of recreation and grazing uses as are currently available. Long-term timber productivity would be adversely affected on the disturbed areas because reclamation would not restore the forest condition that existed prior to the mining.

4.10.6 Irreversible and Irretrievable Commitments of Resources

The conversion of Forest lands to mining uses would temporarily restrict recreational uses of the disturbed area and may cause some recreationists (e.g. hunters who have chosen a particular area year after year to camp or hunt) to abandon the area in search of other remote recreation opportunities. Grazing land use would be temporarily reduced on the lands disturbed by the mining but grazing productivity would eventually be restored due to reclamation activities. Timber productivity would be irretrievably committed on the disturbed areas due to the long time required to re-establish the forest baseline conditions.

4.11 Inventoried Roadless Areas/Recommended Wilderness and Research Natural Areas

No Recommended Wilderness or Research Natural Areas would be impacted by any of the alternatives and thus will not be discussed further.

Issue:
The Project may impact Inventoried Roadless Area characteristics.

Indicators:
Description of impacts to roadless attributes and characteristics.

4.11.1 Direct and Indirect Impacts

4.11.1.1 Proposed Action

The mining activities and associated haul/access road construction from the Proposed Action would disturb approximately 1,040 acres in the Sage Creek Roadless Area (SCRA) and approximately 60 acres in the Meade Peak Roadless Area (MPRA). On May 13, 2005, a Notice of Final Rule was published, which released the current roadless area management regulations for inventoried National Forest System Lands. Inventoried RAs are managed according to the provisions identified in the RFP (USFS 2003a). These disturbances would result in both short- and long-term impacts ranging in intensity from negligible to major (see page 4-1 for definitions) depending upon the roadless and/or wilderness attribute being impacted, as discussed below. The majority of proposed disturbance would be reclaimed following mining activities. However, approximately 71 acres of the Proposed Action disturbance would not be reclaimed, leaving permanent indications of past mining activities in the IRAs. Many of the roadless attributes are also resources that have been described in this EIS in separate sections regardless of whether the resource is located within an IRA. These include: air (**Section 4.2**), water (**Section 4.3**), soils (**Section 4.4**), diversity of plant and animal communities, including wildlife and fish and threatened, endangered, sensitive, and rare species occurrence/habitat (**Sections 4.5, 4.6, 4.7,** and **4.8**), recreation (**Section 4.10**), visual and aesthetics (**Section 4.12**), and traditional cultural properties and sacred sites (**Sections 4.13** and **4.14**). Impacts to each IRA are quantified in **Table 4.11-1**.

TABLE 4.11-1 ACRES OF DISTURBANCE BY THE PROPOSED ACTION WITHIN THE SCRA AND THE MPRA

PROPOSED ACTION	ACRES OF DISTURBANCE WITHIN THE SCRA		PERCENT OF SCRA (12,710 ACRES)	ACRES OF DISTURBANCE WITHIN THE MPRA		PERCENT OF MPRA (44,585 ACRES)
	ON-LEASE	OFF-LEASE*		ON-LEASE	OFF-LEASE	
Panel F, with lease mods.	355	160		0	0	
Panel F Haul/ Access Rd.	5	19		0	0	
Panel G	380	34		25	0	
Panel G - W. Haul/Access Rd.	2	64		2	32	
Power line	8	13		1	0	
Proposed Action TOTAL	750	290	8	28	32	0.1

*includes proposed lease modifications

Roadless Attributes
Soil: As shown in **Table 4-11.1**, approximately 1,040 acres of soils would be disturbed within the SCRA, and approximately 60 acres of soils would be disturbed within the MPRA under the Proposed Action. These impacts to soils, which have been previously described in **Section 4.4**, would represent 8 percent and less than 1 percent of the soils within the SCRA and MPRA, respectively. Approximately 778 acres or approximately 70 percent of this disturbance would occur on current existing leases.

Air: As previously described in **Section 4.2**, impacts to air resources resulting from the Project would consist of emissions from mobile sources and the disturbance of soil. Thus, impacts to air quality within the SCRA and the MPRA would be temporary, occurring during the life of the mining activities. These impacts are not expected to permanently change the overall air quality within the IRAs.

Water/Sources of Public Drinking Water: Although there are no official Sources of Public Drinking Water within the Project Area, potential impacts to surface water and groundwater within the Project Area and areas extending outside the Project Area have been thoroughly described in **Section 4.3**. The potential impacts could be long-term and range from negligible to major depending upon the surface water and/or groundwater source being evaluated. These impacts would occur within portions of both the SCRA and the MPRA.

Diversity of Plant and Animal Communities: As shown in **Table 4-11.1**, approximately 1,040 acres of vegetation/habitat (including trees, shrubs, and ground cover) within the SCRA and approximately 60 acres of vegetation/habitat within the MPRA would be removed during the life of the Project. These impacts to vegetation and habitats, described in **Section 4.5**, are not expected to dramatically alter the Diversity of Plant and Animal Communities within these IRAs, since these impacts represent 8 percent and less than 1 percent, respectively of available vegetation/habitats within the SCRA and the MPRA, and no known unique habitats exist where disturbances would occur (see Chapter 3). The majority of the disturbed areas would be reclaimed following mining activities.

Wildlife and Fish: Potential impacts to wildlife and fishery resources have been described in **Sections 4.7** and **4.8**. As previously mentioned, the SCRA ranked low and the MPRA ranked moderate for wildlife biological strongholds during the RFP Roadless Area Re-Evaluation analysis. In addition, the departure from PFC was moderate for both IRAs (USFS 2003a). The overall effects to wildlife and fish populations and habitats within the SCRA and MPRA would range from negligible to major depending upon the species and the habitat type being impacted

Threatened, Endangered, Sensitive, and Rare Species Occurrence/Habitat: As previously discussed in **Sections 4.5** and **4.7**, the impacts from the Proposed Action to threatened, endangered, sensitive, and rare species occurrence/habitat within the actual Project Area are expected to be site-specific, short to long-term, and negligible to major.

Rare plants, rare plant communities, or plant community references have not been documented in the SCRA, but the Uinta Basin Cryptantha and Starveling milkvetch have been documented in the MPRA (USFS 2003a), although none of these species have been documented in the Project Area (see **Sections 3.5** and **4.5**). Since no populations of any rare plants or habitat have been documented in the Study Area, there would be no effect from the Proposed Action.

Reference Landscapes: For the SCRA, the Deer Creek watershed has not been impacted by mining and could be used as a unique aquatic reference (i.e., control comparison watershed at landscape level) (USFS 2003a). The Proposed Action would result in impacts to the aquatic areas within the Deer Creek watershed as described and addressed in **Sections 4.3** and **4.8,** thus impacts to a potential "Reference Landscape" within the SCRA would occur. These impacts would add to the impacts from roads, timber harvest, and grazing and would potentially eliminate the desire to use the Deer Creek watershed as a unique aquatic reference site if the Proposed Action was implemented.

In regards to the MPRA, no impacts to the Meade Peak RNA and/or the Snowdrift prescribed fire treatment area would occur under the Proposed Action.

Scenic Integrity: As described previously, the SCRA has a low scenic integrity rating due to the level of developments such as timber harvest units, roads, electronic sites, etc. (USFS 2003a). The scenic integrity rating for the SCRA would remain low following mining activities. Visual impacts are addressed in **Section 4.12**.

In regards to the MPRA, mining activities should not be visible within identified high scenic integrity areas (i.e. adjacent to Highway 30, the City of Georgetown, and Crow Creek Road), thus this roadless attribute for this IRA should not be affected by the Proposed Action.

Recreation (Primitive, Semi-Primitive non-motorized, & Semi-Primitive Motorized): Recreation use and impacts throughout the Study Area are thoroughly addressed in **Sections 3.10** and **4.10**. In general, temporary impacts to trails and Forest routes would occur for the life of the mine, and increases in noise levels would detract from the recreational experience in the immediate mining area by users of adjacent trails. In addition, impacts to hunters would also occur, as active mining areas would become closed to hunting, and adjacent areas may be less desirable for hunting during Project activities. These impacts could range from negligible to major.

Traditional Cultural Properties and Sacred Sites: As described in **Sections 3.13** and **4.13**, a determination of no effect to significant cultural resources has been made and clearance is recommended. The Idaho SHPO has been consulted and has concurred with the no effect determination. The survey reports, including the letters documenting SHPO concurrence, are located in the Project Record. Potential impacts to Traditional Cultural Properties and Scared Sites within the Project Area and the IRAs are addressed in **Section 4.14**.

Special Use Permits (Authorizations), Utility Corridors: Descriptions and locations of existing SUAs in the Project Area have been identified in **Section 3.10**. If approval of this Project is granted, it would result in the issuance of SUAs within the SCRA and the MPRA. No impacts to existing SUAs are expected to occur from the Proposed Action.

<u>Wilderness Attributes</u>

In regards to the wilderness attributes previously described for the SCRA and the MPRA in **Section 3.10**, mining activities associated with the Proposed Action could change the current wilderness attribute ratings. An evaluation of the level of impacts to each attribute is described below.

Natural Integrity/Apparent Naturalness: The SCRA and the MPRA have been rated as low and moderate, respectively for this attribute. The SCRA was rated low because the area has been affected by the following physical or man-caused impacts: range improvements, timber harvests, prescribed fire, mineral exploration and development, and unimproved roads (USFS 2003a). The MPRA was rated as moderate because of the evidence of human activities such as unimproved roads and timber harvest activities. The rating for the SCRA would remain low following any mining activities. The rating for the MPRA would remain moderate because the Project would affect less than 1 percent of the area and is confined to the northern edge.

Solitude/Primitive Recreation: The current opportunities for solitude within the SCRA and the MPRA are not anticipated to change as a result of the Proposed Action. The current low rating for the SCRA would remain unchanged as additional mining activities would effectively eliminate the minimal opportunities for solitude that exist currently. The MPRA's current moderate rating would also remain unchanged as proposed mining activities would occur at the extreme northern portion of the MPRA and impact less than 1 percent of the IRA.

The opportunity for primitive recreation in the SCRA is rated as moderate because of the small area size, road corridors projecting into the area, moderate topographic and vegetative screening, and because limited facilities are present (USFS 2003a). The current rating for this attribute within the SCRA could remain unchanged or be reduced to low as additional mining activities would impact approximately 8 percent of the IRA's small size. The MPRA is rated as moderate; however, the approximately 60 acres that would be disturbed occur at the extreme northern portion of the MPRA. Thus, the proposed disturbance acreage and the specific location of the proposed disturbance, is not expected to change the current rating for this attribute within the MPRA.

Challenging Experience: Terrain within both IRAs is very typical of the other mountain ranges in southeast Idaho, thus according to the theme of a challenging experience in comparison to other IRAs that would require a higher level of woodsman and outdoor skills, there are few opportunities for this wilderness attribute within either IRA. The Proposed Action is not expected to change the current rating for this attribute within the IRAs.

Special Features/Special Places/Special Values: Unique or special features are not represented within the SCRA (USFS 2003a) and the MPRA contains Meade Peak (the highest point on the CNF) and the Meade Peak RNA. No impacts to any Special Features/Special Places/Special Values from the Project within the SCRA and the MPRA are anticipated.

Wilderness Manageability/Boundaries: No issues or impacts related to the Wilderness Manageability/Boundaries from implementation of the Proposed Action are anticipated. The manageability of the SCRA would remain fair, and for the MPRA, it would remain poor due to the road intrusions. A core area in this IRA could still be achieved under the Proposed Action as only the extreme northern portion of the IRA would be impacted.

<u>Panel F, Including Lease Modifications</u>

As displayed in **Table 4.11-1**, approximately 515 acres of proposed disturbance would occur within the SCRA. Approximately 160 acres of this disturbance would occur outside of existing leases; this represents approximately 4 percent of the total SCRA. Impacts to the roadless and wilderness attributes as described above for the entire Proposed Action would remain the same under the Panel F component, but at a reduced level.

Panel F Haul/Access Road

As displayed in **Table 4.11-1**, the construction of the Panel F Haul/Access Road would disturb approximately 24 acres within the SCRA. Approximately 19 acres would occur outside of existing leases; this is less than 0.2 percent of the total SCRA. Impacts to the roadless and wilderness attributes as described above for the entire Proposed Action would remain the same under this component of the Proposed Action, but at a reduced level.

Panel G

As displayed in **Table 4.11-1**, approximately 414 acres of proposed disturbance would occur within the SCRA. Approximately 25 acres of disturbance (all on lease) would occur within the MPRA. These totals from Panel G represent approximately 3 percent of the total SCRA and less than 1 percent of the total MPRA, respectively. Approximately 34 acres of this disturbance would occur in the SCRA outside of existing leases; this is less than 0.3 percent of the total SCRA. Impact assessments as described above for the entire Proposed Action would remain the same under Panel G.

Panel G West Haul/Access Road

As displayed in **Table 4.11-1**, the construction of the Panel G West Haul/Access Road would disturb approximately 66 acres within the SCRA. Approximately 64 acres would occur outside of existing leases; this is about 0.5 percent of the total SCRA. Approximately 34 acres of disturbance (all 34 acres outside of existing leases) would occur within the MPRA. Impacts to the roadless and wilderness attributes as described above for the entire Proposed Action would remain the same under this component, but at a reduced level.

Power Line Between Panels F and G

As displayed in **Table 4.11-1**, the construction of the Power Line between Panels F and G would disturb approximately 21 acres within the SCRA, approximately 13 acres would occur outside of existing leases, and approximately 1 acre of disturbance (all on existing leases) would occur within the MPRA. Impacts to the roadless and wilderness attributes as described above for the entire Proposed Action would remain the same under this component, but at a reduced level.

4.11.1.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications

Implementing Alternative A would reduce the amount of disturbance, off existing leases, within the SCRA by a total of approximately 154 acres, assuming that the alternate Panel F Haul/Access was also selected. This would represent an overall reduction of proposed disturbance of approximately 1 percent in the SCRA. This reduced acreage of disturbance within the SCRA is not anticipated to result in any change of current ratings or anticipated impacts to the roadless and wilderness attributes previously described under each component of this Alternative.

No Panel F South Lease Modification

Approximately 138 acres of new disturbance would not occur within the SCRA.

No Panel F North Lease Modification

Assuming that the Alternate Panel F Haul/Access road is also selected under this alternative, approximately 16 acres of new disturbance would not occur within the SCRA.

Mining Alternative B – No External Seleniferous Overburden Fills
No change in the impacts to the SCRA or the MPRA, other than those previously described for the Proposed Action, would occur under this alternative.

Mining Alternative C – No External Overburden Fills at All
No change in the impacts to the SCRA or the MPRA, other than those previously described for the Proposed Action, would occur under this alternative.

Mining Alternative D – Infiltration Barriers on Overburden Fills
Under this alternative, an additional 95 acres of disturbance would occur to the SCRA; all of the proposed disturbance would be situated on existing leases. In addition, another 6 acres of disturbance would occur within the MPRA, all on existing leases. This additional amount of disturbed acreage is not anticipated to change the impacts to the roadless and wilderness attributes for either IRA, already described under the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road
No additional impacts to IRAs would occur under this alternative. However, a reduction of surface disturbance of up to 21 acres in the SCRA and 1 acre in the MPRA would occur. Total actual ground disturbance within either IRA would most likely only be reduced by less than three acres. Along with a reduction of actual disturbance acreage, impacts to several roadless and wilderness attributes (i.e., Scenic Integrity and Natural Integrity/Apparent Naturalness) would be lessened in the specific areas of the Deer Creek drainage area that would not be bisected by the power line. However, the overall ratings of these attributes would likely remain unchanged from the impacts described under the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G
Impacts would be the same as described for Alternative E.

4.11.1.3 Transportation Alternatives

Although the overall impacts to the current roadless and wilderness attributes from each transportation alternative are unlikely to change from what has been previously described for the Proposed Action, the amount of proposed disturbance to IRAs does differ by transportation alternative and is displayed in **Table 4.11-2**. An increase or decrease in the acres of actual new surface disturbance within the IRAs would occur under each alternative. This change in disturbance acreage has been addressed for each transportation alternative throughout this EIS in the various resource sections, and many of the resultant impacts would be applicable as they relate to the roadless and wilderness attributes previously addressed under the Proposed Action. The transportation alternatives could also produce different effects on the wilderness manageability and boundaries attributes.

TABLE 4.11-2 ACRES OF DISTURBANCE BY THE TRANSPORTATION ALTERNATIVES WITHIN THE SCRA AND THE MPRA

TRANSPORTATION ALTERNATIVE	ACRES OF DISTURBANCE WITHIN THE SCRA (12,710 ACRES)		ACRES OF DISTURBANCE WITHIN THE MPRA (44,585 ACRES)	
	ON-LEASE	OFF-LEASE*	ON-LEASE	OFF-LEASE
Proposed Action - Panel F Haul/Access Rd.	5	19	0	0
Proposed Action - Panel G West Haul/Access Rd.	2	64	2	32
Alt 1 - Alternate Panel F Haul/Access Rd.	10	0	0	0
Alt 2 - Panel G East Haul/Access Road**	15	59	0	0
Alt 3 - Panel G Modified East Haul/Access Road**	15	125	0	0
Alt 4 - Panel G Middle Haul/Access Road	34	155	0	0
Alt 5 - Panel G Alternate West Haul/Access Road**	39	58	2	32
Alt 6 – Conveyor to Panel G to Mill	31	22	0	0
Alt 7 –Crow Creek and Wells Canyon Access Road	5	0	0	0
Alt 8 – Middle Access Road	22	75	0	0

* includes proposed lease modifications
** includes topsoil stockpiles

Alternative 1 – Alternate Panel F Haul/Access Road

As displayed in **Table 4.11-2**, Transportation Alternative 1 would reduce the overall disturbance of the SCRA by approximately 14 acres as compared to the Proposed Action Panel F Haul/Access Road, all of which would be situated on the existing Panel F lease. Impacts to the roadless and wilderness attributes as described above for the Proposed Action would remain the same under this alternative.

Alternative 2 – East Haul/Access Road

As displayed in **Table 4.11-2**, Transportation Alternative 2 would increase the overall disturbance of the SCRA by approximately 8 acres and reduce the overall impacts to the MPRA by 34 acres as compared to the Proposed Action Panel G Haul/Access Road. This is mainly because a portion of this alternative would be located on private land where IRAs are not applicable. A total reduction of 37 acres of off-lease disturbance of IRAs would also result under this alternative. As the majority of this road would be located outside the east boundary of the SCRA, it would have negligible to minor effects on roadless and wilderness attributes of this IRA.

Alternative 3 – Modified East Haul/Access Road

As displayed in **Table 4.11-2**, Transportation Alternative 3 would increase the overall disturbance of the SCRA by approximately 74 acres and reduce the overall impacts to the MPRA by 34 acres, resulting in a net increase of approximately 40 acres to IRAs as compared to the Proposed Action Panel G Haul/Access Road. A net increase of approximately 29 acres would occur off existing leases. As the majority of this road would be located outside the east boundary of the SCRA, it would have negligible to minor effects on roadless and wilderness attributes of this IRA, although more than Alternative 2 because of the increased disturbance and activity within lower Deer Creek Canyon.

Alternative 4 – Middle Haul/Access Road
As displayed in **Table 4.11-2**, Transportation Alternative 4 would increase the overall disturbance of the SCRA by approximately 123 acres and reduce the overall impact to the MPRA by 34 acres, resulting in a net increase of approximately 89 acres to IRAs as compared to the Proposed Action Panel G Haul/Access Road. A net increase of approximately 59 acres would occur off existing leases. This road would be located in the southern core area of the SCRA, and would produce moderate effects on some of the roadless and wilderness attributes of this IRA because of the disturbance and activity within the center of the Deer Creek Canyon drainage. It could affect boundaries of this IRA during future roadless inventories because it cuts through the core area of the southern portion of the IRA.

Alternative 5 – Alternate Panel G West Haul/Access Road
As displayed in **Table 4.11-2**, Transportation Alternative 5 would increase the overall disturbance of the SCRA by approximately 31 acres as compared to the Proposed Action Panel G Haul/Access Road. A net reduction of 6 acres of off-lease disturbance to IRAs would occur under this alternative. The effects on roadless and wilderness attributes for this road would be the same as the Proposed Action West Haul/Access Road from Panel G to the Sage Meadows area. This alternative could affect boundaries of this IRA during future roadless inventories because it would separate the south portion of the SCRA from the northern portion.

Alternative 6 – Conveyor from Panel G to Mill
As displayed in **Table 4.11-2**, Transportation Alternative 6 would decrease the overall disturbance of the SCRA by approximately 13 acres and reduce the overall disturbance of the MPRA by 34 acres as compared to the Proposed Action Panel G Haul/Access Road. A net reduction of 72 acres of off-lease disturbance to IRAs would occur under this alternative. This alternative would need to be combined with either Transportation 7 or 8 to evaluate the true impacts. The effects on roadless and wilderness attributes for this alternative would be minor and in-between those of Alternatives 2 and 4. It would cut through the core area of the southern SCRA but would disturb much less ground than either of these other alternatives. Its reclaimed appearance would be less intrusive than any of the haul/access roads and could have lesser effects on boundaries of this IRA during future roadless inventories.

Alternative 7 – Crow Creek/Wells Canyon Access Road
As displayed in **Table 4.11-2**, Transportation Alternative 7 would decrease the overall disturbance of the SCRA by approximately 61 acres and reduce the overall disturbance of the MPRA by 34 acres as compared to the Proposed Action Panel G Haul/Access Road. All disturbance to IRAs under this alternative would occur on existing leases. However, impacts from this alternative would need to be combined with Alternative 6, if selected. This alternative would have negligible effects on roadless and wilderness attributes because of its small disturbance in the IRAs and its location at the south boundary of the SCRA.

Alternative 8 – Middle Access Road
As displayed in **Table 4.11-2**, Transportation Alternative 8 would increase the overall disturbance of the SCRA by approximately 31 acres and reduce the overall disturbance of the MPRA by 34 acres as compared to the Proposed Action Panel G Haul/Access Road. A net reduction of 21 acres of off-lease disturbance to IRAs would occur under this alternative. However, impacts from this alternative would need be combined with Alternative 6, if selected.

It would have similar impacts to roadless and wilderness attributes as Alternative 4. Its location in the southern core of the SCRA could affect boundaries of this IRA during future roadless inventories.

4.11.1.4 No Action Alternative

Under the No Action Alternative, Simplot would not be allowed to proceed with mining of ore in Panels F and G until mining and reclamation plans acceptable to the BLM and USFS were developed and approved. Under the No Action Alternative, there would be no direct or indirect impacts to IRAs within the Project Area, because no mining activities would occur.

4.11.2 Mitigation Measures

Project design features, BMPs, and the proposed Reclamation Plan are elements of the Proposed Action designed to reduce environmental impacts to many of the resources that impact the roadless and wilderness attributes for each impacted IRA. In addition, mitigation measures have been proposed for many of the specific resources and would be implemented in order to offset impacts to affected IRAs. Thus, additional mitigation measures specific to IRAs are not deemed necessary.

4.11.3 Unavoidable (Residual) Adverse Impacts

The result of unreclaimed mining activities (i.e. pit highwalls and road cuts) would present localized and permanent modifications within the IRAs that would have unavoidable impacts to several of the roadless (i.e. Scenic Integrity) and wilderness (i.e. Natural Integrity/Apparent Naturalness) attributes.

4.11.4 Relationship of Short-Term Uses and Long-Term Productivity

The use of the IRAs for recovery of phosphate resources provides economic support for the local economy of southeast Idaho. In the long-term, once reclamation is established, the area would be expected to provide the similar types of IRA characteristics as it currently does with the exception of the areas that would not be reclaimed, which would reduce the long-term productivity in terms of the Scenic Integrity and Natural Integrity/Apparent Naturalness attributes.

4.11.5 Irreversible and Irretrievable Commitments of Resources

Irreversible commitment of resources would occur to specific resources (i.e. soils, water, diversity of plant and animal communities, and scenic integrity) addressed in the EIS that are also identified as roadless attributes. An irretrievable commitment of resources to IRAs would occur as a result of the permanent impacts to several of the wilderness attributes (i.e. Natural Integrity/Apparent Naturalness and Solitude) that would occur from the Proposed Action as some mining areas would not be reclaimed.

4.12 Visual and Aesthetic Resources

Issue:
The Project may adversely affect visual resources in the area.

Indicators:
Estimated compliance with the Visual Quality Objectives (VQOs) in the USFS Visual Management System;

Change in scenery, from baseline to projected, from various public and occupied points within the Study Area.

4.12.1 Direct and Indirect Impacts

The landscape in the Project Area would be permanently altered by the development of lands for mining and transportation under any of the action alternatives. The initial mining-related developments would cause major and dramatic changes to the local landscape; however, this landscape is generally not within view of the casual observer or of property owners along Crow Creek Road.

According to the Seen/Unseen representations provided in **Section 3.12**, certain portions of the Proposed Action and Alternatives have been determined to be visible from view points to the east of the Project. These include views of the top of Panel G and portions of the Wells Canyon Access road and the East Haul/Access Road from south of Stewart Ranch (**Figure 3.12-2**). None of the elements of the Proposed Action or Alternatives would be visible from the Stewart Ranch buildings (**Figure 3.12-3**). Portions of the East Haul/Access Road in Nate Canyon would be visible from the Crow Creek Road between Stewart Ranch and the Mouth of Deer Creek (**Figure 3.12-4**). A small portion of the East Haul/Access Road may be visible from the Osprey Ranch (**Figure 3.12-5**). The East Haul/Access Road and Modified East Haul/Access Road would be visible from the Crow Creek Road at the mouth of Deer Creek Canyon **Figure 3.12.-6**). The East Haul/Access Road in lower Nate Canyon would be visible from the Riede Cabin (**Figure 3.12-7**). Views of almost all components of the Proposed Action and Alternatives would be possible from a remote, high elevation point east of Crow Creek Valley (**Figure 3.12-8**).

VQO's of Modification and Partial Modification would not be met in the Project Area. Scenic integrity would be low in those areas developed for mining, as deviations begin to dominate the landscape view. The mine operation and reclamation plan would mitigate visual changes to the degree that reclamation methods and economics allow. Although VQO's would not be met, the efforts made to mitigate landscape impacts and reclaim mined areas provides compliance with the CNF RFP (USFS 2003b:Vol.II p. 4-9 Final EIS for the CNF RFP).

4.12.1.1 Proposed Action

The proposed operations would result in disturbance of natural slopes in the areas occupied by mining operations, as well as visual changes resulting from the backfill of a currently open pit (Pit E-0). Impacts to visual/aesthetic resources would result from the overall presence of mining activity and equipment, vegetation removal, exposure of soil and rock, topographic changes, road cuts, placement of external overburden, and reclamation. The severity of these impacts is tempered by the reduced level of viewer sensitivity in the area, which contains secondary travel routes, and receives limited dispersed use in all but the hunting season months (August to November). As seeded vegetation becomes established on reclaimed surfaces, visual impacts from mining and backfilling would become less obvious in the landscape; however, reclaimed areas would not be expected to comply with the VQO's described in the CNF RFP (USFS 2003a). Approximately 46 acres of highwalls and pit bottoms would remain after reclamation.

The heaviest recreational uses of the CNF in this area are during the hunting season, when backcountry users and hunters would encounter landscape and aesthetic impacts due to mining and increased activity. These visual impacts to hunters and the hunting experience would range from minor to major, depending upon the sensitivity of the viewer, and would occur seasonally for the life of the Project and reclamation period.

Areas cleared of timber, and other mining activity such as overburden removal and hauling, may be visible to hunters and recreationists at upper elevations in the surrounding area. The upper elevation Seen/Unseen point taken from a horse trail on the southwestern portion of the Stewart Ranch property (**Figure 3.12-2**) shows that some disturbances in Panels F and G, as well as portions of the east side transportation alternatives, would be visible in the distance from this trail.

Panel F, Including Lease Modifications

The development of Panel F, including lease modifications, would disturb approximately 515 acres in an area designated with a VQO of Modification (**Figure 3.12-1**). Visual impacts would result initially from the stripping of vegetation, including timber, from the proposed mining panel. The clear-cuts would affect obvious change to the color and texture pattern of the existing landscape. This would be a major (see page 4-1 for definitions) impact to scenic resources for hikers in the immediate area and in remote high elevation areas to the west of the mine panel with views of the Project Area. The development of Panel F would not be visible from Crow Creek Road; remaining highwalls and reclaimed surfaces would be hidden by intervening hills from viewers on Crow Creek Road.

The unreclaimed 38-acre portion of Panel F (including benched highwalls) would be obvious from trails with access/views into the center portion of Panel F. Early revegetation of the recontoured slopes would contrast in color from any remaining dark green conifer cover on adjacent slopes. The expected time frame is three to five years for the bright green grass/forb revegetation community to become established and apparent. The eventual establishment of 'islands of diversity' (clusters of planted trees & shrubs) would restore a setting more similar to the original landscape in approximately 10 to 50 years.

The proposed pit backfill in Pit E-0 would reduce the currently approved visual impact (unbackfilled and reclaimed) for that pit. The backfilling and reclamation of the 29-acre area of Pit E-0 would visually blend that area with the surrounding reclaimed land in Panel E.

Panel F Haul/Access Road

The Panel F haul/access road would disturb approximately 67 acres of VQO Modification lands in a narrow strip. This disturbance would be visible to hikers in South Fork Sage Creek Canyon, but there would be no motorized public access into the CNF on FR 179 in South Fork Sage Creek Canyon during mining in Panels F and G, limiting public use of this area. This haul/access road would not be visible from the Crow Creek Road.

Panel G

The development of Panel G would disturb approximately 513 acres of an area that is classified predominantly as Partial Retention. The Project Area landscape in Partial Retention Areas has moderate scenic integrity (See Photo in Chapter 3 – View of Panel G). The development of

Panel G would be a major impact to the scenery in this area; this mining disturbance would be visible from points along the existing Wells Canyon Road (FR 146) at the east mouth to South Fork Deer Creek Canyon and from points on foot in higher elevation areas to the west. During mining, the footwall of the Panel G pit would be readily apparent from these viewpoints. After reclamation, the west facing reclaimed slope would be covered with grass and forb vegetation that would contrast with adjacent/visible forested slopes (**Figure 4.12-1)**.

<u>Panel G West Haul/Access Road</u>
This haul/access road would disturb approximately 217 acres in VQO Partial Retention areas. Users of the Diamond Creek Road (FR 1102) and those visiting the areas adjacent to this road in the upper Deer Creek watershed would notice the haul road cut/fill disturbances upslope to the east and traffic along the haul/access road in this area. The Panel G West Haul/Access road itself would be restricted to mine personnel only during mining. This road would be partially reclaimed at the end of mining and turned over to the CNF to replace the current FS road along South Fork Deer Creek Canyon and along Deer Creek to the divide with Timber Creek. Some portions of this road corridor would not be reclaimed due to steep slopes; these unreclaimed strips would likely remain evident in the long-term. This would remain as a minor to moderate impact to scenic resources once reclamation occurs on the lower slopes.

When the FS traffic is routed onto the new road, the visual impact of the road disturbance would be lessened on drivers compared to the view they would have of the road disturbance from the existing FR 1102 because they would actually be on the road and not viewing it from a distance. Views to road users familiar with the route would change from the narrow tree-lined corridor (See photo in Chapter 3, View south along Diamond Creek Road) along the creek in places, to a wider disturbed/partially reclaimed corridor upslope from the creek.

<u>Power Line Between Panels F and G</u>
The power line for Panels F and G would extend for 4.6 miles from the south end of Panel E to Panel G through VQO Modification and Partial Modification lands. The trees would be cut in the 50-foot wide right-of-way for this power line, as needed. Overall, this disturbance would be a minor to moderate impact on the visual resources of the area. None of the power line would be visible from the Crow Creek Road. The portion of the power line and swath of cleared ROW between Panel F and G would likely be visible from the Wells Canyon Road (FR 146) east of the mouth of South Fork Deer Creek Canyon.

4.12.1.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications
<u>No Panel F North Lease Modification</u>
Without the North Lease Modification, there would be 23 fewer acres of VQO Modification lands disturbed, assuming the Alternate Panel F Haul/Access Road were also selected. If the Proposed Action Panel F Haul/Access Road was utilized, the reduction in disturbance from Mining Alternative A would be 2 acres. Motorized (viewer) access along FR 179 in the South Fork Sage Creek Canyon would be cut off in the same location as under the Proposed Action because both the Proposed Action Panel F Haul/Access Road and the Alternate Panel F Haul/Access Road both cross FR 179 in the same location and manner. Impacts to scenic resources would be generally the same as under the Proposed Action.

No Panel F South Lease Modification

There would be 138 acres less of VQO Modification lands disturbed with the smaller scale development of Panel F. There would be less of an impact to scenic resources for viewers from distant, upper elevation areas, but little difference to the overall proposed visual resources impacts under the full development of Panel F.

Access to FR 179 in the South Fork Sage Creek Canyon would be cut off in the same location as under the Proposed Action. However, since overall mine life would be shorter by approximately two years, this access would be returned sooner than under the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills

This alternative would essentially affect visual resources the same as the Proposed Action. The 8-acre highwall remaining in Panel G as part of the Proposed Action would be completely reclaimed under this alternative. However, this change would likely only be noticeable to hikers on Trail 404, which would be located near the highwall. The external overburden fill for Panel F and the East External Overburden Fill for Panel G would have lower profiles that may be less noticeable when reclaimed under this alternative than under the Proposed Action or Alternative A. Reclamation activities would be delayed (by 6 to 7 months) at the end of mining.

Mining Alternative C – No External Overburden Fills at All

Visual impacts would be initially be the same as those for the Proposed Action; however, the final topography would be gentler and more similar to original topography, since no highwalls would be exposed, and the open pit remaining in Panel F under the Proposed Action would be fully reclaimed under Alternative C. All the external overburden areas would be restored to approximate original contours and reclaimed so their long-term visual effects would be less than the Proposed Action and Alternatives A and B. The duration of the mine activities would be extended by 12 months under this alternative.

Mining Alternative D – Infiltration Barriers on Overburden Fills

This alternative would affect visual resources generally the same as the Proposed Action; however, the areas of potential surface disturbance/reclamation would increase. The potential expansion of the Panel F disturbance to obtain additional Dinwoody formation and temporarily store it would disturb an additional 104 acres in VQO Modification areas. The potential expansion of the disturbed area for Panel G would disturb an additional 33 acres in VQO Partial Modification areas and would be visible from Wells Canyon Road.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road

This alternative would have minor effects to visual resources because it is typical to see power lines along roads. It would minimize the power line impact since it would be along the haul/access road, a disturbed area, rather than across undisturbed area.

Mining Alternative F – Electrical Generators at Panel G

This alternative would affect visual resources about the same as the Proposed Action. Impacts would be slightly less since there would be no power line in association with this alternative.

BEFORE MINING

AFTER RECLAMATION

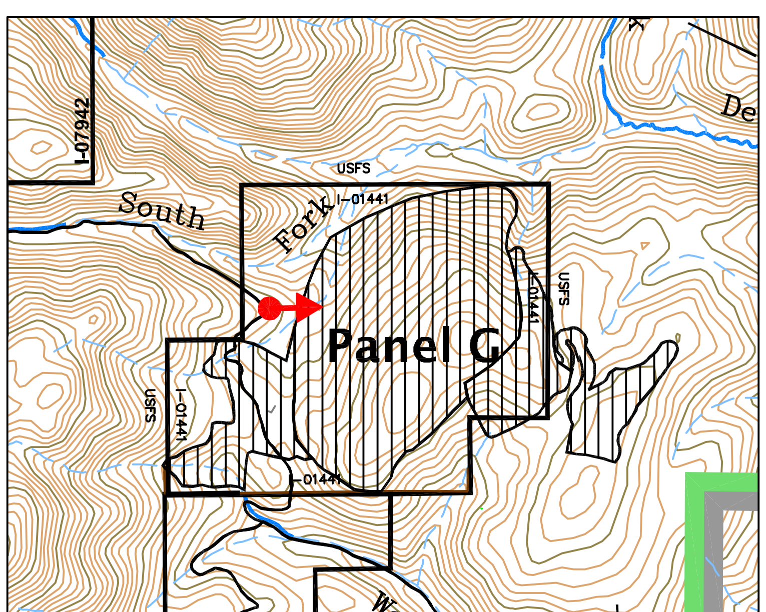


PHOTO LOCATION AND DIRECTION

NOT TO SCALE

Figure 4.12-1
Visual Simulation
Looking East Toward Panel G
Smoky Canyon Mine
Panels F and G

4.12.1.3 Transportation Alternatives

Alternative 1 – Alternate F Panel Haul/Access Road
The Alternate Panel F Haul/Access Road would disturb approximately 46 acres in VQO Modification areas and would affect scenic resources about the same as the Proposed Panel F Haul/Access Road.

Alternative 2 – East Haul/Access Road
This alternative route would disturb 216 acres across VQO Modification and Partial Modification lands; non-motorized access across the haul/access road would continue during mine operations. Portions of this haul road would be visible to residents and travelers along Crow Creek Road. The main visual impacts of this road would occur from its presence in lower Nate Canyon and the mouth of Deer Creek Canyon. In these areas, large road cuts and fills would be visible from along the Crow Creek Road. The haul/access road in lower Nate Canyon would be clearly visible from along the Crow Creek road for about 2 miles south of Nate Canyon. The haul/access road disturbance in Lower Nate Canyon would be quite obvious from the Peter Riede property (**Figure 3.10-2**). The road fill across lower Deer Creek and the approaches to this fill would be visible from the Crow Creek Road at the mouth of Deer Creek Canyon. Less than 0.25 mile of the haul/access road where it crosses the hillside north of the upper Quakie Hollow drainage would be visible from the Osprey Ranch. The rest of the haul/access road would not be visible from the Dickson Whitney and Osprey Partners property (**Figure 3.10-2**). The presence of this road would have local, moderate, and short-term impacts to scenic and aesthetic resources in this portion of the Crow Creek Valley.

Alternative 3 – Modified East Haul/Access Road
This alternative would disturb 276 acres across VQO Modification and Partial Modification lands. The Deer Creek crossing of this road would be about one mile upstream from the Alternative 2 alignment and would not be visible from the Crow Creek Road. However, the large road cuts and fills on either side of the canyon would be readily apparent from the Crow Creek Road at the mouth of Deer Creek Canyon. Fishing or other recreation in lower Deer Creek drainage would include views of these haul/access road cuts on both sides of this steep drainage for a mile. This road would cause moderate, local impacts to scenic and aesthetic resources for Deer Creek drainage and portions of Crow Creek valley.

Alternative 4 – Middle Haul/Access Road
This alternative would disturb 192 acres of VQO Modification and Partial Modification lands. This haul/access route would cross several hiking trails (093, 102, 403, and 404) in the upper parts of Deer Creek watershed. Less than 0.1 mile of this haul/access road would be visible from the Crow Creek Road at the mouth of Deer Creek Canyon. More of the haul/access road would be visible from the Wells Canyon Road (FR 146) at viewpoints near the east mouth to South Fork Deer Creek Canyon. Scenic/aesthetic impacts would include large road cuts/fills and haul truck traffic through this currently undisturbed area. This would be a moderate, local temporary impact to motorists and hikers passing through this area.

Alternative 5 – Alternate Panel G West Haul/Access Road
This alternative would disturb 226 acres in VQO Modification and Partial Modification lands. Effects would be similar to the Proposed Action West Haul/Access Road except in South Fork Sage Creek drainage where Alternative 5 would veer to the south out of the drainage at Sage Meadows averting any visual impact of the road on recreationists along South Fork Sage Creek drainage.

Alternative 6 – Conveyor from Panel G to Mill

The conveyor alternative would disturb 61 acres in a narrow strip from Panel G to the southern end of the existing Panel E mining operations, across mainly VQO Modification lands. Transportation of ore on the conveyor from Panel G would be less visible and noticeable to visitors in the CNF than on any of the haul/access roads. The conveyor structure would be 6 feet wide and 7 feet tall and located on a 50-foot wide right-of-way. It would be visible from certain hiking trails that cross it (404, 093, 402, and 092) and at creek crossings. The conveyor would not be visible from the Crow Creek Road. The southern portion of the conveyor would be visible from the Wells Canyon Road (FR 146) near the east mouth of South Fork Deer Creek Canyon.

The conveyor would produce a minor, local scenic impact to distant viewers for the life of mine operation. With removal of the conveyor and subsequent reclamation, this transportation alternative would have the least transportation-related impacts to scenic resources in the Project Area.

Alternative 7 – Crow Creek/Wells Canyon Access Road

This alternative would disturb 114 acres in VQO Partial Retention lands in the Crow Creek/Wells Canyon road corridor. Visual impacts from the development of the new Wells Canyon road upslope from and north of the existing FR 146 would be confined mainly to the narrow Wells Canyon corridor. This new access road would remain at the end of mining, and the existing FS 146 road would be decommissioned and reclaimed.

Re-aligned and improved sections of the Crow Creek Road would include some visible road cuts and fills. Increased traffic would be evident to residents along Crow Creek Road. This alternative would have local, moderate impacts to scenic/ aesthetic resources of the Crow Creek Road corridor.

Alternative 8 – Middle Access Road

This alternative would disturb 99 acres of VQO Partial Retention and Modification lands. Its visual impacts would be similar, but of a lesser scale, to the Middle Haul/Access Road because its alignment would be very similar to that haul/access road. Scenic/aesthetic impacts would include large road cuts/fills and haul truck traffic through this currently undisturbed area. This would be a local, moderate, temporary impact to hikers and motorists passing through the area.

4.12.1.4 No Action Alternative

Under the No Action Alternative, there would be no mining impacts to the scenic and aesthetic resources in the Project Area.

4.12.2 Mitigation Measures

Over time, the proposed reclamation, included as part of the Proposed Action would provide adequate mitigation to the landscape changes and visual impacts imposed by mining. No additional mitigation measures are proposed.

4.12.3 Unavoidable (Residual) Adverse Impacts

Upon completion of reclamation, the visual qualities of the Project Area would contrast in color, texture, and form from patches of undisturbed landscape. Reclamation would not entirely restore the exact forest condition that existed prior to the mining on the disturbed areas. Residual adverse impacts to scenic and aesthetic resources would include the remaining unreclaimed areas of highwall and pit floor that are visible to hikers or other recreationists in the area. Unreclaimed portions of road corridors would remain evident in the long-term, until natural processes restore some vegetation cover on these steeper slopes.

4.12.4 Relationship of Short-Term Uses and Long-Term Productivity

Once reclamation is established, the overall area would be expected to provide similar scenic views to motorists as are currently available.

4.12.5 Irreversible and Irretrievable Commitments of Resources

The irreversible commitment of resources includes the conversion of forest lands to mining uses, loss of vegetation, and topographic changes which result from large scale excavations. These original characteristic landscapes cannot be re-created. Forest lands with Partial Modification and Modification VQO's would be converted to mining lands with VQO of Maximum Modification.

4.13 Cultural Resources

Issue:
Cultural resource sites may be impacted in the Project Area.

Indicators:
Number of cultural sites eligible for the National Register of Historic Places (NRHP) impacted by the Project.

Issue:
The heritage values (resources) of the Project Area may be compromised by the Project.

Indicators:
Acres to be removed from historic land uses with local heritage value, and duration of the mining activities.

4.13.1 Direct and Indirect Impacts

Potential impacts to NRHP eligible or unevaluated cultural resource sites by each mining and transportation alternative are summarized in **Table 4.13-1**.

TABLE 4.13-1 CULTURAL RESOURCE SITE IMPACTS BY ALTERNATIVE

ALTERNATIVE	SITE NUMBER (STATE OR FS)	SITE TYPE	ELIGIBILITY	IMPACT?
PROPOSED ACTION*				
Panel F	No eligible sites			
Panel F South Modification	No sites			
Panel F North Modification	No sites			
Panel G	CB-342	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to mining activities/construction
Panel G West Haul/Access Road	10CU213 (CB-222)	Trapper's Cabin	Eligible	Outside APE; possible secondary impacts when road becomes public access
	CB-342	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to construction of road and topsoil stockpile
	CB-317	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to construction of road
Panel F Haul/ Access Road	No eligible sites			
Power Line Corridor	No eligible sites			
ALTERNATIVE D				
On lease Dinwoody Borrow Pits/Stockpiles	CB-342	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to borrow pit
TRANSPORTATION ALTERNATIVES				
Alternative 1 – Alternate Panel F Haul/Access Road	No sites			
Alternative 2 -East Haul/ Access Road	CB-342	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to construction of road
Alternative 3 – Modified East Haul/Access Road	CB-342	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to construction of road
Alternative 4 -Middle Haul/ Access Road	No eligible sites			
Alternative 5 – Alternate Panel G West Haul/Access Road	CB-317	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to construction of road
Alternative 6 -Conveyor from Panel G to Mill	No eligible sites			
Alternative 7 – Crow Creek/Wells Canyon Access Road	CB-342	Arborglyphs	Unevaluated	Loss of features (i.e. trees), resulting in loss of integrity, due to construction of road
Alternative 8 – Middle Access Road	No sites			

* Mining Alternatives B and C have the same footprint as the Proposed Action; therefore impacts to cultural resources would be the same for each of these. Mining Alternative A is within the footprint of the Proposed Action. Mining Alternative E would utilize whatever Transportation Alternative corridor was selected with no additional disturbance.

4.13.1.1 Proposed Action

<u>Panel F, Including Lease Modifications</u>

No eligible or unevaluated cultural resource sites are located in Panel F or the associated soil stockpile areas; there would be no impacts to eligible cultural resources.

Panel F would disrupt approximately ½ mile of Trail 402 along Manning Creek, utilized for livestock trailing, during active mining in this immediate area, temporarily interrupting the continuous route between the Crow Creek side of Manning Creek, and Sage Meadows. Non-motorized access through this area would be restored when it is safe to do so. This would be a minor to major impact to the heritage resource of traditional livestock trailing by permittees.

Panel F Haul/Access Road
No eligible or unevaluated cultural resource sites are located in the Panel F Haul/Access Road corridor. There would be no impacts to eligible cultural resources.

Panel G
A large arborglyph site (Forest # CB-342) is located in this lease area. Insufficient data regarding the NRHP unevaluated arborglyph site (as it pertains to local and regional history) precludes a determination of eligibility for the NRHP. Further documentation, following alternative selection, would be necessary should this alternative be chosen. Impacts to this site due to mining would be moderate to major (see page 4-1 for definitions), as components of the site (i.e. trees with carvings) would be removed during mining activities resulting in loss of integrity and a loss of data. The impacts to this site would be site-specific, with local long-term losses of the resource.

Panel G West Haul/Access Road
Two sites (Forest # CB-317 and CB-342) are located within this corridor. Insufficient data regarding the two arborglyph sites (as they pertain to local and regional history) precludes a determination of eligibility for the NRHP. Further documentation, following alternative selection, would be necessary should this alternative be chosen. Impacts to these unevaluated sites would be moderate to major, as components of the site (i.e. trees with carvings) would be removed during road construction activities, resulting in loss of integrity and a loss of data. In addition, there is a NRHP eligible historic cabin (10CU213 or Forest # CB-222) near the proposed road corridor. This portion of the Panel G West Haul/Access Road would not be fully reclaimed after mining; rather, it would become a public access road, replacing the current segment of FR 146 (Diamond Creek Road). An improved public access road could encourage additional casual visitation to the general area, increasing the potential for secondary impacts (such as vandalism) to the cabin site that would be visible from the road.

Power Line Between Panels F & G
No cultural resource sites are present within the power line corridor.

In summary, under the Proposed Action two unevaluated sites would be adversely impacted. Impacts to these sites would be moderate to major and site-specific with minor regional losses. These sites contribute to the heritage values of livestock ranching in the Project Area. The Proposed Action would disturb 1,340 acres within grazing allotments (see **Section 4.9**) and restrict livestock trailing corridors during mining and reclamation of the Project. In addition it would remove ½ mile of Trail 402 (**Section 4.10**) utilized for trailing livestock onto the Deer and Manning Creek Allotments. Impacts to heritage resources would be minor to major and site-specific with minor regional losses.

4.13.1.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications
No Panel F South Lease Modification
There are no known cultural resource sites located in the Panel F South Lease Modification, thus there would be no additional impacts or no reduction of impacts as a result of this option.

No Panel F North Lease Modification
There are no known cultural resource sites located in the Panel F North Lease Modification, thus there would be no additional impacts or no reduction of impacts as a result of this option.

Impacts to heritage resources would be similar to the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills
This Mining Alternative would have the same mining footprint as the Proposed Action; therefore the impacts would be the same as the Proposed Action.

Impacts to heritage resources would be similar to the Proposed Action.

Mining Alternative C – No External Overburden Fills at All
This Mining Alternative would have the same mining footprint as the Proposed Action; therefore the impacts would be the same as the Proposed Action.

Impacts to heritage resources would be similar to the Proposed Action.

Mining Alternative D – Infiltration Barriers on Overburden Fills
This Mining Alternative would include an additional 137 acres of disturbance (on lease Dinwoody Borrow Pits) in addition to that of the Proposed Action. The cultural resource inventory found that a small portion of CB-342 is located in one of the proposed Dinwoody borrow pits in the Panel G lease, a site that would also be impacted by the Proposed Action. Therefore, the impacts to cultural resources would be similar to the Proposed Action.

Impacts to heritage resources would be similar to the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road
This Mining Alternative would have the same mining footprint as the Proposed Action, minus the direct power line corridor, and would utilize whatever Transportation Alternative were selected; therefore, the impacts would be the same as the Proposed Action.

Impacts to heritage resources would be similar to the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G
This Mining Alternative would have the same mining footprint as the Proposed Action, minus the direct power line corridor; therefore, the impacts would be the same as the Proposed Action.

Impacts to heritage resources would be similar to the Proposed Action.

4.13.1.3 Transportation Alternatives

Alternative 1 – Alternate Panel F Haul/Access Road
No eligible cultural resource sites are present in this corridor; therefore, there would be no additional impacts if this transportation alternative were selected.

There would be negligible impacts to heritage resources from Transportation Alternative 1.

Alternative 2 – East Haul/Access Road
One NRHP unevaluated cultural resource site (CB-342) is located on the southwest end of this transportation alternative. Insufficient data regarding the unevaluated arborglyph site (as it pertains to local and regional history) precludes a determination of eligibility for the National Register of Historic Places. Further documentation of the site, following alternative selection, would be necessary should this alternative be chosen. Impacts to this site due to road

development activities would be major, as components of the site (i.e. trees with carvings) would be removed resulting in loss of integrity and a loss of data. The impacts to this site would be site-specific, with local long-term losses of the resource.

In addition to the heritage resource impact of disturbance to the grazing allotments from the Proposed Action and Alternatives, this Transportation Alternative 2 would cross Forest Trail 402 in an additional area, a trail used for driving sheep to the Deer and Manning Creek Allotments. Non-motorized access across the haul/access road would continue during mine operations. Impacts to heritage resources would be similar to the Proposed Action.

Alternative 3 – Modified East Haul/Access Road
One NRHP unevaluated cultural resource site (CB-342) is located on the southwest end of this transportation alternative. Insufficient data regarding the unevaluated arborglyph site (as it pertains to local and regional history) precludes a determination of eligibility for the National Register of Historic Places. Further documentation of the site, following alternative selection, would be necessary should this alternative be chosen. Impacts to this site due to road construction activities would be major, as components of the site (i.e. trees with carvings) would be removed, resulting in loss of integrity and a loss of data. The impacts to this site would be site-specific, with local long-term losses of the resource.

In addition to the heritage resource impact of disturbance to the grazing allotments from the Proposed Action and Alternatives, this Transportation Alternative 3 would cross Forest Trail 402 in an additional area, a trail used for driving sheep to the Deer and Manning Creek Allotments. Non-motorized access across the haul/access road would continue during mine operations. Impacts to heritage resources would be similar to the Proposed Action.

Alternative 4 – Middle Haul/Access Road
No eligible cultural resource sites are located in the Middle Haul/Access Road corridor; therefore, there would be no additional impacts if this transportation alternative were selected.

Impacts to heritage resources would be similar to the Proposed Action.

Alternative 5 – Alternate Panel G West Haul/Access Road
One NRHP unevaluated cultural resource site (CB-317 – arborglyph site) is located within the Alternate West Haul/Access Road. Insufficient data regarding the unevaluated arborglyph site (as it pertains to local and regional history) precludes a determination of eligibility for the National Register of Historic Places. Further documentation of the site, following alternative selection, would be necessary should this alternative be chosen. Impacts to this site due to road development would be moderate to major, as components of the site (i.e. trees with carvings) would be removed during construction resulting in loss of integrity and a loss of data. The impacts to this site would be site-specific, with local long-term losses of the resource.

Impacts to heritage resources would be similar to the Proposed Action.

Alternative 6 – Conveyor from Panel G to Mill
No eligible cultural resource sites are located within the conveyor alternative corridor; therefore, there would be no additional impacts if this transportation alternative were selected.

Impacts to heritage resources would be similar to the Proposed Action.

Alternative 7 – Crow Creek/Wells Canyon Access Road
One NRHP unevaluated cultural resource site (CB-342 – arborglyph site) is located within the East Access Road via Crow Creek and Wells Canyon. Insufficient data regarding the unevaluated arborglyph site (as it pertains to local and regional history) precludes a determination of eligibility for the National Register of Historic Places. Further documentation, following alternative selection, would be necessary should this alternative be chosen. Impacts to this site due to road development would be moderate to major, as components of the site (i.e. trees with carvings) would be removed during construction resulting in loss of integrity and a loss of data. The impacts to this site would be site-specific, with local long-term losses of the resource. The segments of CB-318 and CB-319 in this area are considered ineligible due to previous impacts; therefore, there would be no impacts to either site within the Alternative 7 corridor.

Impacts to heritage resources would be similar to the Proposed Action.

Alternative 8 – Middle Access Road
No eligible cultural resource sites are located within this transportation alternative corridor; therefore, there would be no additional impacts if this transportation alternative were selected.

Impacts to heritage resources would be similar to the Proposed Action.

4.13.1.4 No Action Alternative

There would be no impacts to eligible cultural resources or heritage resources from the Project under the No Action Alternative.

4.13.2 Mitigation Measures

The known eligible sites near mining activities would continue to be avoided by current mining activities and would be monitored annually by a professionally trained archaeologist under the supervision of the CTNF Forest Archaeologist for possible impacts.

Monitoring of CB-222 (Trapper's cabin), under the supervision of the CTNF Forest Archaeologist, is recommended in order to assess the potential for indirect effects of improving a public access road near the site (Panel G West Haul/Access Road).

The two unevaluated ("insufficient information to evaluate") cultural resource sites would require additional study/testing prior to implementation of the Proposed Project if the chosen alternatives would impact them. In order to evaluate the sites and mitigate impacts, the proposed mitigation measures would include:

- An overlay of historic and current grazing allotments with known arborglyphs sites and livestock trails,
- Interviews of current permittees of the seven allotments and possibly local ranchers about current and past corridors and trails (as well as campsites, water sources, etc.),
- Development of a thematic context statement. Research of names in arborglyphs and development of histories on local ranching families, ethnicities, settlement, etc.,
- Core sampling of select trees to support age/dating issues, and

- GPS coordinates for arborglyph group locations.

These mitigation measures would not only provide the needed data to evaluate the sites for the NRHP, but would also mitigate the adverse impacts if the sites were deemed eligible.

If unanticipated cultural materials or historic sites are encountered during mining, the CTNF Forest Archaeologist would be notified, and operations would be halted in the vicinity of the discovery until evaluated by the Forest Archaeologist or a professionally trained archaeologist in consultation with the CTNF Forest Archaeologist and a mitigation plan developed, if necessary.

4.13.3 Unavoidable (Residual) Adverse Impacts

Unavoidable or residual adverse impacts to cultural resource sites would include compromised site integrity and loss of data due to physical damage to the sites (i.e. removal of trees with carvings). Also, the presence of upgraded public access roads could lead to increased casual visitation to nearby site locations resulting in greater vulnerability of site disturbance and vandalism.

4.13.4 Relationship of Short-Term Uses and Long-Term Productivity

The short-term use of natural resources during mining activities could result in adverse effects to cultural resource sites located within the Project Area. If sites are damaged or destroyed during development, mining, or associated activities, significant information could be lost. Information and data retrieved through mitigation measures would represent short-term use of cultural resources at the expense of future research opportunities. Therefore, long-term productivity would be lost.

4.13.5 Irreversible and Irretrievable Commitments of Resources

Any loss of context or destruction of NRHP eligible or unevaluated cultural resource sites would constitute an irreversible commitment of that resource. This loss would be site-specific, as well as a loss of cumulative data on the local and regional level.

4.14 Native American Concerns and Treaty Rights Resources

Issue:
The Project activities may impact the ability of Shoshone-Bannock tribal members to exercise their Treaty Rights and may impact resources of cultural significance to tribal members.

Indicators:
Changes in water quality and quantity of both surface and groundwater.

Acres and types of vegetation disturbed versus acres and types of vegetation replanted.

Acres of wetlands disturbed.

Increased uptake by wildlife and vegetation of contaminants of concern in mining-disturbed areas and areas that are reclaimed.

Changes in types of aquatic resources and comparison with undisturbed habitats in the Project Area.

Acres of access and recreation areas that would be available or unavailable and the duration of mining activities.

Visibility of disturbances to adjoining areas.

Known prehistoric cultural resource sites impacted by the Project.

Issue:
The Project would diminish the locations available to exercise Treaty Rights.

Indicator:
Change in land status and accessibility.

4.14.1 Direct and Indirect Impacts

Administration of Indian Treaty Rights, associated with the Fort Bridger Treaty of 1868, is the responsibility of the federal government. Consultation with the Tribes has yielded important issues regarding treaty resources that would potentially be affected by the Project. As stated in Article 4 of the Fort Bridger Treaty of 1868, the Shoshone-Bannock Tribes "…shall have the right to hunt on the unoccupied land of the United States…" This proposal is to disturb about 1,340 acres of the unoccupied federal land available in southeast Idaho. The following analysis describes Project effects to Native American concerns and Treaty Rights.

Alternatives that change the land status, restrict or alter the ability of the Shoshone-Bannock Tribes to exercise their Treaty Rights, or affects the physical integrity of a sacred site, traditional cultural property, and/or location of traditional importance, it is considered an impact.

Land Status
There would be no change in land ownership status. The affected land would remain under federal ownership while the rights to mine phosphate are granted to Simplot. The use of lands for mining operations and associated facilities would be temporary; lands would be reclaimed and structures removed after mining was completed.

Phosphate mining, directed under the Mineral Leasing Act of 1920, would be considered a temporary surface use and would not change the occupancy of the federal land under lease. This is different from other types of mining conducted under the 1872 Mining Law (such as gold mining). There would be a short-term, temporary loss of land for exercising Treaty Rights under the Proposed Action and action alternatives, but it is minor to negligible (see page 4-1 for definitions) in comparison to the available unoccupied federal lands in southeastern Idaho.

Land Access/Transportation
There would be negligible to minor effects to existing transportation routes under the proposed mining and transportation alternatives (**Section 4.15**). Existing public access roads, including Wells Canyon Road that would be crossed by the Proposed Action Panel G Haul/Access Road, would remain open under the Proposed Action and Alternatives. Public motorized access to active mine areas, including haul/access roads, would be restricted during the life of the mine. Public non-motorized access (i.e. walking, hiking, horse) would be unrestricted during mining,

except to protect personal safety in specific areas where active mining operations were occurring. The impact to land access for exercising Treaty Rights under the Proposed Action and Action Alternatives would be local, temporary, and negligible.

Socioeconomics and Environmental Justice
See **Section 4.16** for impacts to socioeconomics. According to Simplot, few mine employees are Tribal members; therefore, socioeconomic impacts to the Tribes due to continued operations or early closure of the mine and/or the Don Plant would be negligible.

Environmental Justice is discussed in **Section 4.17**. This Project would not cause disproportionately high and adverse effects on any minority or low-income populations as per EO 12898 regarding Environmental Justice. Therefore, there would be no impacts to the Tribes (EO 12898 Section 4-4) under Environmental Justice.

4.14.1.1 Impacts Common to All Action Alternatives

Alternatives would impact various resources which tribal Treaty Rights rely upon as described below. There would be temporary impacts to the access of those resources. None of the Action Alternatives would change the status of federal lands on the CTNF.

Tribal Historical/Archaeological Sites
There would be no impacts to tribal historic/archaeological sites as no Tribal historic or prehistoric archaeological sites have been identified within the current Project boundaries. See **Sections 3.13** and **4.13** Cultural Resources.

Rock Art
No occurrences of rock art have been identified in the Project Area.

Sacred Sites (EO 13007)/Traditional Cultural Properties (NHPA)
No sacred sites have been identified in the Project Area.

Traditional Use Sites
The Tribes have stated that there are traditional use sites in the Project Area. Those that may occur within an area of proposed disturbance would be affected. The landscape in the Project Area would be permanently altered by the development of lands for mining and transportation, under any of the action alternatives. The initial mining-related developments would cause major changes to the local landscape. Changes to the landscape would have minor to major impacts on nearby ceremonial or traditional use sites.

Water Resources
Impacts to water resources are discussed in detail in **Section 4.3**. Runoff from mining disturbances would be contained which would minimize contribution of sediment to local streams and would also decrease the amount of annual runoff to these drainages by a minor amount. Sedimentation of streams due to haul/access roads would be controlled with BMPs although some minor sediment contributions to streams would still occur.

Pumping the proposed water supply well at Panel G is not anticipated to noticeably affect flows of streams or springs in the area.

Development of the mine panels and some transportation features would eliminate some existing small springs and seeps and potentially decrease flows to other such features. The CNF management plan requires replacement of these water sources.

Groundwater impact modeling indicates that infiltration of precipitation through seleniferous overburden in pit backfills and external overburden fills would cause increases in selenium concentrations in lower Deer Creek, lower South Fork Sage Creek, and some reaches of Crow Creek immediately below the confluences with these tributaries. The resulting selenium concentrations for the Proposed Action and Alternatives A through C are estimated to exceed the cold water criterion for selenium that is intended to protect aquatic life. The resulting concentrations would be well below the drinking water levels set for protection of human health or grazing animals.

Wetlands

Approximately 1.96 acres of wetlands and 12,370 linear feet Waters of the U.S. would be impacted by the Proposed Action. Since the majority of these sites would be lost to excavation of the pits or covered by overburden fills, the wetlands would be lost as wildlife habitat, sites of flood attenuation and sediment/nutrient/toxicant retention, as well as other wetland functions and values. These sites would however, be mitigated on- or off-site. See **Section 4.6** for a detailed discussion.

Fisheries

Impacts to Fisheries and Aquatics resources are addressed in **Section 4.8** of this EIS. Among the components of the Proposed Action, only the Panel G West Haul/Access Road would directly impact perennial streams (with two culverted crossings), and some transportation alternatives also involve perennial stream disturbance. Direct impacts to cutthroat trout may occur via sedimentation as culverts are installed or removed or from Project roads themselves. Impacts to fish from culvert installation are expected to be local, short-term, and minor.

Despite the implementation of environmental protection measures, some sediment contribution to streams from roads is expected. Sedimentation into streams would diminish the suitability of those streams as habitat.

Selenium accumulation in the aquatic habitats of the Project Area would be an adverse indirect impact of the Proposed Action. Environmental protection measures in **Section 2.5**, **Appendix 2C,** and the SWPPP describe how Simplot plans to minimize the risk of selenium accumulation in Study Area streams. If sediment controls at the mining operations are implemented as described, seleniferous sediment should be contained on site and impacts from seleniferous sediment accumulation in local streams would be negligible. For the mining alternatives that do not include an infiltration barrier in the caps over seleniferous overburden, modeling estimates that selenium concentrations in lower Deer Creek, lower South Fork Sage Creek, and parts of Crow Creek immediately below these tributaries would exceed State cold water criterion for protection of aquatic life.

Vegetation

As discussed in **Section 4.5**, vegetation would be cleared from approximately 1,340 acres under the Proposed Action. This would include any plants of traditional importance to the Tribes as discussed in **Section 3.14**.

Concurrent with mining, reclamation would include revegetation with short-lived grass species intended to help stabilize the reclaimed surfaces from erosion as well as long-lived native bunch grasses and forbs. Reclamation would include the species indicated in **Section 2.4**. The goal of the selected revegetation mix is to establish healthy native bunch grass communities that are structurally diverse and would allow succession of native species over time. Other native forbs, shrubs, and trees would be seeded or planted in clusters were they are most likely to establish. These species have not been selected yet and could include some of the traditionally important plants indicated in **Section 3.14**. This would constitute a temporary and minor impact to Tribal access of vegetation in the Project Area.

About 71 acres would remain unreclaimed after mining of Panels F and G. These are steep highwall and road cut areas and part of an open pit in Panel F. Native vegetation adapted to rocky areas with no topsoil would gradually colonize these areas. This would constitute a local, long-term, and minor impact to Tribal access of vegetation in this part of the Project Area.

There would be the potential indirect impact of increased uptake of selenium by volunteer plants growing on unreclaimed, disturbed mining areas of Panel F and G. Environmental protection measures for selenium control, including capping all seleniferous overburden fill with at least 4 feet of low selenium chert and then covering this cap with salvaged topsoil would be used to reduce the potential for selenium accumulation in vegetation growing on reclaimed mine disturbances.

Analysis of the pit backfill design predicts that reclamation vegetation would not exceed standards for COPC concentrations in the Area Wide Risk Assessment.

<u>Noxious Weeds and Invasive Species</u>
The Project would have negligible potential to affect the spread or locations of noxious weeds since management/mitigation measures would be in effect for control. The CTNF Integrated Pest Management program provides BMPs for weed control and species specific techniques. The Smoky Canyon Mine is inspected on a monthly basis. Additional information can be found in **Section 4.5**. Impacts due to the spread of noxious weeds or invasive species would be negligible under the Proposed Action or Action Alternatives.

Wildlife
A detailed discussion of impacts to wildlife is found in **Section 4.7**. The Proposed Action and Alternatives are expected to displace wildlife through habitat impacts and avoidance zones and therefore, would impact access to wildlife treaty resources.

<u>Big Game</u>
Direct impacts to big game individuals may occur by vehicle collision on Project roads due to increased traffic. Road collisions would be the most common source of direct mortality; all other impacts would involve displacement and alterations of normal movement routes.

Regarding elk, one observed fall use area near Panel F and the Panel G West Haul/Access Road would be affected due to direct disturbance and noise for the duration of the Proposed Action; displacement from this area may lead to increased competition among elk in adjacent habitat. In addition, a known spring calving ground at Sage Meadows for elk lies within one to two miles of Panel F and may be disturbed by noise, specifically the southwest portion of the area by its proximity to the West Haul/Access Road. One controlled study of the effects of mine disturbance on elk calves in southeast Idaho found that cow/calf pairs remained together but abandoned their traditional calf-rearing area when exposed to human and simulated mine disturbance (Kuck et al. 1985).

The possibility of selenium accumulation by big game would exist if individuals routinely consume vegetation or drank water containing elevated levels of selenium. If this were to occur at all, those animals with a larger range would receive a smaller dose. Higher-level bioaccumulation would then be possible in larger predators (e.g., gray wolf) that consume these herbivores. Adverse impacts of selenium accumulation in reclaimed mining disturbances of Panels F and G are unlikely; however, as the Proposed Action includes design features intended to minimize the potential for selenium uptake in reclamation vegetation on overburden disposal areas. According to a recent assessment by NewFields (2005), risk from selenium in vegetation in the Smoky Canyon Mine area appears to be primarily restricted to sections of overburden disposal areas that are not fully reclaimed or were reclaimed prior to more recently developed reclamation practices that involve placing low selenium chert overburden as a cap over seleniferous overburden fills. Among vegetation samples from reclaimed areas of Smoky Canyon Mine Panels A, D, and E, forage exceeded removal action levels only at Panel A. Selenium concentrations in the more extensively reclaimed D Panel samples were lower than or approximately equal to the removal action level (NewFields 2005).

<u>Wolves</u>
Wolves would possibly alter their normal movement patterns to avoid the mining disturbance, but no direct impacts (i.e. mortality) would be expected.

<u>Bald Eagles</u>
Some potential bald eagle roost trees would be removed, and noise would have the potential to displace wintering bald eagles into adjacent suitable habitat. There is the potential for the indirect impact of selenium bioaccumulation in wintering bald eagles that may feed on waterfowl and fish living in specific reaches of Deer Creek, South Fork Sage Creek, and Crow Creek that would be affected by increased selenium concentrations under the Proposed Action and mining alternatives A, B, and C, although this would be unlikely. Mining Alternative D would mitigate this concern.

<u>Small Mammals and Birds</u>
Any greater sage grouse individuals in the Project Area would be displaced, and noise or increased human presence may cause moderate effects to birds in the vicinity for the duration of the Proposed Action. No direct mortality is expected.

Regarding rabbits, rockchucks, and squirrels, individuals in the mining panels or road footprints would be displaced. Displaced individuals may cause increased competition in adjacent populations that may lead to increased mortality or decreased reproductive rates.

Small herbivorous mammals sampled from reclaimed areas within Smoky Canyon Mine Panels A, D, and E were found to have elevated levels of selenium (**Section 3.7**), but accumulation of selenium would be minimized in small mammals by reclamation measures (cap) implemented for Panels F and G. These measures were not implemented in the areas where the contaminated animals were found.

The impact to wildlife for exercising Treaty Rights in the Project Area under the Proposed Action and Action Alternatives would be minor to major and short-term to long-term depending on species.

Access to Treaty Resources
Access, or the continued availability of the traditional natural resources, would be affected by the Project. The temporary loss of approximately 1,340 acres of land to mining disturbance and the associated impacts to Treaty Rights resources, as discussed herein and in the associated sections, would constitute a local, short-term, minor to major adverse impact to resource access for the exercise of Treaty Rights in the Project Area. As mining progresses and reclamation is maintained concurrent with mining, areas of limited access would be less than 1,340 acres. After reclamation, access would be restored as vegetation would be replanted on most of the disturbed area, wildlife would return, and water would be usable.

Recreation
There are no developed or improved recreation sites within the proposed Project Area. There are no designated Tribal recreation sites within the proposed Project Area. **Section 4.10** addresses impacts to recreation. There would be impacts to solitude, and the temporary loss of dispersed recreation opportunity on the area disturbed by proposed mining and transportation alternatives. The opportunity for recreation uses would be re-established on these areas following mining and reclamation activities. Recreation impacts to the Tribes would be local, short-term, and likely minor.

Air Quality
Specific information regarding effects to air resources is located in **Section 4.2** of this EIS. The Proposed Action and Alternatives would meet NAAQS and IDEQ air quality standards. There would be no air quality impacts to Treaty Rights.

4.14.1.2 Proposed Action

<u>Panel F, Including Lease Modifications</u>
This 515-acre area would not be available during mining to support Treaty Resources or for exercising Treaty Rights that depend on the existing surface resources within the footprint of the proposed disturbance area.

<u>Panel F Haul/Access Road</u>
This proposed 67-acre road corridor would not be available during mining to support Treaty Resources or for exercising Treaty Rights that depend on the existing surface resources within the footprint of the proposed disturbance area.

<u>Panel G</u>
This 513-acre area would not be available during mining to support Treaty Resources or for exercising Treaty Rights that depend on the existing surface resources within the footprint of the proposed disturbance area.

<u>Panel G West Haul/Access Road</u>
This proposed 217-acre road corridor would not be available during mining to support Treaty Resources or for exercising Treaty Rights that depend on the existing surface resources within the footprint of the proposed disturbance area. A portion of this road disturbance would be permanent when it is turned over to the CNF to replace parts of the Wells Canyon and Diamond Fork roads.

<u>Power Line Between Panels F and G</u>
An additional 28 acres would be disturbed by the power line corridor.

In total, there would be a temporary loss of about 1,340 acres of currently unoccupied federal lands, available to the Tribes under the 1868 Fort Bridger Treaty. Approximately 71 acres would remain unreclaimed. Due to concurrent mining and reclamation, there would be less than 1,340 acres of disturbance at any given time. After reclamation, vegetation would be replanted, wildlife would return, and water would be usable. Therefore, the Proposed Action would likely have a minor impact on access and ability of the Tribes to exercise Treaty Rights. The impact would be a site-specific loss of Treaty Resources and area available for the Tribes' use in which to exercise Treaty Rights.

4.14.1.3 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications

<u>No Panel F South Lease Modification</u>

The effects to Treaty Resources would be similar to those described in the Proposed Action for the areas that would be disturbed by mining and transportation activities. The 138 acres of proposed disturbance in the Panel F South Lease Modification would remain undisturbed and available for the exercise of Treaty Rights and to support Treaty Resources.

<u>No Panel F North Lease Modification</u>

The effects to Treaty Resources would be similar to those described in the Proposed Action for the areas that would be disturbed by mining and transportation activities. The 2 acres of mine panel area in the Panel F North Lease Modification would remain undisturbed and available for the exercise of Treaty Rights and to support Treaty Resources. If the Alternate Panel F Haul/Access Road were also selected, another 21 acres would remain undisturbed.

Mining Alternative A would have a minor impact on Tribal Treaty Resources, similar to the Proposed Action. There would be a temporary loss of 1,200 acres (rather than 1,340 acres) of currently unoccupied federal lands. The impact would be a site-specific, temporary loss of access to Treaty Resources and land in which to exercise Treaty Rights.

Mining Alternative B – No External Seleniferous Overburden Fills

The initial effects to Treaty Resources would be the same under this alternative as those described in the Proposed Action. The long-term area of unreclaimed disturbance under this alternative would be reduced by 8 acres because the remaining highwall in Panel G would be reclaimed.

Mining Alternative C – No External Overburden Fills at All

The initial effects to Treaty Resources would be the same under this alternative as those described in the Proposed Action. Under this alternative, all of the mine panel disturbances would be reclaimed.

Mining Alternative D – Infiltration Barriers on Overburden Fills

An additional 137 acres would be disturbed by the on-lease Dinwoody borrow pits and stockpile areas under this alternative. The initial effects to Treaty Resources would be similar under this alternative to those described in the Proposed Action. The long-term effects to water resources would decrease under this alternative due to incorporation of the infiltration barrier over seleniferous overburden areas. This would reduce selenium concentrations in streams affected by the proposed mining operation to levels that comply with all applicable aquatic life protection criterion.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/ Access Road

The effects to Treaty Resources would be similar to those described in the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G

The effects to Treaty Resources would be the same under this alternative as those described in the Proposed Action.

4.14.1.4 Transportation Alternatives

Alternative 1 – Alternate Panel F Haul/Access Road

Under this transportation alternative, 46 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 2 – East Haul/Access Road

Under this transportation alternative, 216 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 3 – Modified East Haul/Access Road

Under this transportation alternative, 276 acres would be disturbed in addition to the selected mining alternative. The impacts to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 4 – Middle Haul/Access Road

Under this transportation alternative, 192 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 5 – Alternate Panel G West Haul/Access Road

Under this transportation alternative, 226 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 6 – Conveyor from Panel G to Mill

Under this transportation alternative, 61 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 7 – Crow Creek/Wells Canyon Access Road

Under this transportation alternative, 114 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

Alternative 8 – Middle Access Road

Under this transportation alternative, 99 acres would be disturbed in addition to the selected mining alternative. The effects to Treaty Resources would be similar to those described in the Proposed Action. The impact would be a temporary, site-specific loss of Treaty Resources and land in which to exercise Treaty Rights.

4.14.1.5 No Action Alternative

The No Action Alternative would continue current management strategies for the Project Area. Trust Assets/Treaty Resources would not be affected by the Project. The unoccupied federal lands in the Project Area would remain open for the Tribes to exercise Treaty Rights.

4.14.2 Mitigation Measures

Mitigation measures, elicited during consultation with the Tribes, have been communicated to Simplot. These measures may include, but are not limited to: providing timber from the site to the Tribes in the form of firewood or teepee poles; purchase of reclamation seed from the Tribes; and incorporating plants of Tribal importance into reclamation seed mixes.

4.14.3 Unavoidable (Residual) Adverse Impacts

The temporary use of 1,340 acres of unoccupied federal lands for the Project would affect the exercise of Treaty Rights during the life of the mine and subsequent reclamation. The potential for the indirect impact of selenium uptake due to bioaccumulation in plants and animals utilized by the Tribes would be minimized by the environmental protection measures. The change in topography (open pits, exposed highwalls, overburden piles) as a result of mining and reclamation represents an unavoidable adverse impact to lands of cultural importance to the Tribes.

4.14.4 Relationship of Short-Term Uses and Long-Term Productivity

The general area of southeast Idaho is of cultural importance to the Tribes. Although no specific areas of traditional cultural significance have been identified within the Project Area, the short-term use of natural resources and the temporary unavailability of 1,340 acres of land during the mining activities would adversely impact the long-term productivity of these lands to provide Treaty Resources.

4.14.5 Irreversible and Irretrievable Commitments of Resources

The Proposed Action and Action Alternatives represent an irretrievable commitment of Treaty Rights Resources for the duration of mining, mining reclamation, and rehabilitation of the area. The loss of timber would be an irreversible commitment of resources. Conifer forests in particular may not recover to current stature and complexity for at least two hundred years (**Section 4.5**).

The change in topography (open pits, exposed highwalls, overburden piles) as a result of mining and reclamation represents an irretrievable commitment of lands of cultural importance to the Tribes.

4.15 Transportation

Issue:
Use of public roads in the Project Area for mine access may affect current traffic characteristics of the roads with increased risk of accidents and potential for spills.

Indicators:
Relative increase in traffic on public roads in the Project Area as a result of proposed mining activities, change in traffic types, and road design features to deal with this;

Changes in existing primary access to and through the CNF on county or open USFS roads caused by the mining and associated activities.

4.15.1 Direct and Indirect Impacts

Except where the Smoky Canyon Road (FR 110) crosses the Panel C Haul Road and there is a guard shack and gate, public, motorized access across or along the existing Smoky Canyon Mine haul/access roads is not currently allowed for safety reasons. This would continue to be the case for the haul/access roads in the Proposed Action and transportation alternatives, except for the proposed crossings of the Wells Canyon Road (FR 146) as part of the proposed Panel G West Haul/Access Road. Non-motorized (pedestrian, bike, or horseback), public access <u>across</u> the mine access/haul roads is currently allowed, and this would continue to be the case for the proposed haul/access roads of the Proposed Action and transportation alternatives. Non-motorized (pedestrian, bike, or horseback), public access <u>along</u> the mine access/haul roads is currently discouraged for safety reasons, and this would continue to be the case for any future haul/access roads.

The Proposed Action and action alternatives would affect a few existing motorized access routes in the CNF. Specific effects of the proposed mining operations and alternatives on motorized, public access along existing roads in the CTNF (Forest Routes) are described below. Impacts to public motorized access routes would be localized to where existing access routes would be physically affected by the proposed mining and transportation facilities. Most of these impacts would have durations equal to the mining operations themselves because reclamation of the mining and transportation facilities would restore the previous public access conditions. In some cases, permanent changes or improvements in the existing public access routes would be made during the proposed mining operations.

4.15.1.1 Proposed Action

<u>Panel F, Including Lease Modifications and the Panel F Haul/Access Road</u>
Mining Panel F, including the lease modifications, would not result in any direct or indirect impacts to improved public roads in the area. The current access provided to mine employees and vendors via Forest Route 110 (FR 110 Smoky Canyon Road) would continue to be used. The Panel F Haul/Access Road would connect the existing non-public Panel E mine road (FR 896) with the northern Panel F area. All mine employees and vendors needing to travel to Panel F would access the panel via this non-public, mine haul/access road.

The Panel F Haul/Access Road would affect an unimproved road that begins at the Crow Creek Road (FR 111) near Sage Creek, crosses private land, enters the CNF as FR 179, and terminates about ¾ mile up from the mouth of South Fork Sage Creek Canyon where it turns into Forest Trail 092, a non-motorized trail. This road would be crossed by the access/haul road fill for the proposed Panel F Haul/Access Road on USFS land at the mouth of South Fork Sage Creek Canyon (**Figure 3.10-1**). Motorized access into the South Fork Sage Creek drainage area west of the proposed Panel F Haul/Access Road on this unimproved road would be unavailable during the life of the Panels F and G mining operations. Non-motorized public access to this area would still be available across the haul/access road. This impact to public access through the CNF would be minor (see page 4-1 for definitions) since the majority of this road is located on private land, and primary access to this road from the Crow Creek Road is controlled by a locked, private gate. Once mining operations are completed, the Panel F Haul/Access Road would be removed, and motorized access into the South Fork Sage Creek drainage past this location would resume, if allowed under the Revised CNF Travel Plan due out in late 2005.

<u>Panel G, Including the Panel G West Haul/Access Road</u>
Under the Proposed Action, mine employees, vendors, and visitors would obtain access to Panel G via the current FR 110 access to the Smoky Canyon Mine, the existing non-public mine road to the south end of Panel E (FR 896), the Panel F Haul/Access Road, and then the Panel G West Haul/Access Road west and south to Panel G. The Panel G West Haul/Access Road would affect currently open to the public FS roads, FR 145 (Sage Meadows Road), FR 1102 (Diamond Creek Road), the access road into the Wells Canyon Lease (FR 220), and FR 146 (Wells Canyon Road). The proposed Panel G West Haul/Access Road would also affect the following closed USFS roads: FR 1248, FR 651, FR 689, FR 560, and FR 557. These roads are old timber and mineral exploration roads that are managed as closed. From north to south, the Panel G West Haul/Access Road would overlie and eliminate FR 1248 and would then cross FR 145 about 1/10 mile from its terminus, cutting off motorized access to the head of non-motorized Forest Trails 102 and 402. This effect would be minor as non-motorized public access across the haul/access road to Forest Trails 102 and 402 would continue. This haul/access road would not directly affect FR 1102 itself, but would affect access to non-motorized Forest Trails 403 and 093 from FR 1102. This effect would be minor as non-motorized public access to these trails from FR 1102 would continue across the haul/access road. In this section, the haul/access road would cross and/or eliminate closed USFS FR 561, FR 689, FR 560, and FR 557. In addition, short, previously established open to the public exploration access roads (FR 554 and FR 690), that head north into the Panel G area off FR 146, would be eliminated by mining activities. Non-motorized Forest Trail 404 would also be eliminated by mining activities.

At the west mouth of South Fork Deer Creek Canyon, the haul/access road would cross FR 146 with an at-grade crossing. Motorized access across the haul/access road on FR 146 would continue at this grade crossing where signs would warn public motorists of the haul road traffic and provide directions on how to safely cross the road intersection. Signs would also be placed to warn motorists not to turn onto the haul road or drive along it. Temporary closures of FR 146 would be in place during construction of the grade crossing. Signs, road cones, barriers, and construction personnel would be used to warn and redirect traffic during these construction period road closures.

A similar situation would exist at the location where FR 146 intersects the proposed mine disturbance areas for Panel G (i.e. staging area, the south overburden fill site, and the Panel G West Haul/Access Road). The portion of the existing road to be impacted would be rerouted across this disturbance area in a manner that would allow continued public motorized access along FR 146. There may be temporary closures of FR 146 in this area to place and grade material during construction, but it is anticipated that this would normally be a matter of a few days at a time. Signs, road cones, barriers, and construction personnel would be used to warn and redirect traffic during these construction period road closures. During the placement of overburden fill material for the completion of the staging area, berms would be in place on either side of the rerouted FR 146 to keep traffic from straying into the active mine site area. Signs would be posted along this portion of the public road to indicate that this is an active mine area and that no stopping or parking would be allowed. Haul trucks crossing FR 146 in this area would do so at a signed, gated, attendant-operated crossing to stop the general public momentarily in order to allow mine traffic to access either side of the public road. This would be similar to the existing grade crossing of the Smoky Canyon Road by the Panel C Haul/Access Road at the current mining operations, and the effect on public access would be approximately the same. No mine-related haul or vendor traffic would use these Forest Routes or any other public roads to access the Panel G area. Some mine visitor or employee traffic may use these roads. Typical seasonal closures of Forest Routes due to snow would continue. Impacts to public access along FR 146 would be negligible to minor depending on the duration of road closures and the time of year they occur.

It is currently proposed that once mining operations cease in Panel G, the portion of the Panel G West Haul/Access Road from Panel G to the pass between Deer Creek and Diamond Creek would be narrowed from 100 feet to approximately 18-20 feet and become part of Forest Routes 146 and 1102. The remaining segments of this haul/access road would be reclaimed. The segments of Forest Routes 146 and 1102 that are no longer needed would also be fully reclaimed. The new sections of Forest Routes 146 and 1102 would be permanently improved in the quality of the grade, curvature, and road surface compared to their current condition. The relocation of FR 1102 out of the Deer Creek riparian area would be a major improvement compared to the existing condition. However, non-motorized access to the CNF west of the new section of FR 1102 would be slightly more difficult than the current condition because the new road would be located up the side of the mountain to the east of the current road and along the east side of upper Deer Creek. There would not be a similar access impact from the replacement of the upper part of FR 146 because the current and future roads are both located on the steep, isolated south slope of South Fork Deer Creek Canyon.

During mining of Panel G, there may be an increase in utilization of the Georgetown Canyon Road (FR 102) and the Wells Canyon Road (FR 146) by visitors to the mine from the Soda Springs and Montpelier areas. The western sections of the Georgetown Canyon Road are scheduled to have some improvement as part of the Twin Creek Timber Sale Project. The road above these potential improvements may need to have some work done to accommodate any increase in traffic. There could also be similar increased utilization of the portion of the Crow Creek Road between Wells Canyon and Montpelier Reservoir.

<u>Power Line Between Panels F and G</u>

No impacts to transportation resources would occur under this component of the Proposed Action.

4.15.1.2 Mining Alternatives

Mining Alternative A – No South and/or North Panel F Lease Modifications
Impacts to public transportation resources would be the same under this alternative as previously described for the Proposed Action.

Mining Alternative B – No External Seleniferous Overburden Fills
Impacts to public transportation resources would be the same under this alternative as previously described for the Proposed Action.

Mining Alternative C – No External Overburden Fills at All
Impacts to public transportation resources would be the same under this alternative as previously described for the Proposed Action.

Mining Alternative D – Infiltration Barriers on Overburden Fills
Impacts to public transportation resources would be the same under this alternative as previously described for the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Road
Impacts to public transportation resources would be the same under this alternative as previously described for the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G
This alternative would increase the required vendor deliveries to the Panel G area via whichever transportation alternative to Panel G is selected. This is because the electrical generators would require approximately 400,000 gallons of diesel fuel per year in addition to the existing fuel requirements for the mining equipment. Deliveries of fuel, lubricants, coolant, and maintenance parts for the generators would be in addition to normal deliveries of such materials for the mining operation, and this would increase vendor traffic to the mine by about 40 to 45 truck loads a year, a moderate increase.

4.15.1.3 Transportation Alternatives

For Transportation Alternatives 1-5, mine employees, vendors, and visitors would obtain access to Panel G via the current FR 110 access to the Smoky Canyon Mine, the existing non-public mine road (FR 896) to the south end of Panel E, a proposed Panel F haul/access road, and then along one of the alternative routes to Panel G.

Alternative 1 – Alternate Panel F Haul/Access Road
Impacts to public transportation resources would be the same under this alternative as previously described for the Proposed Action.

Alternative 2 – East Haul/Access Road
The East Haul/Access Road would affect currently open to the public FS roads FR 146 and FR 740. From south to north, the East Haul/Access Road would cut across the existing alignment of FR 146 (Wells Canyon Road) just below the upper end of Wells Canyon (**Figures 2.6-8a** and **3.10-1).** As described above for the Proposed Action, FR 146 would be relocated through this area to allow continued public access on FR 146 during mining. The haul/access road would cross Deer Creek just above and to the west of the end of an existing private access road near

the lower end of non-motorized Forest Trail 093. Non-motorized access to the trail would be allowed to cross the haul road. The haul/access road would cut across the upper end of open to the public FR 740 (Manning Creek Road) about ¼ mile east from where an unnumbered spur road off of FR 740 ends and non-motorized Forest Trail 402 begins (**Figures 2.6-8a** and **3.10-1**). Non-motorized access across the haul/access road in this area would continue, and this impact would be minor. The East Haul/Access Road would also overlie and therefore cut off motorized access to about one mile of open to the public FR 740. This would be a moderate impact to this Forest Route. This part of the haul/access road would also cut off motorized access from FR 740 to the existing drill access road into the Panel F area. This drill access road is currently closed to public, motorized access with a locked gate. Non-motorized access across the haul/access road up to the Panel F area would continue. Impacts to FR 179 and Forest Trail 092 would be similar to the impacts identified above with the Proposed Action Panel G West Haul/Access Road.

Alternative 3 – Modified East Haul/Access Road
Impacts to public transportation for this alternative would be the same as described under Alternative 2.

Alternative 4 – Middle Haul/Access Road
This alternative would avoid the affects to Forest Roads 145, 1102, and 146 described for the Proposed Action Panel G West Haul/Access Road. It would have no effect on any other Forest Roads but would cross non-motorized Forest Trails 404, 093, 102, and 403. Non-motorized travel on these trails could cross the haul/access road.

Alternative 5 – Alternate Panel G West Haul/Access Road
Impacts to public transportation for this alternative would be the same as those described for the Proposed Action Panel G West Haul/Access Road, except it would not affect closed FR 1248.

Alternative 6 – Conveyor from Panel G to Mill
The conveyor itself would cross the existing drill access road into the Panel F area and the road in the bottom of South Fork Sage Creek Canyon (FR 179) that would be cut off by the Panel F Haul/Access Road. These would be negligible impacts as both of these roads are currently not open to public, motorized access; FR 179 is accessed via private land and the existing drill road is blocked by a locked gate.

The conveyor structure would be more difficult to cross than a haul/access road. Except where the conveyor structure is elevated to provide sufficient clearance under it, there would be insufficient clearance under the structure for persons on foot, bicycles or horseback to safely cross under the conveyor. Points of adequate clearance may occur along the conveyor route where small topographic dips and drainages are spanned by the conveyor structure. Persons attempting to cross under the conveyor would need to move along its length to find safe crossing locations. This would present a major, negative impact to non-motorized access across the conveyor route. Motorized access across the conveyor corridor would be similarly blocked, but the conveyor would not cross any publicly available motorized access routes.

Alternative 7 – Crow Creek/Wells Canyon Access Road
If the conveyor were built, this alternative would provide access to Panel G for mine employees working there, vendors supplying the mining operations, and visitors to the mine. The existing Crow Creek Road (FR 111), which is under Caribou County, Idaho and Lincoln County, Wyoming jurisdiction, would be widened to a 30-foot road surface and re-aligned in some

locations to improve lines of sight and reduce road curvature. The existing single lane road in Wells Canyon (FR 146) would be replaced from the intersection with the Crow Creek Road up to the Panel G operations with a new access road having the same design standards as the improved Crow Creek Road. The existing sections of FR 146 that would be relocated would be reclaimed. These new or upgraded roads would be surfaced with crushed rock and maintained as necessary by the mine to allow year-round access to Panel G from Star Valley. These would be major improvements to these roads and would make public, motorized access from Star Valley up to the end of Wells Canyon possible year-round compared to the current condition where the Crow Creek road is typically blocked by snow in winter at about where the road crosses Sage Creek.

Traffic on the affected portion of Crow Creek Road would increase from the approximate 20 vehicles per day during the week and 60 vehicles per day on the weekends due to the added mine access traffic. The mine employee traffic is estimated to be approximately 105 vehicle round trips per day (automobiles and light trucks) split into two 12-hour shifts, 365 days per year. In addition, approximately 15 vendor and visitor round trips would occur each day. These would be a mixture of semi-trucks, delivery vans, and light vehicles. The most common type of semi-truck using the road would be delivering fuel for the mine equipment. This would be a major change in traffic density and composition for this rural route.

The increased traffic would have the potential for increased chances of traffic accidents along this route, although increased widths and improved sight distances should reduce this potential for accidents. Accidents involving fuel delivery trucks could create situations resulting in fuel spills into the Crow Creek drainage where the current potential for such spills is essentially non-existent due to the lack of this type of traffic. The indirect effects of increased traffic on air quality, noise levels, water quality, and wildlife are discussed in other sections of this EIS. Dust abatement would be required on the Crow Creek Road (FR 111) and the Wells Canyon Road FR 146) to mitigate some of the air quality concerns.

This increased traffic up the Crow Creek road would shift the majority of the mine access traffic in Star Valley from the current focus through Auburn and the Stump Creek/Smoky Canyon roads to a new focus through Fairview to the Crow Creek/Wells Canyon roads. Approximately 30 to 40 vehicles per day would still go to the existing mine and mill facilities in Smoky Canyon, and approximately 120 vehicles per day would go to Panel G via Crow Creek and Wells Canyon roads. These shifting traffic patterns would decrease existing direct and indirect impacts caused by traffic (traffic accidents, air pollution, noise, water pollution, wildlife) along the current Auburn/Stump Creek/Smoky Canyon routes and increase them along the Fairview/Crow Creek/Wells Canyon routes.

Improvements to the Crow Creek and Wells Canyon roads and maintenance of this access year round during mining would likely increase recreational visitation to the CNF via these routes compared to the present. Seasonal residents along Crow Creek could decide to reside in the area year-round with the improved access and plowed road. This could increase winter recreation in the part of the CNF and Crow Creek Valley accessed by these routes. The improvement of these roads could also increase through traffic between the Georgetown Canyon and Crow Creek areas.

Alternative 8 – Middle Access Road

Impacts to public transportation for this alternative would be the same as those described for Alternative 4 in combination with Alternative 6.

4.15.1.4 No Action Alternative

There would be no changes to existing public transportation in the Project Area under the No Action Alternative.

4.15.2 Mitigation Measures

Where the haul/access roads cut off existing Forest Routes (FR 179 and FR 740), turnaround areas would be built by Simplot at the temporary termination of the Forest Routes to allow safe and convenient turning of vehicles. At these locations, trails for non-motorized access would be built across the haul/access roads to allow convenient and safe non-motorized crossing of the haul/access roads (see Recreation and Land Use).

To reduce environmental effects of mine employee traffic under Alternative 7 (Crow Creek/Wells Canyon Access Roads), Simplot would employ a bus service to make one round trip per shift from one or more parking/pickup locations in Star Valley to Panel G.

To reduce the potential for oil spills getting into Crow Creek under Alternative 7, in the event of a fuel tanker accident on the road in this area, Simplot would require all fuel vendors to participate in a spill-response training program and make sure that all vendor trucks carry some spill response materials. Specific Simplot personnel at Panel G would be specially trained in responding to fuel spills along the Crow Creek Road. Spill response supplies and equipment (booms, absorbents, etc.) necessary to respond to a significant fuel spill along Crow Creek would be pre-positioned at Panel G or some location along Crow Creek for ready use.

4.15.3 Unavoidable (Residual) Adverse Impacts

Under the Proposed Action and all transportation alternatives but Alternatives 6 and 7, the unavoidable adverse impacts to public access routes and access to the CNF would be minor. The conveyor (Alternative 6) would present a major impediment to public access across the conveyor corridor. Alternative 7 would increase traffic density on the Crow Creek Road by about 6 times compared to current conditions if all employees accessed Panel G with private vehicles. This could be reduced if Simplot provided bus service for commuting employees. Large delivery trucks would be part of this additional traffic where such vehicles are currently non-existent on the Crow Creek and Wells Canyon roads.

Following completion of the proposed mining operations and subsequent reclamation activities, all mine-related traffic in the Project Area would cease, and public access to the CNF would return to pre-existing conditions. Improvements made to existing public access routes during mining would remain after reclamation.

4.15.4 Relationship of Short-Term Uses and Long-Term Productivity

The local short-term use of the mineral resources for phosphate mining would result in ongoing employment and other economic benefits to the local and regional economies. Local public access routes in the Project Area affected by the Proposed Action or alternatives would be restored to conditions equal to or better than existed before the mining operations began.

4.15.5 Irreversible and Irretrievable Commitments of Resources

Any permanent changes made during mining operations to existing public roads would constitute irreversible commitments for these facilities. All other changes to existing forest routes would be restored to previous conditions during reclamation activities.

4.16 Social & Economic Resources

Issue:
The heritage resources (see **Section 3.13,** Cultural Resources) of the Project Area may be compromised by the Project.

Indicators:
Acres to be removed from historic land uses with local heritage value, and duration of the mining activities. See also **Section 4.9**, Grazing and **Section 4.13**, Cultural Resources.

Issue:
Noise effects from mine operations, mine traffic along haul roads, and traffic on access roads may affect area residents.

Indicators:
Estimated noise levels from mining operations, haul truck traffic related to mining and access road traffic. See also **Section 4.2**, Air Resources and Noise.

Issue:
Potential closure of the mine may affect the local economy.

Indicators:
Numbers of employees, contractors, and their dependents that could be affected by potential mine and fertilizer plant closure and loss of personal/public income. Appropriate multipliers would be used to estimate economic and social impacts.

Issue:
Potential closure of the mine, resulting in decreased domestic phosphate production, effect of reduced fertilizer supply, increased price on national agriculture, and increased foreign natural resource dependence.

Indicators:
Percentage of U.S. phosphate fertilizer market derived from Don Plant production and ability of other domestic and foreign sources to satisfy this demand, if necessary.

Issue:
Chemical degradation of water, soil, and vegetation in the Project Area may impact local farmers and compromise the viability of their farms/ranches in terms of both agribusiness and tourism.

Indicators:
Predicted levels of any offsite contamination of water, soil, and vegetation of farms and ranches within the Project Area with emphasis on compliance with applicable standards. See also **Section 4.3**, Water, **Section 4.4**, Soils, and **Section 4.5**, Vegetation.

Issue:
Nearby property values may be changed by proximity of mine and transportation activities.

Indicators:
Relative potential change of property values from mining operations in the area including relative potential change in property values within the Star Valley if mining were to cease.

4.16.1 Direct and Indirect Impacts

Socioeconomic impacts were evaluated at three different levels: 1) the effect on the Star Valley area of Wyoming, which includes the towns of Afton and Thaynes; 2) the four-county area of Bannock, Caribou, and Power Counties, Idaho and Lincoln County, Wyoming; and 3) an expanded 27-county area that was used to determine the indirect and induced employment and wages resulting from operation of the Smoky Canyon Mine and Don Plant. Star Valley was evaluated separately because it does not receive royalties or tax money from the Smoky Canyon Mine, yet it is the place of residence for most of the mine's employees. The four-county area is influenced by both Smoky Canyon Mine and the Pocatello fertilizer plant.

Direct socioeconomic impacts are those that are caused by the action and occur at the same time and in the local area of the action, including such things as Smoky Canyon Mine and Don Plant employment, royalties, and income tax.

Indirect socioeconomic impacts are those that are caused by the action but may occur later in time or are farther removed from the location of the action including such things as indirect or induced employment and the purchase of goods and services.

The Proposed Action, mining alternatives, and the transportation alternatives would all result in continued operation of the Smoky Canyon Mine and the Don Plant beyond the life of the existing mining operations. Some of the mining alternatives could shorten the mine life of the proposed mining operations and reduce royalty income to the government.

This EIS does not attempt to quantify either the real estate value of any individual property in the Study Area or the amount that any individual property may change in value as a result of the alternative selection process. However, it does try to identify the characteristics/amenities that subjectively influence property value and describe which ones may be affected. It is possible that any of the action alternatives could affect the characteristics/amenities that influence property values in the Crow Creek valley. Proximity to the mine expansion and related facilities would likely determine the degree to which amenities/characteristics are affected. Because the Agencies cannot approve any alternative that would violate laws, impacts to resources such as water quality and endangered species would likely have little effect on property values. Mining impacts on visual resources, noise, and recreational resources can play a role in indirect effects on property value, although the role of each is subjective. There are also factors outside the influence of the Proposed Action and alternatives that can affect property values.

4.16.1.1 Proposed Action

The Smoky Canyon Mine is a significant employer of residents of Star Valley and is commonly acknowledged to provide the highest paying jobs in the area. The mine employs 214 persons, while the associated fertilizer plant near Pocatello, Idaho employs 331 persons. Indirect employment above the direct employment is an additional 1,452 persons. The Proposed Action would result in continued employment for these individuals beyond the life of the existing mining operations at the Smoky Canyon Mine.

Significant socioeconomic impacts to an area occur when there is a large migration of population into, or out of, the area. Since there is no anticipated change in employment as a result of the Proposed Action, there is no anticipated change in population or in-migration to Bannock, Caribou, or Power Counties, Idaho or Lincoln County, Wyoming. Therefore, the Proposed Action would not result in changes to the current status of community resources such as schools, housing, police and fire protection, and water and sewage services.

Property values along Crow Creek Road may be affected by the development of the mine panels due to perceived changes in the environment of the Project Area. It is beyond the scope of this EIS to predict in detail how such land values would be impacted. However, the Project would affect some of the areas' characteristics/amenities that subjectively affect property value (i.e. noise, visual, recreation, traffic); these impacts may be positive or negative and may change over time as desired property characteristics change. Under the Proposed Action, most of the expected disturbance would be approximately two miles or more from the Crow Creek Valley area.

The Project effects on air quality are described in **Section 4.2** and are estimated to be in compliance with applicable air quality standards and regulations in the vicinity of Crow Creek valley. Air quality impacts from the Proposed Action are not expected to have an impact on property values in Crow Creek valley.

Proposed Action noise effects are discussed in **Section 4.2** and are described as being negligible to minor to Crow Creek residents. Noise from the Proposed Action is not expected to have an impact on property values in Crow Creek valley.

The effects of the Proposed Action on water resources are described in **Section 4.3**. Decreases in water quality of certain reaches of Deer Creek, Sage Creek, and Crow Creek are estimated to occur. Any contamination of the streams to the estimated levels could be perceived by Crow Creek residents as a negative change of the characteristics of the affected properties.

The effects of the Proposed Action on local recreation and land use are described in **Section 4.10**. The Proposed Action is described as having negligible to minor impacts on motorized access and recreation in the Project Area as the Wells Canyon Road would remain open. Non-motorized access across forest lands involved in the mining would be affected to a minor to moderate degree. Effects would be short-term. These restrictions to the current unrestrained use of the Project Area for non-motorized recreation may be perceived by some visitors to the

CNF as a negative change of the forest land recreation values that are a benefit to property owners along Crow Creek.

The visual impacts of the Proposed Action are described in **Section 4.12** and would be minor in nature to residents along Crow Creek as most of the Project disturbance would not be visible from Crow Creek valley. As described in Chapter 2, transportation of ore from Panel G to the existing mill area would be along the westernmost analyzed haul/access route. This aspect of the Proposed Action should not impact the scenic values that may have a subjective effect on property values along Crow Creek.

The Proposed Action would not result in noticeable changes to traffic in Crow Creek valley (**Section 4.15**). Traffic would enter the mine via the existing roads in Smoky Canyon. Transportation of ore from Panel G to the existing mill area would be along the westernmost analyzed route. Haul roads would not be visible from the Crow Creek Road. Traffic patterns on Crow Creek Road would change very little.

The Proposed Action would temporarily affect heritage resources by temporarily restricting access to traditional livestock trailing corridors (**Section 4.9**); this impact would be minor. Further, the Proposed Action might alter the ability for Tribal members to exercise Treaty Rights for use of Forest resources as discussed in **Section 4.14**.

Star Valley, Wyoming

The Proposed Action would result in continued employment for approximately 174 residents of Star Valley at the Smoky Canyon Mine. Annual payroll for these workers is approximately $7.6 million per year, or about 3 percent of total nonagricultural payroll for Lincoln County, Wyoming. The income from these 174 employees helps support the Star Valley economy through sales tax, personal property tax, and purchase of good and services.

Four-County Area

The Proposed Action of continuing to operate the Smoky Canyon Mine would result in continued economic benefits to the economy of Bannock, Caribou, and Power Counties, Idaho and Lincoln County, Wyoming. The primary benefits to local and state governments are royalties paid for mining on federally owned land, and other income and property taxes. The Smoky Canyon Mine pays a federal lease royalty of 5 percent of gross value mined. One-half of the royalty is returned to the Idaho State government, which in turn disburses 10 percent of the funds it receives to Caribou County, which contains the current mine. The operation also pays property taxes directly to Caribou County and other government entities, such as school districts; these payments would continue under the Proposed Action. As mentioned in Chapter 3, the Smoky Canyon Mine provides royalty payments that annually range from 1.6 to 2.0 million dollars. Further, employees pay income, sales, and other taxes.

Under the Proposed Action, employment would continue at the Smoky Canyon Mine and the Pocatello fertilizer plant beyond the life of the existing mining operations. Direct employment at the Smoky Canyon Mine is 214 (including 14 employed at the Conda pumping plant), while the Pocatello fertilizer plant employs about 331 individuals. Annual payroll for these 545 persons is $31,863,000, or about 2 percent of total nonagricultural payroll for the four counties.

Twenty-Seven-County Area
In addition to the direct employment, there is indirect and induced employment. The indirect and induced employment is that of suppliers to the Smoky Canyon Mine and the Don Plant and employment due to spending by employees of the two operations. The majority of the operating inputs for the both the Smoky Canyon Mine and the Pocatello fertilizer plant are purchased in Southeastern Idaho. The majority of the heavy equipment parts and operating supplies required by the mine are purchased from dealerships in Pocatello, Idaho. The mine also purchases engineering supplies from suppliers in Salt Lake City, Utah. The fertilizer plant purchases natural gas from producers in the Rocky Mountains. The area examined to determine indirect and induced employment was expanded from the four counties to the 27-county area shown in **Figure 3.16-2** to capture the effect of the Don Plant on the natural gas producing areas in the Rocky Mountains.

Continued operation of the Smoky Canyon Mine and Don Plant would result in ongoing employment for the 545 employees at the mine and plant and the 1,452 additional persons considered indirect and induced employment in the 27-county area examined. The jobs created as a result of the Smoky Canyon Mine and Don Plant, including indirect and induced employment, pay higher wages than the average job in the 27-county area. The average job created by the Smoky Canyon Mine and Don Plant, including direct, indirect, and induced employment, has an annual wage of $54,400, as compared to an average annual wage for the 27-county area of $30,327.

The Proposed Action would not result in impacts to land ownership, population, demographics, personal income, local infrastructure, local government finances, agricultural economics, the phosphate industry, property taxes, or mine profits taxes.

A continuing ore supply to the Pocatello fertilizer plant would be maintained under the Proposed Action for another 13-15 years past the currently approved operations. The Don Plant is a significant supplier of phosphate fertilizer to the agricultural industry in the western half of the United States. The plant receives 100 percent of the ore mined at Smoky Canyon Mine.

4.16.1.2 Mining Alternatives

If the ore recovery under these mining alternatives were equal to the Proposed Action, then socioeconomic effects would be the same, with the continuation of mining and mining-related employment. However, additional costs associated with the alternatives could affect ultimate pit size and ore recovery, both of which affect royalties paid, number of employees, and mine-life.

As mine-life is diminished by an alternative, new deposits would need to be mined to continue a steady supply of ore to processing facilities to avoid closure. More phosphate mines of lesser depth, compared to the Proposed Action, would ultimately lead to a greater disturbance per ton of phosphate rock mined. Maximizing recovery [pit depth] at each mine tends to keep this ratio as low as possible.

If ore recovery were reduced as much as potentially could occur, as described in geology (**Section 4.1**), then the socioeconomic effects of each alternative would vary as described below.

Mining Alternative A – No South and/or North Panel F Lease Modifications

If the ore recovery under this alternative were equal to the Proposed Action, then socioeconomic effects would be the same. In this case, less ore would be mined over a smaller area. Cost estimates have shown that under Mining Alternative A, up to about 10.7 percent less ore would be mined than the Proposed Action (both Panels F and G) with no South Lease Modification and 3 percent less ore with no North Lease Modification, thereby reducing the life of the mine by 1.8 years and 0.5 year from the Proposed Action, respectively. Mining in Panel G would need to be moved up in schedule to accommodate the shorter mine life of Panel F. This would shorten employment at the Smoky Canyon Mine, Panels F and G by up to 2.3 years, reduce local employment income by $7.6 million (2.3 years x $7.6 million/year = loss of $17.5 million into local economy), and reduce federal lease royalties paid by up to 2.3 years or $3.7 to $4.6 million (2.3 x $1.6 to $2.0 million).

Not mining the North Lease Modification would have no effect on Crow Creek property values. Not mining the South Lease Modification could be perceived by recreationists in the middle Deer Creek watershed as a favorable change because the disturbance from the southern portion of the Panel F pit would not encroach into the Deer Creek watershed. This could have a positive effect on perceived forest land recreation values that may be one of the factors that subjectively affects property values along Crow Creek.

Mining Alternative B – No External Seleniferous Overburden Fills

If the ore recovery under this alternative were equal to the Proposed Action, then socioeconomic effects would be the same. Cost estimates have shown that under Mining Alternative B, up to about 19.3 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the Panels F and G mine by 3.2 years from the Proposed Action. This would mean a loss of about $24.3 million in salaries into the Star Valley economy from this Project. Mining in Panel G would need to be moved up in schedule to accommodate the shorter mine life of Panel F. This would shorten employment at the Smoky Canyon Mine, Panels F and G, by up to 3.2 years and reduce federal lease royalties paid by 3.2 years or $5.1 to $6.4 million.

Under this mining alternative, impacts to some of the areas' characteristics/amenities that could subjectively affect property values would be similar to the Proposed Action.

Mining Alternative C – No External Overburden Fills at All

If the ore recovery under this alternative were equal to the Proposed Action, then socioeconomic effects would be the same. Cost estimates have shown that in order to compensate for the increased cost associated with rehandling material under Mining Alternative C, it is predicted that up to 46 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the Panels F and G mine by 7.7 years from the Proposed Action. This would mean a loss of about $59.8 million in salaries to the Star Valley economy. Mining in Panel G would need to be moved up in schedule to accommodate the shorter mine life of Panel F. This would shorten employment at the Smoky Canyon Mine, Panels F and G, by up to 7.7 years and reduce federal lease royalties paid by up to 7.7 years or $12.3 to $15.4 million.

Under this mining alternative, impacts to some of the areas' characteristics/amenities that could subjectively affect property values would be similar to the Proposed Action.

Mining Alternative D – Infiltration Barriers on Overburden Fills

If the ore recovery under this alternative were equal to the Proposed Action, then socioeconomic effects would be the same. Cost estimates have shown that under Mining Alternative D, it is predicted that up to 22 percent less ore would be mined than the Proposed Action (both Panels F and G), thereby reducing the life of the Panels F and G mine by 3.7 years from the Proposed Action. This would mean a loss of about $28.1 million in salaries to the Star Valley economy. Mining in Panel G would need to be moved up in schedule to accommodate the shorter mine life of Panel F. This would shorten employment at the Smoky Canyon Mine, Panels F and G, by up to 3.7 years and reduce federal lease royalties paid by up to 3.7 years or $6 to $7.4 million.

Under this mining alternative, impacts to some of the areas' characteristics/amenities that could subjectively affect property values would be similar to the Proposed Action.

Mining Alternative E – Power Line Connection from Panel F to Panel G Along Haul/Access Roads

There would be some increased costs associated with the longer power lines along the haul/access roads if this mining alternative were selected. The effects of these increased costs on ore recovery and mine life have not been estimated. Ore recovery under this alternative is assumed to be equal to the Proposed Action; therefore, socioeconomic effects would be the same.

Under this mining alternative, impacts to some of the areas' characteristics/amenities that could subjectively affect property values would be similar to the Proposed Action.

Mining Alternative F – Electrical Generators at Panel G

The capital cost of the electrical generators at Panel G would be similar to the cost of the power line to this panel in the Proposed Action, but the annual operating costs would be approximately five times more than the power line. The total increase in costs would be similar to those for Panel G under Alternative C. If the ore recovery under this alternative were equal to the Proposed Action then socioeconomic affects would be the same. However, under Mining Alternative F, up to 38 percent less ore would be mined than the Proposed Action, thereby reducing the life of the Panels F and G mine by 6.5 years from the Proposed Action. This would shorten employment at the Smoky Canyon Mine, Panels F and G, by up to 6.5 years and reduce federal lease royalties paid by up to 6.5 years or $10.4 to $13 million.

Under this mining alternative, impacts to some of the areas' characteristics/amenities that could subjectively affect property values would be similar to the Proposed Action.

4.16.1.3 Transportation Alternatives

None of the transportation alternatives have been identified as having negative effects on potential ore recovery or mine life compared to the Proposed Action.

Alternative 1 – Alternate Panel F Haul/Access Road

This transportation alternative is a relatively minor modification to the Proposed Action Panel F Haul/Access Road located in a relatively isolated area away from local residents. Its socioeconomic effect would be the same as the Proposed Action.

Alternative 2 – East Haul/Access Road

The East Haul/Access Road alternative would be the closest haul/access road to the residences of Crow Creek valley. The East Haul/Access Road would extend from Panel G east towards the Crow Creek Road, approximately two miles north of the location of the residences in Census Block 1161 (**Section 3.15**). Mine traffic would be audible and visible from some locations in the Crow Creek valley. This alternative would affect public access to the CNF. Further, this route would require either the purchase of private land or the negotiation of a right-of-way across private land. Visual impacts (**Section 4.12**) of the haul/access road along the west side of Crow Creek valley, changes in access to the CNF across this road (**Sections 4.11** and **4.16**), and increased noise (**Section 4.2**) would affect the current, rural quality of life for property owners and perceived, adjacent, aesthetic qualities that are some of the resources that may subjectively affect property values along Crow Creek. It is beyond the scope of this EIS to predict in detail how such land values would be impacted.

Alternative 3 – Modified East Haul/Access Road

This transportation alternative would avoid disturbance of private land and reduce noise and visual effects of the haul/access road to the Crow Creek valley area compared to Alternative 2 (**Sections 4.2** and **4.12**). Its effects on access to the CNF and associated recreation values would be similar to Alternative 2. The effects of this alternative to property values along Crow Creek would be less than Alternative 2 but more than the Proposed Action.

Alternative 4 – Middle Haul/Access Road

Due to its remote location in the middle Deer Creek watershed and negligible environmental impact to the Crow Creek area, this alternative would have negligible impacts to socioeconomics.

Alternative 5 – Alternate Panel G West Haul/Access Road

Due to its remote location, and relatively minor impacts to forest land resources above those already described for the Proposed Action, this transportation alternative would have negligible impacts to socioeconomics.

Alternative 6 – Conveyor from Panel G to Mill

This transportation alternative would have much lower impacts on the surface environmental resources of the local area compared to any of the haul/access road alternatives but would have a larger impact on access across it compared to a haul/access road or the mine panels themselves (**Section 4.10**). The conveyor would have sufficient clearance underneath it for livestock, hikers, and horseback riders to cross the corridor in a few locations where there are existing FS trails but not in most other locations along the conveyor corridor. This restriction on access across the conveyor would be a major impact on forest land recreation values in this local area, which could be perceived by local private landowners as a diminution of adjacent aesthetic values for their property, which could affect property values along Crow Creek. As stated in **Section 4.2**, there would be no noticeable noise increases at current residences along the Crow Creek Road from the conveyor.

Alternative 7 – Crow Creek/Wells Canyon Access Road

This alternative would increase traffic on the Crow Creek and Wells Canyon Roads (**Section 4.15**), which could affect the development of property in Crow Creek valley. Road improvements and year-round access along Crow Creek Road and the Wells Canyon Road may eventually make the area more desirable to development of permanent, rather than seasonal homes, and this increased access may benefit property values. Increased noise, visual disturbance, and traffic would impact characteristics/amenities that may subjectively affect property values along Crow Creek Road.

Alternative 8 – Middle Access Road
This transportation alternative would have negligible impacts to socioeconomics for the same reasons as Alternative 4.

4.16.1.4 No Action Alternative

Under the No Action Alternative, the mine would cease operation when the currently approved mine panels are mined out and remain closed until a mine plan is approved, at an unknown point in the future. Upon closure of the mine, employment would cease for the 214 employees of the mine with potential decreases in employment for vendors supplying the mine. Once any stockpiled ore or concentrate is consumed, the Don Plant just west of Pocatello, Idaho could also cease operation, resulting in an additional 331 persons becoming unemployed and also potential effects on business and employment for vendors supplying the plant. In addition, Simplot employees not directly associated with the mine or Don Plant could be impacted.

The No Action Alternative is not expected to impact land ownership patterns (private vs. public, etc.), agriculture or agricultural economics in the Project Area. There would be no additional noise, traffic, or visual impacts from mining to affect characteristics that subjectively influence property values along Crow Creek. Population demographics may be affected should Star Valley residents relocate in search of other employment opportunities. Demographics and individual land ownership may be impacted if there is an out-migration of residents relocating for employment. It cannot be anticipated how many unemployed workers (and families) would remain in the area and how many would move. Prediction of the effects of the No Action Alternative and subsequent unemployment on property values cannot be concluded, other than to acknowledge that they are likely tied to the extent that the local community is dependant on the mining industry. Potential impacts to personal income, county finances, the phosphate industry, mineral lease payments, tourism, and property taxes are discussed below.

<u>Star Valley, Wyoming</u>
Under the No Action Alternative, production at the Smoky Canyon Mine would cease when the currently approved mine panels are mined out. The mine would remain closed either permanently or until such time that an acceptable mine plan is approved. The most direct effect of ceasing production at the Smoky Canyon Mine would be 174 residents of Star Valley becoming unemployed and the loss of approximately $7.6 million in annual payroll. Compared to the Proposed Action, there would be a lost of $98.8 million in employment income to the Star Valley area. The jobs at the Smoky Canyon Mine are widely acknowledged to be among the highest-paying available to residents of Star Valley, and some of the few that include benefits packages such as health care.

In addition to increased unemployment and reduced wages spent in the local economy, increased use of public assistance programs would result. The community service providers in Star Valley, the Wyoming Department of Family Services, and the Lincoln County Health Department, would experience an increased demand for their services under the No Action Alternative. It is anticipated that additional personnel may be temporarily needed by these organizations should the Smoky Canyon Mine cease production.

Star Valley in recent years has experienced an influx of wealthy residents. The No Action Alternative may accelerate this change in social structure of Star Valley. As employees of the Smoky Canyon Mine leave the area for alternative employment opportunities, should they become unemployed as a result of the No Action Alternative, residences and real estate in Star Valley would be available for purchase. Star Valley's economy would be altered, with a lesser focus on natural resources extraction and a greater emphasis on tourism and land development.

<u>Four-County Area</u>

The No Action Alternative would result in closure of the Smoky Canyon Mine upon completion of mining of the currently approved mine panels. Once any stockpiled ore and concentrate is processed, the Don Plant may also cease operation. The No Action Alternative would result in the loss of 545 jobs with an annual payroll of $31,863,000.

Royalty payments would cease upon mine closure under the No Action Alternative. The No Action Alternative would also result in reductions in the property tax paid to Caribou County and to other local taxing entities such as school districts. The phosphate mining and processing industry pays approximately 41 percent of the property taxes paid in Caribou County. Increased use of public assistance and unemployment compensation funds would result from the No Action Alternative as the Smoky Canyon Mine and the Pocatello fertilizer plant close, and remain closed until a mine plan is approved.

<u>Twenty-Seven-County Area</u>

In addition to the 545 Simplot employees, an estimated additional 1,452 persons across a 27-county area in northeast Colorado, northern Utah, southwestern Wyoming, and southeastern Idaho could become unemployed. Estimated annual wages for these 1,452 persons are $76,792,365. The change in employment and wages in the 27-county area may not be directly observable since other fluctuations in the economy may mask the effect.

<u>Phosphate Industry</u>

The Don Plant ceasing operations would result in closure of about 30 percent of the ammonium phosphate manufacturing capacity in the western United States. The other two ammonium phosphate manufacturing plants in the western United States are the Agrium Conda Plant north of Soda Springs, Idaho and the Simplot Phosphates Manufacturing Complex at Rock Springs, Wyoming. While the Don Plant represents a major portion of the ammonium phosphate manufacturing capacity in the western United States, it represents 2.4 percent of nationwide capacity. The three western plants represent 8 percent of nationwide capacity, with the Florida and Gulf Coast plants accounting for 92 percent of nationwide ammonium phosphate manufacturing capacity (Chemical Market Reporter 2002b). With the drop in export sales of ammonium phosphate fertilizers since the late 1990s, and agricultural chemical production in general dropping since 1998, enough excess plant capacity exists nationwide to supply ammonium phosphate fertilizer should the Smoky Canyon Mine fail to obtain the required operating permits, under current conditions. However, there may be additional associated transportation costs with increased delivery of phosphate from the eastern to the western United States.

4.16.2 Mitigation Measures

No mitigation and monitoring of socioeconomic resources are necessary under the Proposed Action or the Mining Action Alternatives. The No Action Alternative poses the greatest possibility of altering the socioeconomic resources of Star Valley and the four-county area. However, no mitigation or monitoring is necessary due to established programs in place such as economic monitoring conducted by state employment and social service agencies, the U.S. Bureau of Census, and the U.S. Bureau of Labor Statistics. Social programs operated by the state and federal governments are capable of addressing issues arising from closure of the mine should the No Action Alternative be adopted.

4.16.3 Unavoidable (Residual) Adverse Impacts

There would be no residual adverse impacts to socioeconomic resources as a result of the Proposed Action or the Action alternatives.

4.16.4 Relationship of Short-Term Uses and Long-Term Productivity

The short-term use of mining of the phosphate ore would result in beneficial long-term effects from increased public funds available for social programs and/or infrastructure improvements due to increased federal lease royalties. There would also be an increase in wealth and economic stimuli from the manufacture of goods and services related to mining phosphate ore from the leases.

4.16.5 Irreversible and Irretrievable Commitments of Resources

Under the Proposed Action, there would be no irreversible and irretrievable commitment of socioeconomic resources.

All the Action Alternatives continue operation of the Smoky Canyon Mine; therefore, they have similar effects on irreversible and irretrievable commitment of socioeconomic resources as would the Proposed Action. Alternatives A, B, C, D, and F would have shorter lives than the Proposed Action and consequently would pose incremental losses of economic values compared to the Proposed Action.

Implementing one of the alternatives that allow for continued operation of the Smoky Canyon Mine has a greater economic value than closing the mine.

Under the No Action Alternative, there would be an irreversible and irretrievable loss of economic value of the Smoky Canyon Mine.

Under the No Action Alternative, there is high likelihood of the mine and Don Plant ceasing operation until a revised mine plan is approved. Former employees of the Smoky Canyon Mine may leave Star Valley as alternative employment opportunities arise and place their residences and real estate up for sale. Placing more real estate in Star Valley up for sale would undoubtedly increase the influx of buyers from outside Star Valley. This would result in an irreversible change in the social characteristics of Star Valley. Changes in social characteristics of Star Valley would include an increase in the number of part-time residents, smaller families, and higher incomes, primarily among the newly arrived residents. Additionally, the economic structure of Star Valley would be irreversibly altered. Natural resources extraction would play a much smaller role in the area's economy, while real estate development and tourism would be more important.

4.17 Environmental Justice

Issue: No issues were identified for Environmental Justice.

4.17.1 Direct and Indirect Impacts

The communities of Afton and Fairview, Wyoming, and ranchers along Crow Creek Road would continue to be affected by the presence of the Smoky Canyon Mine, but none of these communities are minority or low income as a whole, and none would be exposed to high and adverse environmental impacts.

EO 12898 directs agencies to consider patterns of subsistence hunting and fishing when an agency action may affect fish or wildlife (See **Sections 4.7** and **4.8**) for disproportionately high and adverse human health or environmental effects on low-income populations, minority populations, or Indian tribes. As discussed in **Sections 4.3**, **4.5**, and **4.7** (Water, Vegetation, and Wildlife), BMPs, and mitigations measures should preclude uptake of selenium in plants and animals and prevent water contamination. Therefore, there would be no disproportionately high or adverse human health or environmental effects to the Shoshone-Bannock Tribes as a result of the Proposed Action or Alternatives.

It has been determined that this Project would not cause disproportionately high and adverse effects on any minority or low-income populations as per EO 12898 regarding environmental justice.

4.17.2 Mitigation Measures

Mitigation measures for environmental justice are not deemed necessary.

4.17.3 Unavoidable (Residual) Adverse Impacts

There would be no unavoidable, residual adverse impacts to environmental justice as a result of the Proposed Action or alternatives.

4.17.4 Relationship of Short-Term Uses and Long-Term Productivity

Environmental justice would not be affected by this Project in the short-term or long-term.

4.17.5 Irreversible and Irretrievable Commitments of Resources

There would be no irreversible or irretrievable impact to environmental justice.

Smoky Canyon Mine
Panels F & G Draft EIS

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Chapter 5
Cumulative Effects

Cumulative effects are those environmental impacts that result when the incremental impacts of the Proposed Action or Alternatives are added to those of other past, present, and reasonably foreseeable future actions on the Cumulative Effects Areas (CEAs). Major past and present land uses in the area, which are also projected to continue into the future, include: roads/trails, timber harvesting, wildfires, livestock grazing, agriculture, and mining. Dispersed recreation (including hunting and fishing) and residential development also occur in parts of the CEAs.

The CEAs for this EIS vary by resource. The configuration of the Proposed Action and Alternatives, as well as public scoping input gathered for this EIS, provided the foundation for identifying CEAs. Cumulative effects should be evaluated in terms of the specific resource, ecosystem, and human community being impacted, and therefore, the boundaries of the CEAs vary by resource. An attempt was made for each environmental resource to determine the extent to which the environmental effect could be reasonably detected and then include the geographic areas of resources that could be impacted by the environmental effect. However, for simplicity, ease of cumulative impact analysis, and in an attempt to avoid having different CEAs for every resource, CEA boundaries were left identical for the resources where it seemed reasonable and conservative to do so. Guidance from the Council on Environmental Quality (CEQ), "Considering Cumulative Effects – January 1997," was used in identifying geographic boundaries and ultimately the CEA for each resource. The CEA for each environmental resource – and the rationale for its boundaries – is described below in the specific resource subsection. Maps for the various CEAs are also included.

5.1 Geology, Minerals and Topography

CEA Boundary

The CEA boundary for geology, minerals, and topography (**Figure 5.1-1**) was delineated to include the southeast Idaho phosphate mining area, including Known Phosphate Lease Areas (KPLAs) in Bear Lake and Caribou Counties, Idaho. This is an area of 789 square miles (504,960 acres) within which there are current leases for 38,874 acres or 7.7 percent of the total CEA area. **Figure 5.1-1** shows locations of KPLAs, phosphate mine leases, and past and present phosphate mines in Bear Lake and Caribou Counties, Idaho.

Rationale: With the exception of the Gay Mine, located on the Fort Hall Indian Reservation, impacts to geology, mineral, and topography from past, present, and future phosphate mining operations are confined to specific phosphate mining properties (KPLAs and leases) within these two counties.

Cumulative Effects

Potential effects to the geology, mineral, and topographic resources consist of mineral resource depletion, paleontological resource disturbance, topographic changes, exposure of rock bearing COPCs, and geotechnical instability. Past and present phosphate mining activities, and proposed future phosphate mining are analyzed in terms of cumulative effects for this resource.

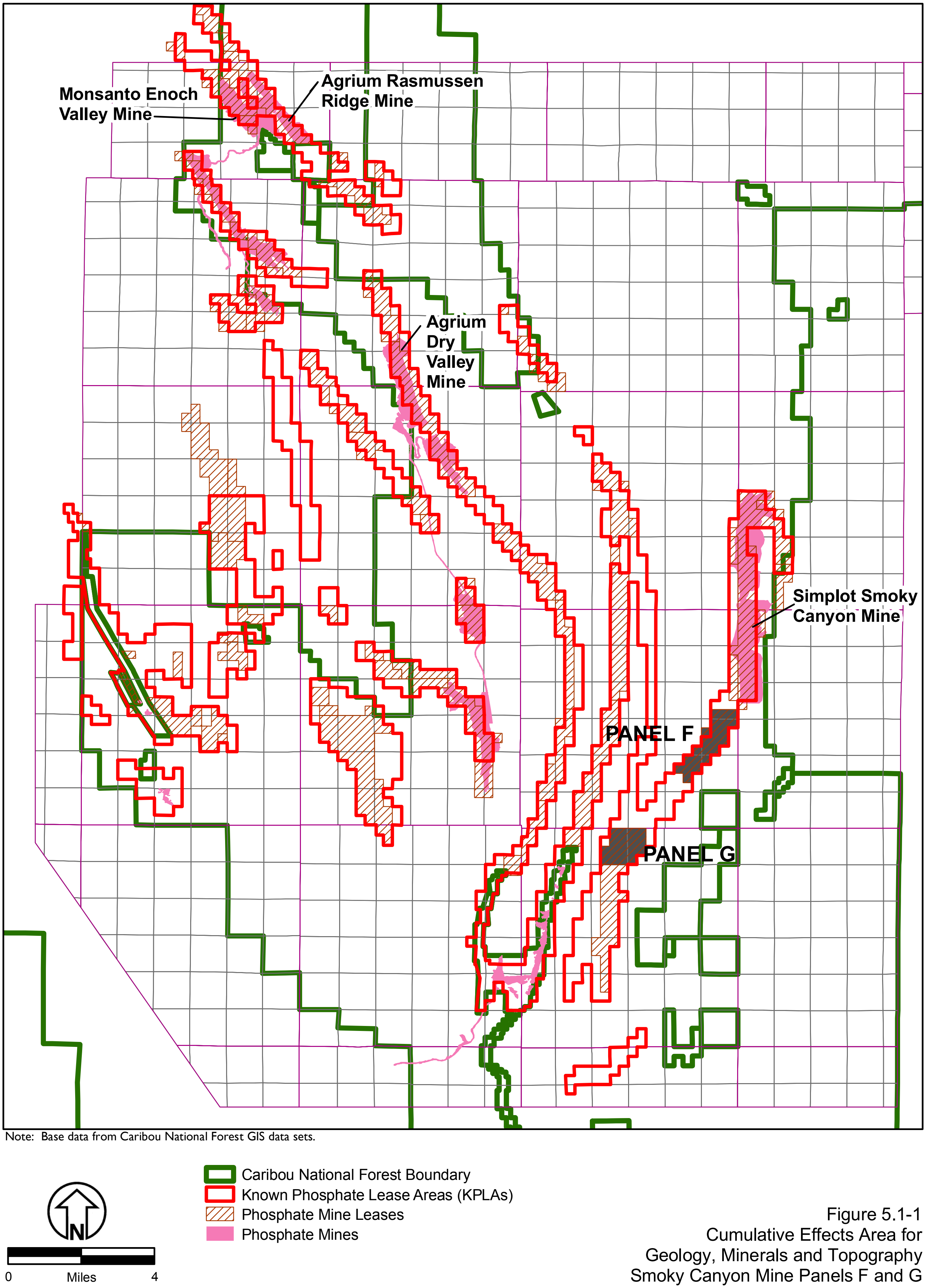
Since phosphate mining began in southeastern Idaho, there have been a total of 31 phosphate mines in the area (USGS 2001c). Through consolidations of the original operations, there are 28 mines remaining as listed in **Table 5.1-1**. Of these, 12 were small underground mines that have been closed for years. The current surface disturbance from these underground mining operations is typically an acre or less. Three former underground mines, Waterloo, Conda, and Maybe Canyon were converted to surface mining operations, and the surface mine disturbance for these mines is still noticeable. There have been 20 open pit phosphate mines in the CEA of which those with significant production include: Waterloo, Conda, Gay, Ballard, Maybe Canyon, Georgetown Canyon, Mountain Fuel, Henry, Wooley Valley, Lanes Creek, Champ, Enoch Valley, Smoky Canyon, Rasmussen Ridge, South Rasmussen, and Dry Valley. Only the last four of these mines are still in operational status.

TABLE 5.1-1 PHOSPHATE MINES OF SOUTHEASTERN IDAHO

MINE	YEARS OF OPERATION	DISTURBED AREA (ACRES)
Waterloo	1907-1920, 1945-1960	196
Hot Springs	1907-1911, 1954-1956	0.5
Paris Canyon	1917-1926	<2 (estimate)
Rattlesnake Canyon	1920-1926	0.40
Bear Lake	1920-1921	0.1
Conda	1920-1984	1,608 (Simplot)
Home Canyon	1916-1924	0.8
Consolidated	1920-1921, 1930-1938	<1 (estimate)
Bennington Canyon	1907-1912, 1939-1942	2 (estimate)
Wyodak	1942-1943	<1 (estimate)
Gay	1946-1993	3,097
Ballard	1952-1969	635
North and South Maybe Canyon	1951-1995	1,028
Georgetown Canyon	1958-1964	251
Wooley Valley	1955-1989	808
Diamond Gulch	1960	32
Fall Creek	1955-1964	<1 (estimate)
Mountain Fuel	1966-1967, 1985-1993	716
Henry	1969-1989	1,074
Bloomington Canyon	1972-1975	<1
Pritchard Creek	1975-1976	2 (estimate)
Lanes Creek	1978-1989	29
Champ	1982-1985	392
Smoky Canyon	1982-present	2,150
Enoch Valley	1990-2003	673
Rasmussen Ridge	1991-present, idle	687
South Rasmussen	2003-present	285
Dry Valley	1992-present	847
Total All Mines	1907-present	14,250

Sources of information: USGS 2001c, Open file Report 00-425; IDEQ 2004, Final Orphan Mine Site PA Screening Report; Various 2004 Annual Operating Reports to BLM

In 1975, economically recoverable phosphate ore reserves in southeastern Idaho were estimated at one billion tons, comprising about 80 percent of reserves in the Western Phosphate Field and about a quarter of total U.S. reserves (USGS 1977). Through 1974, total phosphate ore production in Idaho was estimated to be 74 MMT (USGS 1977). Through 1985, an additional 73 MMT of phosphate ore were produced from federal leases (BLM 1987). Since



Note: Base data from Caribou National Forest GIS data sets.

Figure 5.1-1
Cumulative Effects Area for
Geology, Minerals and Topography
Smoky Canyon Mine Panels F and G

then, phosphate ore production in southeastern Idaho has been approximately 6 MMTPY (Buck and Jones 2002). The total phosphate ore production from southeast Idaho through 2004 is estimated to be about 261 MMT or about one quarter of the 1977 estimate of total economically recoverable ore reserves.

Overall worldwide demand for phosphate is forecast to grow at a rate of 2.5 percent per year during the next five years, and production from large mines in Florida is projected to decrease while supply from large deposits in North Africa will increase (USGS 2005). Based on this information, phosphate production from the CEA will likely also be stable or increase slightly. Over the next 15 years, between 80 and 100 MMT of total phosphate ore production, or an average annual production of about 6 MMT, is projected from southeast Idaho. With respect to depletion of mineral reserves within the CEA, the impact of the Proposed Action accounts for approximately 40 percent of the total to be mined over the next 15 years. The amount of ore produced from the proposed mining operations would represent approximately 4 percent of the 1977 estimate of economic phosphate ore reserves in southeast Idaho. Positive effects associated with recovery of this resource include making this commodity available to society now, economic growth and employment, and increased understanding of the geology of this and similar deposits.

Altogether, the phosphate mining operations in southeast Idaho have disturbed approximately 14,250 acres of surface or about 2.9 percent of the total CEA. The historic mining operations are typically not reclaimed. The mines that were in operation within the last 20 to 30 years have undergone various degrees of reclamation to restore the land to a stable and usable condition. This reclamation has typically included: removal of structures and equipment, backfilling open pits during mining where feasible, regrading overburden piles to slopes of approximately 3h:1v, stabilizing surface runoff patterns, and revegetating regraded surfaces.

At the current time, three of the phosphate mines listed in **Table 5.1-1** are operating, and one is idle. These modern mining operations work within the current environmental protection requirements by the State, BLM and USFS. A major environmental mitigation measure employed by each of these mining operations is concurrent reclamation wherein previously disturbed areas are reclaimed during the course of ongoing mining. As a result of concurrent reclamation, the total topographic disturbance of the three active phosphate mines at the end of 2004 was 1,905 acres, about 58 percent of the total area initially disturbed (3,282 acres) (**Table 5.1-2**).

TABLE 5.1-2 DISTURBED AREA STATUS OF CURRENT MINING OPERATIONS AT END OF 2004 (ACRES)

MINE	TOTAL DISTURBANCE	AREA RECLAIMED	UNRECLAIMED AREA
Smoky Canyon	2,150	756	1,394
South Rasmussen	285	69	216
Dry Valley	847	552	295
Total All Mines	3,282	1,377	1,905

Source of information: 2004 Annual Operating Reports to BLM

The total remaining unreclaimed topographic disturbance from the active mining operations at the end of 2004 was 1,905 acres or about 0.4 percent of the total area within the CEA.

The currently approved mine plans for the active mining operations would allow ongoing mining and reclamation to proceed. In addition, a new phosphate mining operation has been proposed by Monsanto at the Blackfoot Bridge property. The currently approved and proposed mine disturbance, area to be reclaimed and net unreclaimed areas are listed in **Table 5.1-3**.

TABLE 5.1-3 CURRENTLY PERMITTED AND PROPOSED MINE DISTURBANCE AREAS (ACRES)

MINE	TOTAL DISTURBANCE	AREA RECLAIMED	UNRECLAIMED AREA
Smoky Canyon[1]	2,437	2,417	20
South Rasmussen	380	303	77
Rasmussen Ridge[2]	651	579	72
Dry Valley	1,191	1,141	50
Blackfoot Bridge[3]	380	310	70
Total All Mines	5,039	4,750	289

Source of information: 2004 Annual Operating Reports to BLM, Mine and Reclamation Plans, NEPA documents, and proposed Mine Plans. 1) Includes currently permitted mine plans and tailings pond reclamation plan, excepting the Panels F&G Proposed Action. 2) Permitted but currently idle. 3) Proposed.

When all currently permitted and proposed mining operations listed in **Table 5.1-3** are fully implemented, a total of 289 acres of unreclaimed disturbance would result. This would be 0.06 percent of the total area within the CEA. The potential development of the Wells Canyon lease area was not included in **Table 5.1-3** because it has not been proposed at this time.

The total initial disturbance for the Proposed Action would be 1,340 acres, of which 1,269 acres (95 percent) would be reclaimed. The total unreclaimed area of the Proposed Action would be about 71 (parts of mine panels and haul/access roads) acres or 0.01 percent of the total area within the CEA and when added to the permitted and proposed unreclaimed mining area of the mining operations listed in **Table 5.1-3**, the total projected unreclaimed mining disturbance from the current and proposed mining operations would be about 0.07 percent of the total area in the CEA.

Within the CEA, impacts on the discovery, destruction, and removal of paleontological resources occur primarily from mining activities. The effects from mining activities can be positive as well as negative. Mining activities can destroy buried and unidentified fossils but can also uncover paleontological resources and information that would otherwise not be uncovered, thereby increasing scientific understanding. To date, the paleontological impacts within the CEA have occurred at all the phosphate mines, and the Proposed Action and Alternatives would not cause significant additional impacts.

Effects on highwall and overburden fill stability within the CEA occur primarily from mining activities, but can also occur from other major earth moving activities such as the construction of surface water impoundments and road cuts and fills. Potential geotechnical instability from these activities usually affects only a relatively small area, in the immediate vicinity of the disturbance. The analysis conducted for the Proposed Action and Alternatives assessed overall stability. Small failures of highwalls or overburden fills might still occur. It is not possible to account for all factors affecting stability on a small scale. With advances in geotechnical analysis methods and the benefit of previous experience, the potential for future geotechnical instability impacts will likely be diminished. The predicted minor potential impacts to geotechnical stability from the Proposed Action, alternatives, and future foreseeable activities would be insignificant with respect to the CEA. By reducing the amount of external overburden, Alternatives B and C would also reduce the cumulative number of features subject to possible instability.

Selenium mobilization within the CEA can be affected by a variety of activities. However, phosphate mining activities have the most significant impact due to the disturbance of geologic units with elevated selenium concentration and the exposure of these materials during mining.

Prior to 1997, selenium was not recognized by the mining industry or regulatory agencies in southeast Idaho as the primary contaminant released to the environment from phosphate overburden. Since 1997 the mining industry and regulatory agencies have conducted extensive studies throughout the phosphate mining area of southeast Idaho, which have identified the sources and potential effects of selenium releases (Buck and Jones 2002). It has been determined that selenium contained in phosphate overburden can be in chemical forms amenable to uptake by plants or direct ingestion by animals, movement in surface runoff, and leaching from overburden fills into underlying groundwater. Former phosphate mining disturbances that result in exposure of seleniferous overburden to these potential exposure pathways can be sources of selenium contamination to the environment. Unfortunately, prior to the understanding of the importance of vegetative uptake of selenium from seleniferous shale overburden, a reclamation practice endorsed by agencies and mining companies included covering regraded areas with overburden shales to be used as growth medium for reclamation vegetation. Consequently, some of these areas are currently sites of elevated selenium concentrations in vegetation, which can have deleterious effects on surface resources.

A complete accounting of estimated surface areas presenting enough risk from elevated selenium to require remediation has not been done on a regional basis and is planned to be accomplished on a mine-specific basis. A conservative estimate of the potential source area of selenium contamination in southeast Idaho would be the total disturbed area from phosphate mining (**Table 5.1-1**). However, it is unlikely that this entire disturbed area is a source requiring remediation because of the documented wide variations in selenium concentrations of mine overburden in the area (Montgomery Watson 1999, IDEQ 2002c).

Mining companies in southeast Idaho have entered into Administrative Orders on Consent (AOCs), with the State and federal regulatory agencies, leading to site investigations of their mined areas in order to describe the environmental effects of the past mining and reclamation practices. These Site Investigations will lead to Engineering Evaluations/Cost Analyses (EE/CAs), which will describe appropriate remedial actions proposed to mitigate the environmental effects of the past mining. In addition, the agencies have conducted preliminary site assessments of orphaned mine properties throughout the CEA to determine the conditions and identify any mitigative measures required. At the Smoky Canyon Mine, the Site Investigation for Area A (historic mining on federal lands) and Area B (the tailings impoundment on private ground) has been completed. The EE/CA is scheduled to be released for public review in early 2006 and an agency decision document is expected in the fall of 2006.

Agency NEPA analyses and mine-specific studies conducted to date, as well as investigations by the USFS and USGS, have identified a number of potential operational practices that are expected to limit the environmental effects of the selenium contained in the overburden. All the reasonably available mitigative measures determined to date have been proposed by Simplot to be incorporated into the Proposed Action (**Sections 2.4 and 2.5**). As a consequence of these proposed mitigative measures and BMPs, the overburden surface of the Proposed Action is not expected to present a risk from selenium exposure and release. Thus the area of the Proposed Action is not expected to be additive to the existing mining disturbances in the CEA in a cumulative manner with regard to exposure of seleniferous overburden. The covered and capped seleniferous overburden in the Proposed Action would be additive to the other seleniferous overburden fills in the CEA with regard to potential sources of groundwater contamination. However, site-specific characteristics at each overburden would control the pathway of selenium release to groundwater, so an accurate estimate of the cumulative effects of this impact between the Proposed Action and the other mine sites in the CEA cannot be made.

5.2 Air and Noise

CEA Boundary

The CEA boundary for air and noise (**Figure 5.2-1**) was delineated to include the past, present, and reasonably foreseeable Smoky Canyon Mine operations, and the Wells Canyon Lease Area. It also includes the area along the Crow Creek, Wells Canyon, and Diamond Creek roads that could be affected by air emissions and/or noise along various transportation alternatives.

Rationale: Air pollutants are expected to comply with all federal and State air quality standards within the direct effects Study Area, so cumulative effects are not anticipated outside of this area.

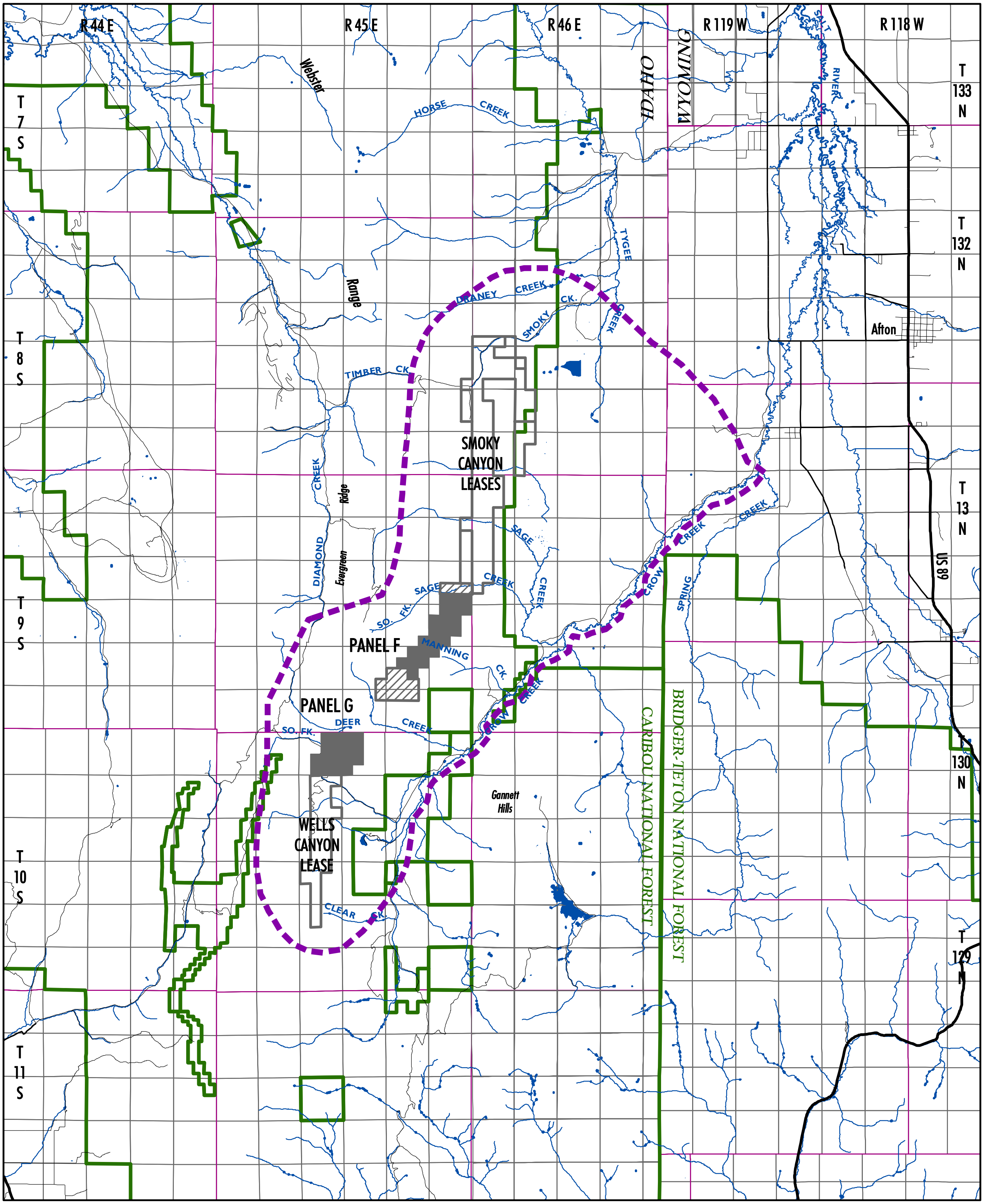
Noise from mining is attenuated by vegetation and topography to levels that are not discernable to humans. Noise related to access traffic and haul roads is of importance to persons along nearby public roads and in nearby residences.

Cumulative Effects

Excellent air quality generally exists on National Forest System Lands (USFS 2003b). Air quality in the CNF can occasionally be adversely affected by pollutants from sources outside the CNF such as Pocatello or Soda Springs. These effects typically occur during winter inversions or when stable air masses occur under static, high-pressure weather systems. Other pollution sources outside the CNF include power plant, factory, agricultural burning, and auto emissions (USFS 2003b). Cumulative effects to air quality in the CEA from past, present, and foreseeable future activities are largely from air borne dust released by agricultural practices, mining, travel on unpaved roads, and smoke from wildfires or prescribed burns. Grazing and timber harvesting can produce fugitive dust, but the quantities are minimal and are expected to remain approximately equal to present conditions. Travel on unpaved roads in the CEA can adversely affect air quality from auto emissions, but this type of use has not adversely affected air quality measurably in the past and is considered insignificant (USFS 2003b).

Wildfire and prescribed burns have the greatest potential to affect air quality in the CNF and surrounding lands (USFS 2003b). Fire produces particulates, carbon monoxide, nitrogen oxides, and volatile organic compounds. Fuel loading in forested and non-forested vegetation in the CNF has increased, along with the risk of wildfires that may contribute to air pollution in the future. Wildfire emissions, when added to existing concentrations of air pollutants, could produce cumulative effects that result in non-attainment of the particulate standards in specific areas. Prescribed fires are conducted in compliance with State regulations for protection of air quality and only when ambient air quality standards will not be exceeded.

Mining is the major fugitive dust producing activity in the CNF. Phosphate ore production in Idaho is expected to remain stable or slightly increase over the next 15 years. The fugitive dust emissions would likely increase the same amount because the dust emission rate is roughly proportional to the mining rate. Cumulative effects of dust emissions from the mines operating in southeast Idaho is not expected because all mining must be done in compliance with IDEQ regulations requiring application of dust control BMPs and adherence to permit conditions that ensure protection of air quality.



Note: Base data from Caribou National Forest GIS data sets.

Cumulative Effects Study Area
Panel F and G Lease Areas
Lease Modification Areas
National Forest Boundary
Roads
Perennial Stream

0 Miles 4

Figure 5.2-1
Cumulative Effects for Air and Noise Resources
Smoky Canyon Mine Panels F and G

All the past, present, and reasonably foreseeable mining activities in the CEA are operated by Simplot, and the amount of air pollutants resulting from this activity is largely based on the mining rate and the truck haul distances. The present rate of mining is comparable to the proposed mining rate for the Proposed Action and reasonably foreseeable future mining activities. The location of the mining would change along the Simplot land position, but the mining related air emissions would stay approximately constant so the air emissions from the mining over time are not cumulative, rather would primarily just be relocated. Depending on the truck haul distances for each phase of mining, the air emissions from this activity would change over time. The volume of air emissions related to truck hauling would increase slightly when mining is shifted from Panels B and C to Panels F and G because of the longer haul. The Proposed Action and Alternatives would comply with National Ambient Air Quality Standards and applicable State and federal regulations on protection of air quality.

Current, future, or alternative operations at Smoky Canyon Mine are not forecasted to impact any federally designated Class I Areas (Grand Teton and Yellowstone National Parks).

The mining related noise within the applicable CEA, if the Proposed Action or Alternatives were selected, would basically be equivalent to existing conditions. Noise impacts from mining operations would shift in a southerly direction for the proposed mining operations. The noise from these operations would not be cumulative; rather it would be relocated along the phosphate mining trend. Noise from haul traffic between the mine panels and the mill at Smoky Canyon would also be the same as present conditions but would be relocated south of the existing mine operations. The public driving on the Smoky Canyon Road is currently exposed to the mining and haul traffic noise. This effect would be shifted south and, depending on the alternative under consideration, would impact persons on the Wells Canyon, Diamond Creek, or Crow Creek roads.

5.3 Groundwater Resources

CEA Boundary

The CEA boundary for groundwater (**Figure 5.3-1**) encompasses the area along Draney Creek from where it is crossed by the West Branch Meade Thrust Fault to the top of Webster Range, south along the Webster Range to South Fork Sage Creek, west along South Fork Sage Creek to the top of Freeman Ridge, south along Freeman Ridge and Snowdrift Mountain to Clear Creek, east along Clear Creek to the trace of the West Branch Meade Thrust Fault, and north along the West Branch of the Meade Thrust Fault to Draney Creek.

Rationale: Groundwater flow in the area affected by past, present, and future phosphate mining to the north of Pole Canyon flows to the north and northwest under Webster Ridge, where deep burial essentially isolates it from exposure to the surface environment (BLM and USFS 2002). Groundwater in the area south of Pole Canyon flows to the east from recharge areas along Freeman Ridge and the Snowdrift Mountain area to discharge points along the outcrop of the Meade Thrust Fault. The Meade Thrust Fault is considered to be permeable along the strike of the fault plane but is relatively impermeable across the fault (Maxim 2004a). The tailings pond is not included in the CEA because past studies have demonstrated that it is hydrogeologically isolated from the regional aquifer that is present west of the Meade Thrust Fault, and upward groundwater flows of naturally saline water under this facility eliminate its potential to negatively effect groundwater chemistry (JBR 2001b).

Cumulative Effects

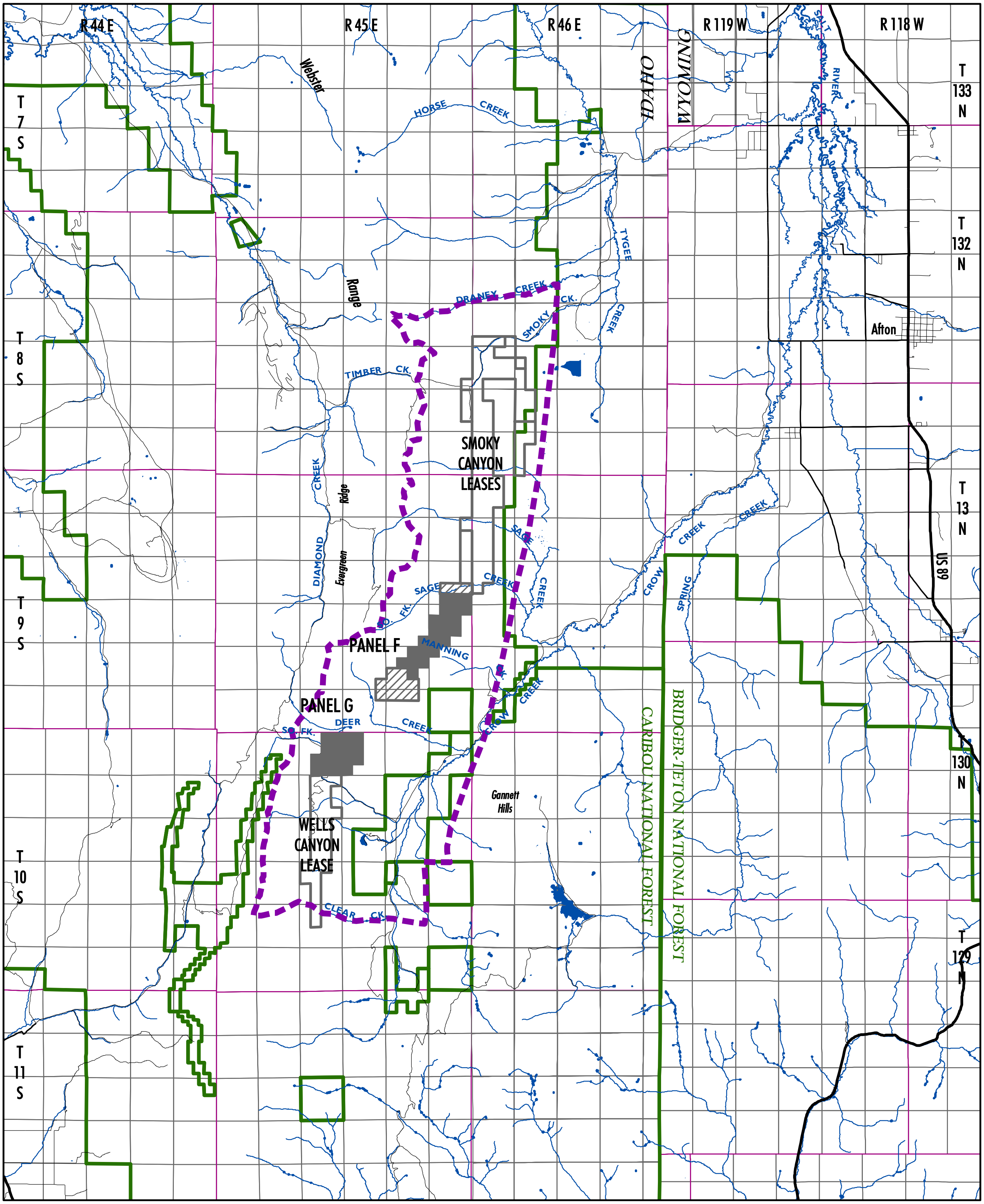
Cumulative effects to groundwater in the CEA would consist of groundwater withdrawals from wells or chemical effects caused by surface land uses that contribute contaminants to the groundwater under or down gradient of these land uses. Effects from timber harvesting, grazing, rights-of-way, and recreational uses on groundwater resources are negligible. Mining activities within the CEA have the greatest potential to impact the groundwater resources by withdrawal for consumptive use or from infiltration from open pits and seepage through overburden disposal fills, which have the potential to affect groundwater quality. The only mining operations in the CEA are those of the Smoky Canyon Mine.

Groundwater conditions in the CEA have been described in studies conducted for the Smoky Canyon Mine. The most recent of these studies are the Final Site Investigation Report for the Smoky Canyon Mine (NewFields 2005), the Groundwater Modeling Report for Panels F and G (JBR 2005a), the Water Resources Baseline Technical Reports for Panels F and G (Maxim 2004c and 2004d), and the Water Resources Technical Report for Panels B and C (JBR 2001b). These reports also summarize the results of studies done in the area by others. The northern boundary of the groundwater impacts modeling area conducted for the Panels F and G EIS is located along South Fork Sage Creek and is a physical flow boundary as described by JBR (2005a). The groundwater conditions north of South Fork Sage Creek are outside of the direct effects Study Area for the Panels F and G EIS and have been the subject of the other studies described above.

Within the CEA, usable amounts of groundwater are known to exist within the regional-scale Wells formation/Brazer Limestone aquifer, and aquifers of local importance in the Rex Chert member of the Phosphoria formation and the Dinwoody formation. As described in **Sections 3.3 and 4.3** of this EIS, impacts to the aquifers of the Rex Chert and Dinwoody formation are expected to be of limited extent in the immediate vicinity of the mine pits and overburden fills. The primary effects would be reduction in flows or elimination of small, isolated seeps and springs that could have local importance to wildlife and livestock. The development of Panels F and G could reduce or eliminate flow at 13 such seeps and springs in the immediate vicinity of the mine disturbance. Development of the existing Smoky Canyon Mine may have already affected flow at 2 natural seeps and springs that were described as being located very near the existing mine disturbances prior to mining (BLM and USFS 2001).

The most recent searches for existing groundwater withdrawals via pumping wells in the CEA were made by Maxim (2004c) and NewFields (2005). The only pumping wells in the CEA are the culinary and industrial wells at the Smoky Canyon Mine (**Figure 5.3-2**). These wells withdraw groundwater from the Wells formation aquifer for use at the mine. There are other wells located to the east and west of the CEA, and these are located in different aquifers so they would not be affected by groundwater extraction from the Wells formation aquifer at the mine.

In groundwater studies conducted on the mine area before its construction, Ralston (1979) concluded that pumping the Culinary and Industrial wells at the mine would not cause a noticeable decrease in flow from springs discharging from the Wells formation in the vicinity of the mine (Lower Smoky Creek, Hoopes Spring and Lower South Fork Sage Creek). During preparation of the Final SEIS for Panels B and C, the cumulative discharge of these springs in 2000 was compared to that recorded in 1981, and there was no discernable reduction in flow over this time period (BLM and USFS 2001). The proposed Panel G operations would include a 100 gpm water supply well. The area of influence of this well and its potential effect on the

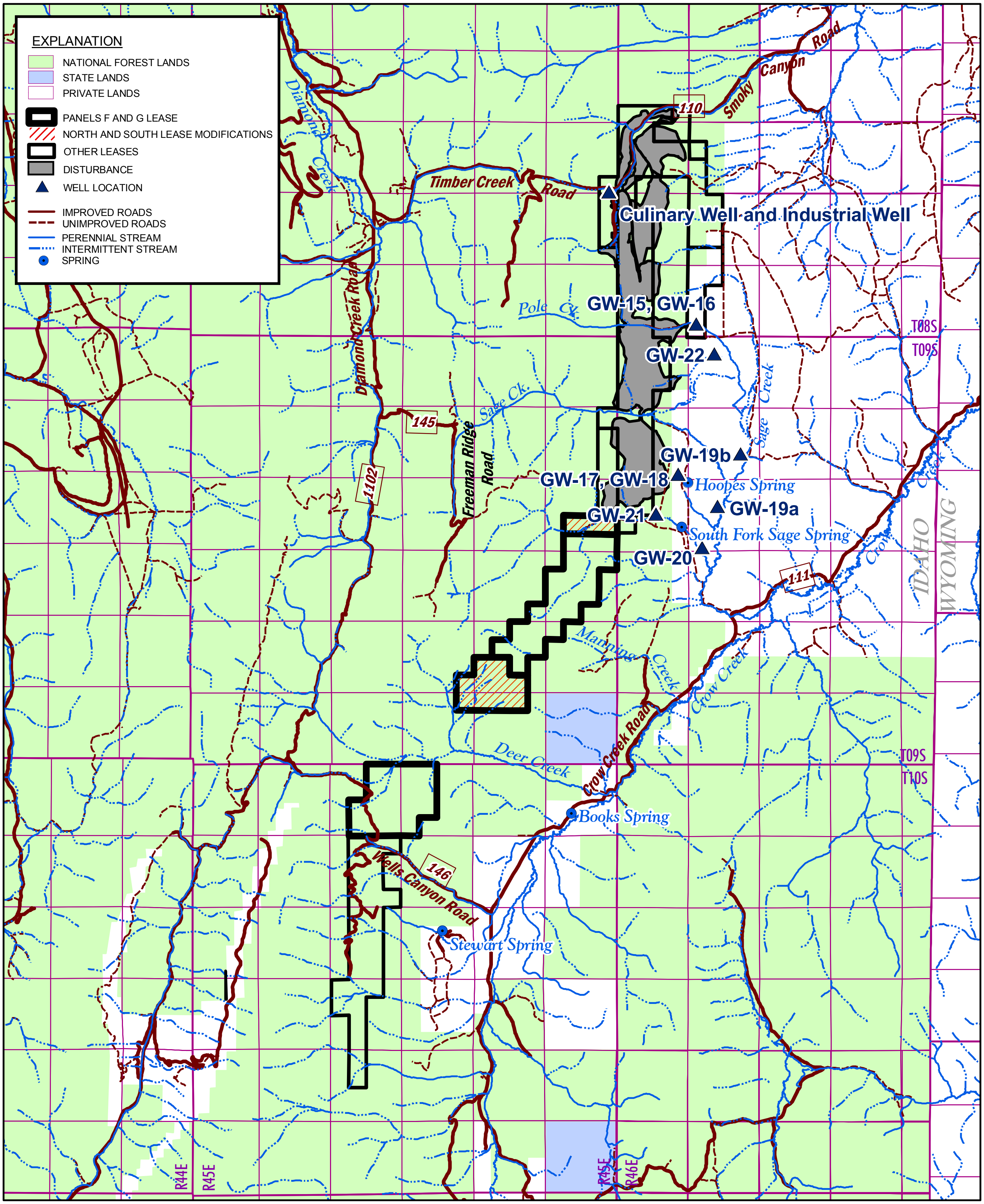


Note: Base data from Caribou National Forest GIS data sets.

Cumulative Effects Study Area
Panel F and G Lease Areas
Lease Modification Areas
National Forest Boundary
Roads
Perennial Stream

0 Miles 4

Figure 5.3-1
Cumulative Effects Area for
Ground Water Resources
Smoky Canyon Mine Panels F and G



Note: Base data from Caribou National Forest GIS data sets.

Figure 5.3-2
Site Investigation Wells
Smoky Canyon Mine Panels F and G

water table in the Wells formation is described in **Section 4.3** of this EIS. It was estimated that pumping this well would not affect the flow of other Wells formation springs in the area (Lower Deer Creek, Books Spring, Stewart Ranch Spring). Based on the investigations into the effects of existing groundwater pumping at the Smoky Canyon Mine and proposed pumping at Panel G, there should be no cumulative effects of this pumping on the flow of springs in the CEA.

Hoopes Spring is located along the trace of the West Sage Valley Branch Fault and is apparently a discharge point for groundwater from the Wells formation (Ralston 1979, JBR 2001b, NewFields 2005). The selenium concentration of this spring began to increase in the fall of 1997 while other parameters appeared to stay at background concentrations. During the 13-year period from 1984 to 1997, the mean selenium concentration was 0.0024 mg/l, ranging from <0.001 to 0.005 mg/l (BLM and USFS 2001). The selenium concentration then increased and ranged up to 0.0013 mg/L prior to October 2002, with concentrations in 2003 and 2004 ranging from 0.0067 to 0.015 mg/L and averaging 0.011 mg/L (NewFields 2005). The surface water aquatic criterion for selenium is 0.005 mg/L.

The reason for the increased selenium concentrations is thought to be due to seepage of seleniferous leachate from the Pole Canyon Dump entering the upper part of the Wells formation aquifer downgradient of the dump and migrating south along the West Sage Valley Branch Fault (NewFields 2005). Contribution of selenium from other parts of the Panel D and E operations is possible but has not been shown to date from existing groundwater monitoring studies.

The Panel F and G Proposed Action and Alternatives are not anticipated to impact Hoopes Spring because the groundwater regimes for these two areas are different. Groundwater flow in the Wells formation in the vicinity of Hoopes Spring is apparently flowing from west to east toward the West Sage Valley Branch Fault then from north to south along the fault zone to the spring (NewFields 2005). In the vicinity of Panel G, groundwater flow in the Wells formation is to the east, discharging in Lower Deer Creek, Books Spring, and Crow Creek. In the vicinity of Panel F, groundwater flow in the Wells formation is east to the West Sage Valley Branch Fault and then north to South Fork Sage Creek Spring where the groundwater discharges about 0.6 mile south of Hoopes Spring (**Section 3.3**). Groundwater in the Wells formation south of South Fork Sage Creek Spring likely does not flow further north. This is because South Fork Sage Creek Spring is at an elevation approximately 10 feet lower than Hoopes Spring. Groundwater studies done by NewFields (2005) at the Smoky Canyon Mine have indicated that there is a low elevation area in the Wells formation water table at the mouth of South Fork Sage Creek Canyon.

As described in **Section 4.3**, the Proposed Action for Panels F and G, and Mining Alternatives A, B, and C is estimated to result in discharges of selenium in groundwater to Lower Deer Creek, exceeding the surface water selenium standard of 0.005 mg/L. The same effect is also estimated to occur at South Fork Sage Creek Spring. These water quality impacts are not expected to influence water quality at Hoopes Spring for the reasons described above. Alternative D would result in lower selenium concentrations in groundwater down gradient of Panels F and G due to reductions in seepage through the overburden, but again, this is not expected to affect water chemistry in Hoopes Spring.

The development of open pits and subsequent pit backfills in the existing Smoky Canyon Mine have the potential to increase local groundwater recharge to the Wells formation aquifer because the Meade Peak aquitard covering the Wells formation in these areas is largely removed by mining. The same situation would be produced in the Proposed Action and Mining Alternatives for Panels F and G. Alternative D (infiltration barrier) would reduce this effect because of the designed reduction in percolation through the infiltration barrier.

The previous mine operations in the Panel A area have apparently affected groundwater quality in the underlying Wells formation aquifer, as evidenced by selenium concentrations observed in the culinary and industrial wells. In 1996, about 12 years after mining began, the selenium concentration in the well water increased to 0.017 mg/l (BLM and USFS 2001). The groundwater standard for selenium is 0.05 mg/L.

In 2000, the wells had selenium concentrations that varied from 0.007 to 0.031 mg/l averaging 0.0136 mg/l for the industrial well and 0.013 mg/l for the culinary well (BLM and USFS 2001). In 2003 and 2004, the selenium concentration in the culinary well ranged from 0.013 to 0.021 mg/L and in the industrial well the concentrations ranged from 0.011 to 0.012 mg/L (NewFields 2005).

Future groundwater quality in these wells could be affected by the recently opened Panels B and C, but these effects are not expected to extend south of these mine panels (BLM and USFS 2001). Groundwater quality in the Wells formation aquifer that may be impacted by the proposed Panels F and G would not impact water quality in the culinary and industrial wells. Groundwater in the vicinity of Panels F and G is not expected to flow north to the current mine facilities.

Panels B and C have the potential to degrade water quality of the Wells formation aquifer in a local area under and down gradient of the approved pit backfills and external overburden fill areas. This affected groundwater is not expected to discharge to the surface environment or be used by developed water wells (BLM and USFS 2001). Mitigation measures required by the approving Agencies are expected to reduce the water quality impacts to acceptable levels within a relatively short distance from the margins of the Panels B and C operations area.

The Pole Canyon overburden disposal facility was built as a canyon fill from approximately the contact of the Phosphoria and Wells formations downstream to the mouth of the canyon. A French drain was designed in the bottom of the fill to continue to convey Pole Canyon Creek under the overburden. Run of mine overburden was then placed on top of the French drain to the current surface configuration of the fill. The water chemistry exiting the French drain has contained cadmium and selenium concentrations greater than the groundwater standards for these parameters. Water with chemistry similar to that discharging from the French drain outlet is apparently infiltrating into the alluvial channel fill under the overburden fill. An alluvium monitoring well located about 750 feet downgradient of the overburden fill (GW-15) has indicated total selenium concentrations ranging from 0.31 to 0.66 mg/L, well above the groundwater standard (NewFields 2005) (**Figure 5.3-2**). Sulfate, manganese and TDS concentrations in this well also exceeded secondary groundwater standards. Other alluvial monitoring wells installed further down gradient to the east of the Pole Canyon overburden disposal facility (GW-22, 19b, and 19a, respectively) in alluvium along Pole Canyon Creek have indicated lesser concentrations at GW-22 and at background concentrations in GW-19b and 19a. Cadmium concentrations are less than the applicable groundwater standard (0.005 mg/l) in all alluvial monitoring wells indicating this solute is attenuated chemically in the flow path.

A monitoring well installed in the Wells formation down gradient of the Pole Canyon overburden fill (GW-16) indicated total selenium concentrations ranging from 0.45 to 0.64 mg/L (NewFields 2005). Another Wells formation monitoring well located between Panel E and Hoopes Spring (GW-18) indicated selenium concentrations ranging from 0.004 to 0.006 mg/L, below the groundwater standard.

Data generated during the Smoky Canyon Site Investigation have indicated that selenium and other COPCs are leached from the Pole Canyon overburden fill, primarily through the action of seasonal wetting of the lower portion of the overburden during high runoff events followed by gradual drainage of generated leachate to the French drain. This leachate combines with other stream flow in the French drain exiting to the surface channel downstream, percolating into the shallow alluvial aquifer, and also into the underlying Wells formation aquifer. Some contaminated groundwater in the alluvium migrates down gradient into Sage Valley where concentrations decrease to low levels through attenuation and dilution. Other contaminated alluvial groundwater enters the Wells formation and recharges the regional aquifer under Pole Canyon Creek. This groundwater flows east toward the West Sage Valley Branch Fault and then southward to discharge at Hoopes Spring. It should be noted that the Pole Canyon overburden fill hydrogeological setting is unique at the Smoky Canyon Mine and likely represents a worst-case condition that is not repeated anywhere else at the mine.

Groundwater quality in the alluvial and Wells formation aquifers downgradient of the Pole Canyon overburden would not be impacted by groundwater quality effects from the proposed Panels F and G because Wells formation groundwater from south of South Fork Sage Creek would not flow northward to the Pole Canyon area as described previously for Hoopes Spring.

Existing groundwater monitoring at Smoky Canyon Mine has not indicated water chemistry impacts to alluvial or Wells formation groundwater related to operations at Panels D or E.

Based on the available hydrogeological information for the areas north and south of South Fork Sage Creek, it appears that groundwater from under the past and present mining operations at Smoky Canyon Mine would not mix with groundwater from under the proposed Panels F and G operations. Thus, the water quality effects would remain physically separated. The geographic area (footprint) of the Wells formation regional aquifer that could potentially become impacted by Panels F and G with regard to water quality would be in addition to that already and potentially impacted at the Smoky Canyon Mine.

Current impacts to groundwater, from the existing Smoky Canyon Mine, are not expected to continue in perpetuity. Simplot has entered into an AOC with the State and federal regulatory agencies. The AOC implements measures to determine the nature and extent of COPC releases. A response action will be developed by the regulatory agencies and implemented by Simplot. As mentioned previously, the Site Investigation for Area A (historic mining on federal lands) and Area B (the tailings impoundment on private ground) has been completed. The EE/CA is scheduled to be released for public review in early 2006 and an agency decision document is expected in the fall of 2006.

5.4 Surface Water Resources

CEA Boundary

The CEA boundary for surface water (**Figure 5.4-1**) includes the Crow Creek Watershed (HUC 5) to its confluence with the Salt River, the Tygee Creek Watershed (HUC 5) to its confluence with Stump Creek, and Diamond Creek Watershed (HUC 6) that extends to the confluence with Timber Creek. There are 148,956 acres (232.7 square miles) in the surface water CEA.

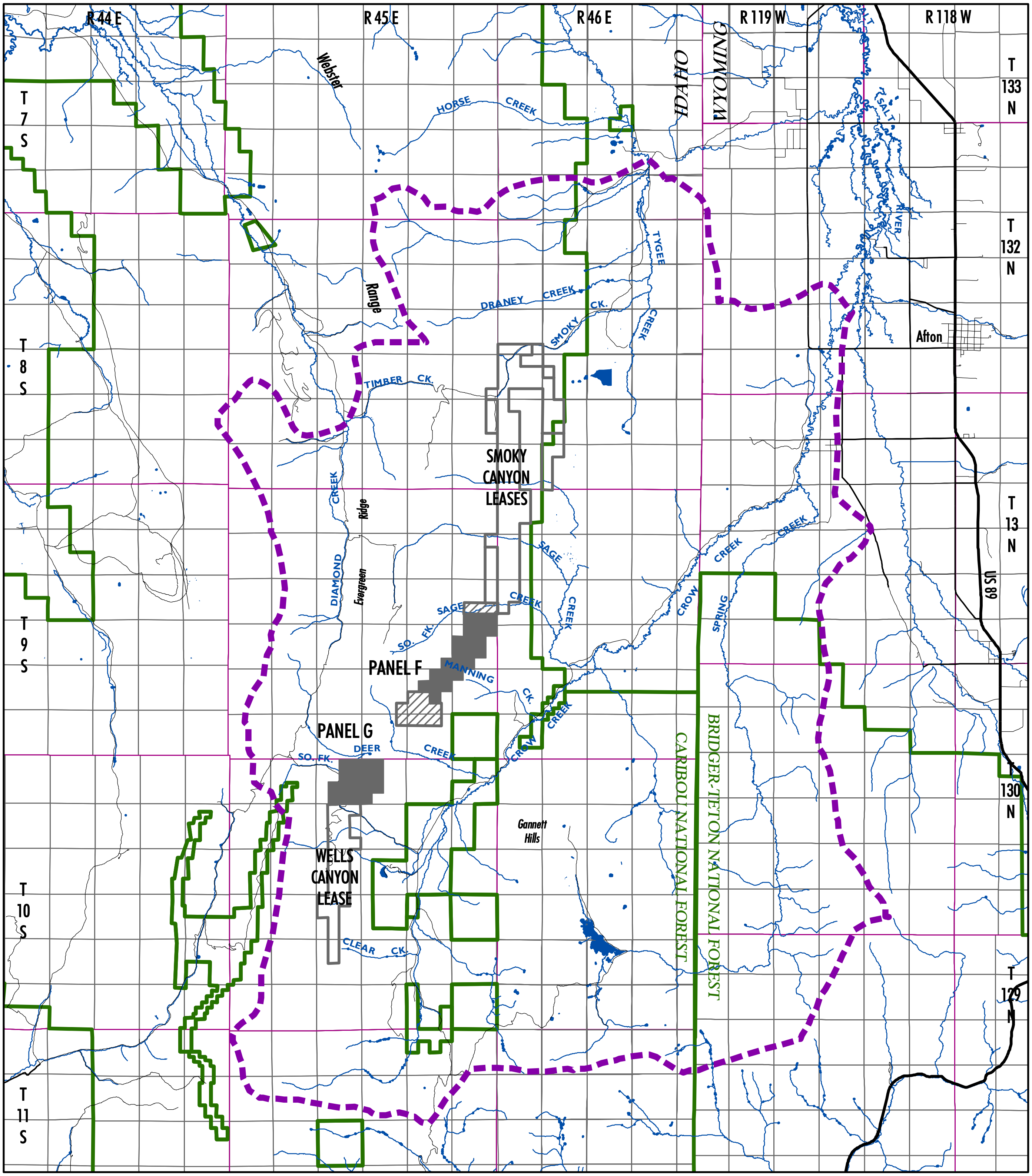
Rationale:
This delineation incorporates natural watershed boundaries including all past, present, and reasonably foreseeable phosphate mining and transportation-related disturbances upstream of Stump Creek, the Salt River, and Timber Creek. As flows progress downstream, localized effects become more and more diluted and eventually reach a point where effects become non-measurable. This point varies between watersheds, season, flow events, and type of pollution element. Typical annual transport distances are estimated to be approximately 10, 2, and 0.2 kilometers for suspended sediment, sand, and coarse particles, respectively (Bunte and McDonald 1998). IDL (2000) suggests that watershed areas greater than 20,000 acres in size (approximately a 6th HUC watershed) have such diversity in the complexity of streams, soils, geology slopes, and land use that meaningful cumulative effects are difficult to detect. Therefore, surface water resources should not be significantly affected by the Project beyond this area.

Cumulative Effects

Potential cumulative effects to surface water resources within the CEA can occur from road construction and maintenance, livestock grazing, timber harvesting, agricultural activities and mining. Simplot's current mining activities span two watersheds, both of which ultimately are part of the Salt River system. The northernmost watershed is the Tygee Creek basin (**Figure 5.4-1**). The existing Smoky Canyon access road, mill, offices, maintenance facilities, tailings pond, and mine Panels A, B, and C are located within the Smoky Creek watershed that drains to Tygee Creek, or are located in the Tygee Creek watershed (tailings pond). Tygee Creek is a tributary of Stump Creek, which drains to the Salt River approximately 5 miles downstream of Tygee Creek.

The existing mine Panels D and E are located along tributaries to Sage Creek. These tributaries include Pole Canyon Creek, mainstream Sage Creek, and South Fork Sage Creek. After exiting the Webster Range, Sage Creek drains to the south through Sage Valley. With a total watershed area of approximately 25 square miles, it joins Crow Creek in the approximate center of the Water Resources CEA (**Figure 5.4-1**). Crow Creek flows northeastward into Wyoming, combining with flow from Spring Creek, and enters the Salt River about 8 miles upstream from the confluence of Stump Creek with the Salt River. The southern portion of the CEA (from South Fork Sage Creek south) is largely the same as the direct effects Study Area for this EIS, while the northern portion of the CEA is outside of this direct effects Study Area.

Forest management activities including timber harvests, livestock grazing, and public recreational uses occur within the CNF located on the east and west slopes of the Crow Creek watershed upstream (south) of its confluence with Sage Creek. The CNF comprises most of the west slopes of the Sage Creek and Tygee Creek watersheds and all of the Diamond Creek watershed. In Wyoming, the Bridger-Teton National Forest comprises most of the Spring Creek watershed which drains into Crow Creek about 5 miles upstream of the Salt River.



Note: Base data from Caribou National Forest GIS data sets.

Figure 5.4-1
Cumulative Effects Area for Surface Water, Soils, Vegetation, Wetlands, Fisheries and Aquatics, Visual/Aesthetics, Cultural, and Noise Resources
Smoky Canyon Mine Panels F and G

Cultivated agriculture and livestock pasture land uses occur on private land located in the bottom of the Crow Creek Valley upstream of Sage Creek. Agricultural private lands also dominate the eastern portions of the Tygee and Sage Creek watersheds and along Crow Creek Valley from Sage Creek downstream to the confluence with the Salt River.

Forest Service GIS mapping and Idaho and Wyoming Gap Analysis Project maps indicate the past and present land uses and vegetative cover types within the Surface Water CEA as listed in **Table 5.4-1**.

TABLE 5.4-1 PAST AND PRESENT LAND USES THROUGH 2004 AND VEGETATIVE COVER TYPES WITHIN THE SURFACE WATER CEA

LAND USE	AREA (ACRES)
Mining	2,150
Mineral Exploration	62
Timber Harvests	2,150
Burned Areas	11
Agriculture Areas (private)	6,018
Utility and Pipeline Corridors	61
Roads/Trails	305
MAJOR VEGETATION TYPES	
Aspen	20,149
Aspen-Conifer	10,611
Conifer	34,897
Sagebrush/Shrub	49,244
Grassland	5,088
Riparian	3,201
POTENTIALLY SUITABLE TIMBER	
Aspen	10,503
Aspen-conifer	5,649
Conifer	23,723
LAND OWNERSHIP	
USFS	106,404
Private	37,902
State	2,616
BLM	2,034

The reasonably foreseeable developments within the CEA that could affect surface water quality or quantity, in addition to the Proposed Action and Alternatives, include ongoing development of the Smoky Canyon Mine, which would add approximately 287 acres of disturbance over what is currently present at the mine. No USFS timber sales are proposed for the CEA in the current planning cycle. Effects of potential wildfires and suppression activities in the CEA are unknown at this time and are thus not considered for this analysis. Changes to transportation and recreational uses of the CEA that could noticeably impact surface water resources have not been proposed. Changes to private agricultural lands within the CEA are likely as some of these lands are converted from traditional agricultural utilization (ranching) to more residential and recreational utilization. The Agencies are not aware of any such specific plans that could impact water resources, and these are not considered for this analysis.

None of the streams within the CEA are on the latest EPA approved (1998) State of Idaho 303(d) list of impaired waters, nor are they on the list of streams whose quality has been determined to be threatened (IDEQ 1999). According to the Idaho 1998 303(d) List (IDEQ 1999), Crow Creek, Deer Creek, Stump Creek, and Tygee Creek were all found to support their beneficial uses according to surveys by the Division of Water Quality between 1993 and 1996. Sage Creek, while it appeared on the 1996 303(d) List as sediment-impaired, was removed from the 1998 list because it was deemed by the Division of Water Quality to support all of its beneficial uses. In 2003, IDEQ released the Draft 2002-2003 Integrated 303(d)/305(b) Report which contains the draft 2002-03 303(d) list (IDEQ 2003c). Pole Canyon Creek was listed for selenium. North Fork Deer Creek, South Fork Deer Creek, and upper Deer Creek above its confluence with the South Fork are listed due to sediments. The recommendations of the draft 2002-2003 report have not yet been finalized. Simplot, in consultation with the regulatory agencies, would take steps to ensure compliance with future EPA approved 303d lists and applicable discharge limitations, if they were to change from current conditions.

IDEQ described water quality conditions in Sage Creek in the Final 2003 Supplement to 2001 Total Maximum Daily Load Baseline Monitoring Report (IDEQ 2004d). Samples were obtained in May 2003 from Hoopes Spring, Lower Sage Creek above its confluence with Crow Creek, Sage Creek below its confluence with Pole Canyon Creek, and Lower South Fork Sage Creek. The 4-day average selenium values for Lower South Fork Sage Creek and Sage Creek below its confluence with Pole Canyon Creek were both less than 0.001 mg/L. The 4-day average for Hoopes Spring was 0.0103 mg/L and Lower Sage Creek above its confluence with Crow Creek was 0.004 mg/L. Selenium loads observed in May 2003 were comparable to selenium loads observed in May 2001 and 2002 (IDEQ 2004c). IDEQ concluded that Hoopes Spring is the source of the selenium loads in Lower Sage Creek and that selenium loads are reduced by as much as 34 percent along the Hoopes Spring – Lower Sage Creek flow path. The report also indicated that selenium in surface waters is apparently immobilized within wetlands and beaver dam complexes. Conversely, selenium was observed to be mobilized from sediment when flow velocities entrain particles. It was suggested that selenium cycling in streams and upland soils can result in selenium loads in streams reflecting releases from mines in prior years.

The Area Wide Human Health and Ecological Risk Assessment (IDEQ 2002c) contains surface water data for the CEA. The risk assessment presents data collected by Tetra Tech EM and Montgomery Watson in 2001 as part of the Selenium Project Area Wide Investigations. Samples were taken of stream surface water, stream sediment, riparian soil and plant tissue, and aquatic plant, insect and fish tissue. Within the CEA, samples were taken upstream and downstream of the Smoky Canyon Mine along Smoky Creek and Sage Creek. Samples were taken in lower South Fork Sage Creek and Sage Creek above its confluence with Crow Creek. Samples were also taken at the mouth of Deer Creek and Crow Creek just above Deer Creek. The results of these sampling events for the COPCs of interest are shown in **Table 5.4-2**.

TABLE 5.4-2 AREA WIDE INVESTIGATION SURFACE WATER RESULTS FOR THE SURFACE WATER CEA

SAMPLE SITE (SURFACE WATER STANDARDS)	TSS (NONE)	CADMIUM (1.0 UG/L)	CHROMIUM (10 UG/L)	SELENIUM (5.0 UG/L)	ZINC (105 UG/L)
Smoky Creek Above Mine	<4	0.16	<0.5	<1	46
Smoky Creek Below Mine	59	0.27	<0.5	<1	68
Sage Creek Above Mine	<4	<0.13	<0.5	<1	<10
Sage Creek Below Mine	7	0.16	<0.5	<1	<10
Lower South Fork Sage Creek	<4	<0.13	<0.5	1.4	<10
Sage Creek above Crow Creek	7	<0.13	<0.5	3.2	<10
Lower Deer above Crow Creek	4	<0.13	<0.5	1.2	94
Crow Creek above Deer Creek	11	<0.13	<0.5	<1	66

All metals shown as dissolved concentrations except selenium, which is total. TSS units are mg/L all others are ug/L.

The Area Wide Investigation results suggest that suspended sediment (TSS), cadmium, and zinc in Smoky Creek is increased downstream of the Smoky Canyon Mine, but the downstream water quality is still within surface water standards. Sage Creek also showed slight increases in TSS and cadmium but not zinc. Cadmium and chromium were not significantly increased downstream of the mining for any of the streams. Selenium did not increase downstream of the mine in Smoky Creek or Sage Creek where it flows through the active mining area. In 2001, Lower Sage Creek above its confluence with Crow Creek had a total selenium concentration of about 64 percent of the Criteria Continuous Concentration for surface water (0.005 mg/L). This is likely due to the selenium in Hoopes Spring, which was not sampled. Selenium was just above the detection level in lower South Fork Sage Creek and lower Deer Creek.

According to the 2002-2003 CTNF Monitoring Report, every major stream in the Caribou portion of the Forest has been rated on a stream-wide basis (USFS 2003e). In 2001 and 2002, 38 streams, some with multiple reaches, were field verified for Properly Functioning Condition (PFC). Of these reaches, 20 (43 percent) were considered to be in Properly Functioning Condition, 25 (53 percent) were considered to be Functioning-at-Risk, and two were considered to be Non-Functioning. Most of the evaluated reaches had improving trends.

The CTNF Monitoring Report also described that since 1997, the CNF has conducted BMP audits of 10 timber sales. No detrimental effects to or violations of water quality standards were documented. All applied BMPs appeared to be effective in controlling erosion/sediment and protecting water quality. Shortcomings in road maintenance were noted, but detrimental effects to surface water from these shortcomings were not observed. The report suggested that, when planned and administered properly, timber harvesting and associated roading on the CNF have little observable effects to surface water quality through the application of BMPs and other mitigating actions (USFS 2003e). In addition, the report indicates that water yields were calculated for major land-disturbing timber sales, and the analyses determined that no projects resulted in measurable changes or influences to stream channel morphology or condition. It was also reported that BMP reviews found no impacts to adjacent and downstream channels due to changes in amounts and timing of water yields.

Many of the past and current human activities within the watersheds of the CEA, including mining, livestock grazing, timber harvesting, and road construction, can increase sediment loads to streams and result in channel instability. According to the current (1998) Idaho 303d list of impaired waters, all of the streams in the CEA were found to support their beneficial uses. The Draft 2002-03 Integrated 303d/303b Report listed Pole Canyon Creek for selenium; it listed North Fork Deer Creek, South Fork Deer Creek, and upper Deer Creek above its confluence with South Fork for sediment.

On a regional basis, throughout the Snake/Blackfoot River watershed, weighted average annual suspended sediment concentrations are approximately 150 mg/l (USGS 1977). Water quality data obtained for four quarterly samples taken in 1998/1999 at the USGS gauging station on the Salt River (USGS 2001d) showed that suspended sediment concentrations ranged from 24 mg/L during fall baseline condition to 105 mg/L during spring snow melt conditions. Aquatic monitoring data for the Smoky Canyon Mine from 1981- 2003 showed suspended sediment (TSS) concentrations in lower Smoky Creek to range from non-detectible to 240 mg/L (upper Smoky ranged from non-detectable to 1120 mg/L) and in lower Tygee Creek TSS ranged from non-detectible to 28 mg/L (TRC Mariah 2004).

A recent, comprehensive study of potential mining effects on surface water resources within the CEA is described in the Site Investigation Report for the Smoky Canyon Mine (NewFields 2005). Surface water and sediment samples were obtained from streams upstream and downstream of the Smoky Canyon Mine and from seeps issuing from the bases of some of the overburden fills at the mine.

A survey of existing overburden seeps resulted in six areas of seepage from the overburden fills being found. Five of the six seeps contained selenium concentrations greater than the IDEQ removal action levels for livestock extended use (0.05 mg/L) and transient use (0.201 mg/L). Total selenium concentrations for these five seeps ranged from 0.27 to 13.6 mg/L. All of these seeps are contained within fenced detention basins in the mine area and are therefore not regulated under State and federal water quality statutes and regulations.

Table 5.4-3 indicates the results of the surface water sampling for streams in the vicinity of the Smoky Canyon Mine. The streams that contained COPCs above surface water quality standards were Pole Canyon Creek below the Pole Canyon Overburden Fill for cadmium, nickel, selenium and zinc; Hoopes Spring for selenium; South Fork Sage Creek for selenium; and, Lower Sage Creek (between Hoopes Spring and Crow Creek) for selenium.

TABLE 5.4-3 2003 – 2004 SITE INVESTIGATION SAMPLING OF STREAM WATER IN THE CEA

STREAM	# OF SAMPLES TAKEN AT ALL SITES ALONG STREAM	# OF SAMPLES EXCEEDING SW STANDARDS	CONSTITUENTS EXCEEDING SW STANDARDS
Tygee Creek	5	0	
Smoky Creek	10	0	
Roberts Creek	4	0	
Pole Canyon Creek	10	10	Cd, Ni, Se, Zn
Upper Sage Valley	13	0	
Upper Sage Creek	5	0	
Hoopes Spring	11	11	Se
S.F. Sage Creek	22	1	Se
Lower Sage Valley	32	14	Se
Crow Creek	5	0	

Beginning in 1987, for lower Pole Canyon Creek below the overburden fill, every sample collected at that site has contained selenium concentrations greater than 0.005 mg/l. None of the samples taken from that site before that time had values greater than 0.005 mg/l, nor have any of the samples taken from the stream above the overburden fill had values greater than 0.005 mg/l. Concentrations of selenium since 1991 in Lower Pole Canyon Creek, below the French drain, have ranged from 0.07 mg/l to 1.5 mg/l.

During 2003 and 2004 Site Investigation, Pole Canyon Creek was monitored in two sites above the Pole Canyon overburden fill and 5 sites downstream of the overburden. Two of the downstream sites were located close to the base of the overburden, and three sites were located along Pole Canyon Creek in Sage Valley. During the site investigations, none of the COPCs were measured above the IDEQ monitoring action levels or the surface water standards in Pole Canyon Creek above the Pole Canyon overburden fill. (Monitoring Action Levels are COPC concentrations for regulated surface water and groundwater identified in the Area-Wide

Risk Management Plan (IDEQ 2004) to identify the primary transport pathways from sources related to past mining. The surface water Monitoring Action Levels are based on the maximum Area-Wide Background Level; the groundwater Monitoring Action Levels are based on water quality criteria for protection of surface water.) Downstream of the overburden fill, concentrations of cadmium, nickel, selenium, and zinc exceeded the monitoring action levels in all samples. Cadmium and selenium concentrations also exceeded their water quality standards in all samples. Nickel and zinc exceeded their water quality standards in the sample sites closest to the base of the overburden but did not exceed the standards in the Sage Valley sample sites. Total selenium concentrations ranged from 0.164 to 1.5 mg/L and averaged 0.623 mg/L in Pole Canyon Creek downstream of the overburden fill. All COPC concentrations decreased with distance along the creek downstream of the overburden fill. Selenium concentrations decreased from over 1 mg/L at the base of the overburden to about 0.2 mg/L in Sage Valley.

The water quality discharged to the surface from Hoopes Spring ranged from 0.0067 to 0.15 mg/L total selenium and averaged 0.011mg/L total selenium. No other COPCs exceeded either IDEQ monitoring action levels or surface water quality criteria in Hoopes Spring.

In one side spring to Lower South Fork Sage Creek (LSS-SP1), 1 out of 6 samples had a selenium value of 0.008 mg/L, which exceeded the surface water quality criteria for selenium. The total selenium concentrations in the 22 samples obtained from Lower South Fork Sage Creek ranged from less than 0.001 mg/L to 0.008 mg/L and averaged 0.0017 mg/L.

None of the COPCs except selenium were present in concentrations above the monitoring action levels in Sage Creek upstream of its confluence with Hoopes Spring. Total selenium concentrations ranged from less than 0.001 to 0.0036 mg/L. In the reach between its confluences with Hoopes Spring and South Fork Sage Creek none of the COPCs other than selenium were present above the monitoring action levels and total selenium concentrations exceeded the surface water standard in all samples. Below its confluence with South Fork Sage Creek, 5 of the 18 samples exceeded the surface water standard for selenium with concentrations ranging from 0.003 to 0.0068 mg/L averaging 0.0047 mg/L.

Overall, it appeared that Hoopes Spring was the source of the elevated selenium concentrations in Lower Sage Creek with the highest concentrations occurring in the roughly 4,000-foot long reach of Sage Creek between the confluences of Hoopes Spring and South Fork Sage Creek. Downstream of South Fork Sage Creek, the main stem of Sage Creek varied with total selenium concentrations exceeding the water quality criteria during low flow periods of the year. This is consistent with the observations made by IDEQ in the 2003 Supplement to the 2001 TMDL Baseline Monitoring Report.

Water quality was monitored in Crow Creek just above and below its confluence with Sage Creek. Total selenium was higher than the monitoring action level (0.0016 mg/L) in 2 of 5 samples collected in Crow Creek downstream of Sage Creek (both had concentrations of 0.002 mg/L), but no samples were above the water quality criteria for total selenium.

The Proposed Action and Alternatives would not change the current conditions in surface streams north of South Fork Sage Creek. Therefore there would be no cumulative effect to Sage Creek upstream of its confluence with South Fork Sage Creek. There would also be no change to the Tygee Creek watershed from the Proposed Action and Alternatives. The tailings pond would be increased in size in compliance with its existing permitted expansion plan. As described in the FSEIS for the Panels B and C, construction of the tailings pond has had an overall beneficial effect on water quality in Tygee Creek compared to the baseline condition when saline spring discharge impacted the water quality of the stream (BLM and USFS 2001). This beneficial water quality effect would continue with ongoing operation of the tailings disposal facility.

As described in **Section 4.3**, the Proposed Action and Alternatives would add sediment and reduce runoff to area streams from South Fork Sage Creek to Wells Canyon. Similar and extensive mining and haul/access road construction/operation related to the existing Smoky Canyon Mine has apparently had limited TSS impact on downstream water quality due to surface runoff effects (BLM and USFS 2001). Cumulative effects to runoff and sediment from the Smoky Canyon Mine and the Proposed Action and alternatives are possible in lower Sage Creek and downstream but are not expected to be noticeable.

The primary COPC impact of the proposed mining operations on surface water in the CEA would be from construction of seleniferous overburden pit backfills and external overburden fills as part of Panels F and G. The permeable chert/topsoil cap used in the Proposed Action and Alternatives A through C would allow percolation of annual recharge water through the seleniferous overburden fills introducing COPCs into the Wells formation aquifer beneath these areas. As described in **Section 4.3** for the Proposed Action and Alternatives A through C, the transport of the COPCs in the Wells formation to points of groundwater discharge at the surface is estimated to result in peak concentrations of selenium in lower Deer Creek, Crow Creek, South Fork Sage Creek, and lower Sage Creek (**Table 4.3-16**). Under these alternatives, selenium concentrations in lower Deer Creek and South Fork Sage Creek that are currently less than the surface water standard would increase to approximately twice the surface water standard of 0.005 mg/L. Lower Sage Creek between the confluence with South Fork Sage Creek and Crow Creek, which now contains total selenium above the surface water standard during low flow conditions would contain selenium concentrations that are estimated between 0.008 to 0.009 mg/L during all times of the year. Crow Creek immediately downstream of Sage Creek under these alternatives is estimated to be at or slightly above (0.006 mg/L) the surface water standard for selenium year-round. Dilution and attenuation in Crow Creek is expected to reduce total selenium concentrations downstream of Sage Creek to less than 0.005 mg/L before the stream leaves the CEA.

Where the impact analysis predicts exceedances of applicable standards for selenium in groundwater and surface water, none of the above alternatives would be chosen by the Agencies without additional measures designed to limit releases so applicable standards were met.

Under Alternative D, lower Deer Creek and South Fork Sage Creek would maintain total selenium concentrations just below the surface water standard, but the added selenium load would result in increasing the selenium concentration in lower Sage Creek between South Fork Sage Creek and Crow Creek to approximately 0.007 mg/L year-round. The total selenium concentration in Crow Creek downstream of Sage Creek is estimated to be approximately 0.005 mg/L or less year-round.

It should be noted that the timeframe for the peak selenium concentrations at lower Deer Creek and South Fork Sage Creek are about 50 and 100 years, respectively. After these peaks, the concentrations are estimated to gradually decrease over periods of hundreds of years. In addition, the estimated concentrations in Sage Creek downstream of South Fork Sage Creek assume that the existing, seasonal concentrations continue unchanged. These concentrations are due to contributions of selenium from Hoopes Spring, which are attributed to leaching of selenium from the Pole Canyon Overburden Fill at the Smoky Canyon Mine. This is currently being addressed through the AOC between Simplot and the Agencies. Mitigation measures that would be employed at the Smoky Canyon Mine to reduce the selenium in Hoopes Spring would also reduce the estimated cumulative effects to Sage Creek from the Proposed Action and Alternatives.

5.5 Soils

CEA Boundary

The CEA boundary for soils (**Figure 5.4-1**) is the same as described in surface water (**Section 5.4**).

Rationale: This CEA boundary is the same as for surface water, primarily for simplicity in the cumulative effects analysis. Soil resources would not be affected by the Project beyond these watershed areas.

Cumulative Effects

The CEA for soil resources includes private lands, State land, BLM land, portions of the CNF in southeastern Idaho, and portions of the Bridger-Teton National Forest in southwestern Wyoming (**Table 5.4-1**). The boundary of the CEA encompasses approximately 148,956 acres. The USFS administers the largest amount of land within the CEA (71 percent) followed by private land (25 percent), with the State and BLM administering a few percent each of the total area.

The CEA encompasses five watersheds including Tygee Creek, Crow Creek, upper Diamond Fork, Deer Creek and Sage Creek. Soil resources beyond these watershed boundaries would not be affected by implementation of the Proposed Action or Alternatives. The RFP (USFS 2003a) requires that less than 30 percent of a watershed should be in a hydrologically disturbed condition. The surface water impact analysis in **Section 4.3** showed that the mining components of the Proposed Action, or any of the mining alternatives, would result in 11 percent or less hydrologic disturbance in any of the affected watersheds. The watersheds evaluated include most of the surface water CEA with the exception of the Tygee Creek watershed. None of the Tygee Creek watershed would be disturbed by the Proposed Action or Alternatives.

Major land uses in the CEA are timber harvesting, livestock grazing, agriculture, and mining. The area is also used for hunting, fishing, and other outdoor recreation where ORV use can disturb soil resources, but the effects of these activities on soils are insignificant compared to the other four major land uses. The past and present disturbances to soil resources from these land uses within the CEA are shown in **Table 5.4-1**.

According to CNF data, approximately 27,000 acres of timber harvest has occurred on the CNF since 1964 with 2,150 acres of this occurring in the CEA (**Table 5.4-1**). Removal of trees and vegetation exposes the soil resources to erosional factors, and equipment used to remove and haul the timber can cause compaction that further increases the erosion potential by increasing runoff and decreasing infiltration. Logging roads can alter water flow on the soil surface, creating impervious surfaces that concentrate runoff and increase erosion. The primary effect of these activities on soil resources is increased erosion of in situ soil with the secondary effect of increased sediment loading in downstream surface waters. The 2002-2003 CNF Monitoring and Evaluation Report (USFS 2003e) indicated that audits of 10 timber sale disturbances in the CNF showed BMPs appeared to be effective in controlling soil erosion and stream sedimentation. The same report indicated that monitoring of 24 soil erosion collection tanks on the CNF showed observed soil erosion rates ranged from 0.03 TPY to 1.05 TPY, which are below allowable soil loss levels needed to maintain soil productivity (3 – 5 TPY). The monitoring report also discussed the 13 miles of new roads constructed in the CNF in the previous 5 years and described that timber sale roads were typically being built on land types capable of this use, and no road failures or unmitigated problems were reported. The report concluded that, when planned and administered properly, timber harvesting and associated roading had little observable effects to stream water quality due to soil erosion and sedimentation.

Controlled burning for fuel management on Forest lands, and the occurrence of unplanned seasonal wildfires, increase the risk of soil erosion by removing the organic surface material from the soil. Extremely hot fires have the potential to permanently alter the top layers of the soil, changing the soil structure, productivity, chemistry, and hazard of erosion. Within the CEA, soil impacts resulting from fire would vary by location, timing of the fire, soil and vegetation type, and post-fire environment (USDA 2003a).

Livestock grazing may affect soil by decreasing the vegetation cover, destroying the microbiotic crust, increasing compaction, and thereby increasing the surface erosion of soils. Specific localized damage in riparian areas from compaction and vegetation removal by cattle can happen, allowing sediment to enter the waterway and contributing to the destruction of the stream banks. Disturbance of soil resources by livestock is also a factor in the introduction and spread of noxious and non-native vegetation species.

The 2002-2003 CTNF Monitoring Report also indirectly discussed impacts of livestock grazing on soil resources (USFS 2003e). It described WEPP modeling on 15 sites with different vegetation communities in the CNF that are commonly used for livestock grazing. The modeling results indicated that 0.03 – 0.08 TPY of soil loss was estimated for juniper, mountain mahogany, and one-third of the mountain sagebrush areas. The aspen, mountain brush, tall forb, and two-thirds of the mountain sagebrush areas were estimated to have no soil loss. The report concluded that range management activities were not causing excessive soil losses in any of the vegetation types monitored. The report described that upland vegetation is generally under-utilized by livestock grazing activities with some heavy grazing on certain sheep allotments. As a whole, the rangeland vegetation trend was reported to be upward. This past and present vegetation and soil loss condition due to grazing uses of the CTNF is applicable to the CEA and is expected to continue in the foreseeable future.

Typical recreation in the CEA consists of hunting, fishing, and other outdoor activities. Generally, these activities have a lesser impact on the soil resources than other uses due to their intermittent and seasonal nature. Potential cumulative effects are limited and would include compaction from vehicle travel.

Of all the land uses in the CEA that can affect soils, the most significant one is mining because the soils within the disturbed areas are physically removed and then replaced during reclamation activities. The only mining in the CEA is related to the Smoky Canyon Mine. Mining activity at the Smoky Canyon Mine has disturbed 2,150 acres of soil resources in the CEA (**Table 5.4-1**), including Smoky Canyon Mine Panels A, B, C, D, and E. An additional 62 acres have been disturbed due to phosphate exploration programs in the Manning, Deer, and Wells Canyon leases. Excluding the proposed Panels F and G expansion, the Smoky Canyon Mine is currently permitted to expand to a total disturbance area of 2,437 acres (**Table 5.4-2**). Most of the disturbed areas in the current mining area and all of the proposed future mining would result in topsoil salvage and reapplication during reclamation. Reclamation is conducted concurrent with mining so the total disturbed area is larger than the actual unreclaimed area at any one time.

Within the Tygee Creek watershed, approximately 13 acres within the Smoky Canyon B and C Panel area remain unreclaimed as pit highwall. Disturbance within the existing Smoky Canyon Mine operations at Panels D and E is within the Sage Creek watershed that flows to Crow Creek. Implementation of the Proposed Action or Alternatives would involve disturbances within the Deer Creek and Sage Creek watersheds, to the mouth of the Crow Creek watershed. With implementation of the Proposed Action or Mining Alternatives D, E, or F, an additional 46 acres of highwall and pit bottoms would not be reclaimed. Implementation of Mining Alternative A would yield approximately 17 acres of unreclaimed disturbance, and Alternatives B and C would have 38 and zero acres, respectively of unreclaimed permanent disturbance. In accordance with the RFP (USDA 2003a), less than 15 percent of soils in the activity area would be detrimentally disturbed.

The concentration of selenium and other metals in surficial growth medium and vegetation at reclaimed mining sites can be influenced by the mining operations. The type of reclamation treatment methods will affect the selenium concentration in the growth medium materials and vegetation. Previously, reclamation techniques at phosphate mines included the use of middle waste shales as growth medium. This was an accepted practice prior to the discovery in the late 1990s that selenium and other COPCs in the shale presented environmental risks. These past reclamation practices resulted in elevated concentrations of selenium and other COPCs in the seedbed, and reclamation vegetation rooted in this material was also likely to have elevated concentrations of some of these elements.

Simplot investigated the correlation between concentrations of COPCs in growth medium and reclamation vegetation at the Smoky Canyon Mine (JBR 2001c). Elevated levels of selenium and other COPCs were present in the root zone growth material and vegetation rooted in this material, where reclamation involved seeding directly into overburden shale. Vegetation concentrations were still elevated where a thin layer of topsoil was spread on top of the overburden and vegetation roots could penetrate through the topsoil into underlying shale. Where vegetation is rooted in topsoil on top of low selenium chert, the selenium and other COPCs levels in the root zone and the vegetation were significantly lower than vegetation rooted in shale overburden material.

As part of the site investigations conducted at the Smoky Canyon Mine, concentrations of selenium and other COPCs were determined for natural soils around the mine and growth medium within the reclaimed mine disturbance (NewFields 2005). Mean concentrations of cadmium, vanadium, and zinc in the reclaimed overburden areas were less than the site-specific reference (baseline) concentrations for native soil. Nickel was slightly elevated in the overburden areas over the reference concentration. Mean copper and selenium concentrations in the reclaimed overburden areas were greater than the reference concentration. The site-specific reference concentration for selenium was 3 mg/Kg. The average selenium concentration in the root zone of the reclaimed overburden at Panels A, D, and E was 30.5 mg/Kg.

The reclamation practices at the Smoky Canyon Mine have changed since mining began in 1983. Topsoil was not salvaged during the earliest disturbances (Panel A), and reclamation was accomplished by regrading ROM overburden, covering with weathered overburden shale, and revegetating. These areas now have some high selenium concentrations in the growth medium. In later operations (Panel D), topsoil was salvaged and spread over reclaimed ROM overburden in thicknesses ranging from zero to over 3 feet. These areas have varying levels of selenium concentrations in the growth medium. Since about 1998, overburden has been segregated into low selenium chert and ROM with the chert being used to cover ROM shale overburden. Salvaged topsoil has been spread over the chert. These areas have low selenium concentrations in the growth medium and subsoil layers comparable to most native soils. This reclamation practice has been used in the southern part of the Panel D backfill, Panel E, and the latest mining in Panels B and C (including backfilling and reclaiming the north half of Panel A). Based on the above, it can be assumed that the current and future mining activities in the Smoky Canyon Mine (Panels B, C, E and parts of A and D backfill) will preserve the salvaged topsoil and apply it on top of a low selenium chert cap to minimize selenium concentrations in the root zone.

The current reclamation technique planned for the Proposed Action and Alternatives is to reduce the exposure of seleniferous overburden to the surface environment by placing low selenium chert as a thick cover over all areas of seleniferous overburden fills and then apply a layer of salvaged topsoil. The thickness of this chert layer would be a minimum of four feet thick for the Proposed Action and Alternatives A through C and thicker on the slopes of Alternative D. The chert and topsoil would deter root penetration into underlying seleniferous overburden, thereby reducing bioaccumulation in reclamation vegetation. In this manner, the soil disturbance area of the Proposed Action and Alternatives would be cumulative with the existing and approved Smoky Canyon Mine disturbance but would not add to the existing areas of elevated selenium concentrations in the growth medium of parts of the Smoky Canyon Mine.

5.6 Vegetation

CEA Boundary

The CEA boundary for vegetation (**Figure 5.4-1**) is the same as described for surface water and soils.

Rationale: The CEA for water and soils was determined to be sufficient in size for vegetation. Vegetation effects from the Proposed Action and Alternatives would not be noticeable beyond this area.

Cumulative Effects

Disturbance of vegetation in the CEA occurs primarily through disturbances related to mining, agriculture, timber harvests, grazing, wildfires, prescribed burns, and ORV use. **Table 5.4-1** indicates the acreage/disturbance from land use that has been affected in the CEA by past and present activities. **Table 5.4-1** also provides the major vegetation types and the amount of acreage each vegetation type encompasses within the CEA. According to the USFS GIS mapping and both the Idaho and Wyoming Gap Analysis Program (GAP) maps, the six major vegetation types cover approximately 83 percent of the CEA. The largest land use within the CEA is from agriculture, which accounts for approximately 4 percent of the CEA area. According to available data, approximately 11,000 acres of past and present land uses/disturbances have occurred within the CEA. This represents approximately 7 percent of the total CEA. Adding the largest amount of potential new surface disturbance from this Project (Mining Alternative D and Transportation Alternative 3 = 1,468 acres), with past and present known disturbances, results in approximately 8 percent of the CEA vegetation being disturbed. The majority of this disturbance to vegetation within the CEA is temporary as natural revegetation and reclamation relatively quickly reestablishes some sort of vegetation to the disturbed areas, although the vegetation composition and community type is changed and modified from its pre-disturbance state.

Past timber sales have reduced stand densities, simplified stand structure, and have resulted in the partial treatment of created fuels (logging slash) through the use of fire and mechanical means. Forest product extraction (including fuel, posts, poles, plant gathering, and Christmas trees) has and would continue to impact minor amounts of forest resources throughout the CEA. Impacts associated with timber harvests can include changes in species composition, habitat loss, habitat fragmentation from road construction, and an increase in soil erosion.

Timber harvest activities have occurred on approximately 2,150 acres within the CEA over the past 30 to 35 years, with the most recent timber harvests, not related to mining, occurring in 1999. Timber on 532 acres of the Smoky Canyon Mine Panels B and C and external overburden storage area was harvested prior to land clearing in 2002, and additional timber harvest activities for mining exploration in Manning Creek, Deer Creek, and Wells Canyon have also occurred over the past three years.

Grazing activities also occur throughout the majority of the CEA. Livestock grazing has and would continue to utilize the grass/forbs species, reducing competition for natural regeneration of tree/shrub species. In addition, grazing activities can result in specific, localized damage in riparian areas from vegetation removal by cattle as wells as increasing the introduction and spread of noxious and non-native vegetation species.

In terms of potential bioaccumulation of selenium in vegetation growing on potential, future reclaimed areas associated with Panels F and G, as stated in **Section 5.5**, the Proposed Action or Alternatives would not incorporate harmful amounts of selenium or trace metals in the soil of reclaimed areas due to the incorporation of BMPs into the mine and reclamation plan. Studies of the vegetation at the Smoky Canyon Mine (BLM and USFS 2002, NewFields 2005) have identified existing reclaimed areas at the mine consisting of vegetation with selenium concentration levels exceeding the acceptable thresholds (see **Section 5.10**). However, BMPs would apply to any future mining activities that would occur for Panels F and G so that the vegetation with high selenium levels would be confined to limited areas of the existing Smoky Canyon Mine. Thus, selenium content of growth medium and subsequently potential bioaccumulation by vegetation on new reclaimed areas in the CEA would not increase under the Proposed Action or future mining of phosphate and no cumulative impacts are expected to vegetation from this potential impact.

In terms of cumulative impacts to TECPS plant species, implementation of the Proposed Action and Alternatives could disturb potentially suitable habitat for one USFS sensitive species within the CEA. No known observations of TECPS species are known to occur or have been identified within the CEA, with the exception of red glasswort that was discovered on private land along Crow Creek (Maxim 2004e), and this species would not be impacted by the Proposed Action and Alternatives. Potentially suitable habitat for starveling milkvetch that could be impacted by the Proposed Action and Alternatives represents less than <0.5 percent of the mapped potential habitat for this species in the Study Area, which encompasses 20,462 acres. Thus, the potential cumulative impact to this sensitive species would even be further lessened when taking into consideration the CEA that encompasses nearly 150,000 acres.

Regarding noxious weeds, past and present surface disturbances (i.e. roads, mining and exploration activities, grazing, and private land development) have introduced and increased the susceptibility for the establishment of noxious weeds in the CEA. Adding the proposed increase in additional new surface disturbance within the CEA from implementing the Proposed Action and Alternatives would have a cumulative effect on increasing the amount of disturbed acres susceptible to noxious weed invasion. However, improved prevention measures and control/treatment requirements would limit this overall cumulative effect within the CEA.

5.7 Wetlands

CEA Boundary

The CEA boundary for wetlands (**Figure 5.4-1**) is the same as described for surface water (**Section 5.4**).

Rationale: Wetlands are supported by surface water and near-surface groundwater. This delineation incorporates natural watershed boundaries including all past, present, and reasonably foreseeable phosphate mining and transportation-related disturbances upstream of Stump Creek, the Salt River, and Timber Creek. Wetland resources should not be significantly affected by the Project beyond this area.

Cumulative Effects

According to CNF, GAP, and NWI data/coverages, approximately 4,400 acres of wetlands occur with the CEA. Impacts to most wetlands within the CEA have most likely occurred mainly through mining and road building activities. The principal impact to wetlands within the CEA occurred as a result of the construction of the Smoky Canyon Mine Tailings Pond (TP2). The completed facility disturbed a total of 137 acres of wetlands. This total includes 17 acres of saline springs previously located near the confluence of Tygee and Roberts Creeks. As part of the Corps approval process, Simplot was required to provide onsite and off-site mitigation for this loss of wetlands.

Other disturbance to wetlands in the CEA has included approximately 1.5 acres of wetland impacts from fill placement and road crossings associated with mining activities at Pole Creek and Sage Creek (BLM and USFS 2002) and less than one acre of wetland disturbance from Panels B and C mining activities. Some additional wetland impacts, although unknown, likely have or are likely to occur from road maintenance, livestock grazing, and other activities, such as those conducted on private lands within the CEA.

In addition to these past impacts, implementation of the Proposed Action or Alternatives could result in a maximum disturbance of approximately three acres of wetlands depending upon which mining component and transportation alternative was selected and ultimately approved. Thus, in total, past, present, and reasonably foreseeable future disturbance could have a cumulative impact of approximately 143 acres of jurisdictional wetlands in the CEA. This represents approximately 3 percent of the estimated wetlands in the CEA.

Although approximately 3 percent of wetlands in the CEA either have or could be disturbed, compensatory mitigation by the Corps is required for most projects that impact wetlands, thus this would greatly reduce or eliminate a potential net loss of wetlands.

5.8 Wildlife

CEA Boundary

The CEA boundary for wildlife species (**Figure 5.8-1**) generally includes suitable habitat for a given species within a 15-mile radius surrounding the Project Area.

Rationale: Most impacts to wildlife would occur within or immediately adjacent to the Project Area. Impacts would mostly be limited to temporary (during the life of the Project) displacement. Some individuals may be killed or permanently displaced; however, there should be no significant impacts to wildlife populations on a whole. The Project Area does not provide unique habitats that are not widely available adjacent to the Project Area, thus minimizing potential impacts related to displacement. However, for the boreal toad, a known breeding site (considered a unique habitat) was discovered in Sage Meadows and is the only known breeding site for this species within the CEA. How far individuals would displace, and the impacts of displacement on resident populations is unknown; however, given the scale of the Project, it is unlikely that any short-term or long-term, adverse impacts to wildlife species would occur beyond the identified CEA.

Cumulative Effects

Past, present, and reasonably foreseeable actions in the wildlife CEA have likely resulted in both beneficial and negative impacts, at various levels, on wildlife. Beneficial impacts related to timber harvesting would include increased foraging opportunities for species that utilize forest openings. Negative impacts would include loss of habitat, displacement, and fragmentation as a result of mining, timber harvesting, roads, private land development and agriculture, and recreation. Specific to small and less mobile wildlife species (i.e. small mammals, amphibians, and reptiles), past impacts from direct crushing and mortality by livestock, large wild ungulates, and vehicles has likely also occurred within the CEA. In addition, grazing can contribute impacts by increasing competition for forage and changes in the structure or composition of native plant communities.

The CEA encompasses approximately 452,000 acres, and approximately 65 percent (294,000 acres) is administered by the USFS. Within mainly the USFS lands in the CEA, major past and present disturbances and impacts have resulted from mining activities (approximately 5,100 acres), timber harvests (approximately 7,000 acres), recreation, existing roads/trails (estimated between 400 – 600 acres), and livestock grazing. In addition to the past and present disturbances and impacts described in **Sections 5.1** through **Sections 5.7** within the applicable CEAs, **Table 5.8-1** lists some additional USFS proposed activities that could impact wildlife habitat throughout the wildlife CEA. The remaining 35 percent (158,000 acres) of the CEA occurs on private lands. Past and present actions on private land within the CEA have mainly included agriculture and grazing activities. Housing development has also occurred on the large ranches within the CEA.

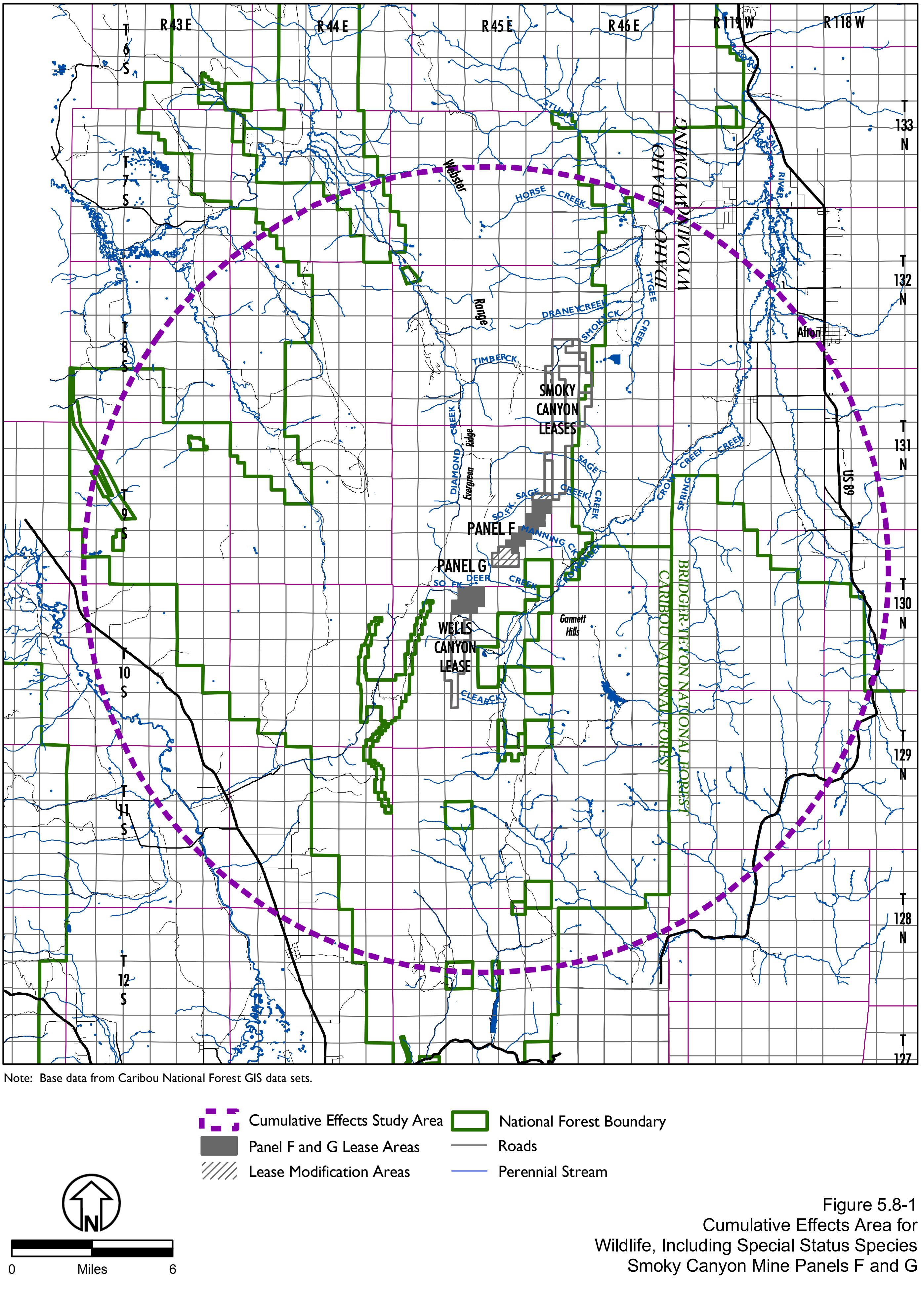
TABLE 5.8-1 PROPOSED ACTIONS IN THE WILDLIFE CEA

PROJECT NAME	PROJECT TYPE	SCHEDULE	ACRES
Upper Dry	Timber Harvest	2005	272
Slug Creek Aspen Restoration	Forest Treatment	2005	783
Twin Creek	Timber Harvest	2006 - 2007	191
Aspen Range 1	Timber Harvest	2007-2008	250
Aspen Range 2	Timber Harvest	2008-2009	250
Boulevard/Little Elk	Timber Harvest	2009-2010	200
Lone Tree	Timber Harvest	2009-2010	150
Dairy Syncline Exploration Project	Exploration Drilling	2006	20
TOTAL	-	2005 - 2010	2,116

According to GAP and CNF data, coniferous forest, aspen, and sagebrush are the dominant vegetation types within the CEA. Riparian areas and other vegetation communities also occur throughout the CEA in lesser amounts. This diversity in habitat types allows for many wildlife species to utilize the area. The foremost impact to wildlife within the area has been habitat changes associated with mining activities, grazing, and timber harvest. Other impacts have included noise disturbance/displacement from mining, timber harvest, roads, and recreational activities.

The majority of habitat conversion is in the form of forest removal followed by reforestation with a short period of early seral conditions. This habitat conversion will cause forest dependent wildlife to disperse in search of new areas. As stated previously in **Section 5.5**, approximately 25 percent of the timber harvests in the CNF since 1966 have occurred in the wildlife CEA and this represents approximately 15 percent of forested stands. In addition, as listed in **Table 5.8-1**, approximately 1,400 acres of proposed timber harvests are scheduled within the CEA over the next five years. In general, dispersal decreases survival rate and increases competition. Species such as elk may take advantage of new foraging areas.

In terms of mining activities exposing wildlife species in the area to potentially toxic levels of selenium, as discussed in **Section 5.5**, the Proposed Action or Alternatives would not incorporate harmful amounts of selenium or trace metals in the growth medium/soil of reclaimed areas due to the incorporation of BMPs into the mine and reclamation plan. Thus, although studies of existing mining disturbances within the Wildlife CEA have identified elevated selenium concentrations in some forage rooted in seleniferous overburden, BMPs applied to any future mining activities that would occur for Panels F and G would minimize this effect on any future reclaimed areas. Therefore, selenium content of growth medium and subsequently potential bioaccumulation by vegetation/potential forage on new reclaimed areas in the CEA would be controlled to levels complying with USFS requirements under the Proposed Action or future mining of phosphate, and thus no cumulative impacts are expected to wildlife from this potential impact.



Note: Base data from Caribou National Forest GIS data sets.

Figure 5.8-1
Cumulative Effects Area for
Wildlife, Including Special Status Species
Smoky Canyon Mine Panels F and G

The general effects of grazing are well documented. In general, wildlife are affected by livestock grazing due to competition for forage, direct mortality by trampling (i.e. amphibians and reptiles), and habitat removal/conversion. As described in the Canada Lynx Conservation Assessment Strategy (Ruediger et al. 2000), both domestic livestock and/or wild ungulate grazing may change the structure or composition of native plant communities. Proper rotation and stocking rates can minimize these negative effects. Recent USFS monitoring data (long and short term trends) indicate that allotments within the Project Area, specifically Sage Meadows, are within the objectives of the Allotment Management Plan and have improved. In addition, other trend studies within the Project Area have concluded that the rangelands are functioning with an upward trend.

Human presence tends to disturb many species of wildlife. Major recreational uses in the area include hunting, fishing, ATV and snowmobile use, camping, and picnicking. Human disturbance during periods of the year when wildlife are otherwise stressed, due to a lack of forage and/or harsh weather (as occurs during the winter season), can further stress wildlife and may increase mortality. Implementing the Proposed Action and Alternatives would result in the displacement of wildlife and some forms of recreation (hiking, hunting, ATV use, etc.) from the Study Area into adjacent undisturbed areas. Thus, displacement of some forms of recreation from this Project has the potential to result in a minor cumulative impact to wildlife for the duration of the Project as a result of the past and present impacts from recreation on wildlife in the CEA when adding the impacts from this Project.

Past and present disturbances, from roads and mining activities, has resulted in fragmentation of certain wildlife populations and their habitats. Implementing the Project would result in additional fragmentation to wildlife habitat and could isolate populations of amphibians and reptiles as described in **Section 4.7.1.1.1**. Thus, a minor cumulative effect to wildlife from fragmentation impacts would potentially occur for the duration of the Project activities.

Bald eagles potentially utilize all areas within the CEA. Bald eagles are known to utilize the Crow Creek drainage during the winter months and were observed in the fall and winter months in 2002 and 2003 around the Simplot tailings ponds (the only large body of open water in the CEA). Bald eagles are likely attracted to this area by waterfowl utilizing the ponds. Past and present mining activities have likely resulted in temporary displacement of individuals within the CEA at various times as a result of noise and disturbances. Since some displacement of bald eagles into adjacent habitats would likely occur for the duration of the Project, cumulative effects are anticipated, although these effects should be negligible within the CEA.

Canada lynx, wolverine, and gray wolves also potentially utilize all areas within the CEA. Disturbance associated with activities previously identified and described in earlier sections may limit the attractiveness of the CEA to these species, which generally prefer extensive tracts of undeveloped land. Conversely, the presence of livestock may attract the gray wolf, and could result in conflicts with human activities. Impacts to mature forest and riparian areas and the large disturbances associated with the Project would decrease potential Canada lynx habitat and impact travel/linkage corridors and result in a minor cumulative effect when added to the other past, present, and reasonable foreseeable actions in the CEA. However, since disturbance associated with the Proposed Action and Alternatives, including the existing Smoky Canyon Mine, are oriented in a north-south direction and forested areas are available for reasonable movement around these areas, the overall impact to travel/linkage corridors should be minimal.

Baseline surveys and other known recorded observations (USFS 2003b) have documented that the CEA is used by at least the following CNF sensitive species: boreal owl, flammulated owl, northern goshawk, sage grouse, three-toed woodpecker, potentially wolverine, and the great gray owl. **Section 4.7** identifies potential direct and indirect impacts to these species, resulting mainly from habitat loss and displacement during mining activities at Panels F and G. Disturbance associated with mining activities, which includes the removal of mature forest habitat, snags, conifer, mixed conifer or shrubland habitats could impact all of the sensitive species known to occur in the CEA. The effects of past management activities on these species is not known. Any future management activities must meet standards and guidelines specifically developed to protect habitat for these species, thus future management activities should result in negligible to minor cumulative effects to these species.

Past actions have likely reduced the number of boreal toads in the CEA below what might have historically occurred. Implementing the Proposed Action and Alternatives would vary in the potential direct and indirect impacts that would occur, mainly from the selection of the various Transportation Alternatives. Depending upon the selected Transportation Alternative, adding these direct and indirect impacts would result in cumulative impacts to boreal toad populations that could range from negligible to moderate. Major cumulative impacts are not anticipated to the boreal toad population based upon proposed installation of pipes allowed for passage of amphibians in known amphibian habitat areas and the protection of the Sage Meadows breeding site area.

The past, present, and proposed disturbances represent approximately 4 percent (approximately 12,000 acres) of the USFS lands in the CEA. When adding the maximum potential disturbance of the Proposed Action and Alternatives (1,536 acres) to that total, the overall percent of disturbance increases to about 5 percent within the USFS lands in the CEA. Cumulative effects to wildlife are expected to be negligible to minor.

5.9 Fisheries and Aquatics

CEA Boundary

The CEA boundary for fisheries and aquatics (**Figure 5.4-1**) is the same as described for surface water (**Section 5.4**).

Rationale: This delineation incorporates natural watershed boundaries including all past, present, and reasonably foreseeable phosphate mining and transportation-related disturbances upstream of Stump Creek, the Salt River, and Timber Creek, which provide sufficient dilution to reduce impacts to below all applicable surface water quality standards. Aquatic resources should not be significantly affected by the Project beyond this area.

Cumulative Effects

The effects of mining on aquatic habitat in the CEA include a temporary reduction of the runoff contribution to Project Areas streams and the potential for increased sedimentation, which could result in a loss of spawning habitat for fish and a decrease of benthic organisms used by fish for food, and the potential for introduction of higher levels of selenium into streams by surface and subsurface flow of water in addition to that introduced with sediment. These potential water quantity and quality impacts to the surface waters in the CEA have been previously described in **Section 5.4**. A negligible amount of potential loss in large woody debris input could also occur at locations of culvert installations.

The livestock industry has been an integral part of the CEA since human settlement of the area. Following years of grazing, livestock stocking levels have been recently decreased in order to bring numbers in line with forage production. Livestock grazing would continue to be a major land use activity within the CEA but is not expected to increase above current rates. The effect of grazing near aquatic habitats is well documented (USFS 2003b). Within the Study Area, recent USFS monitoring data (long and short term trends) indicate that allotments are within the objectives of the Allotment Management Plan and have improved. In addition, other trend studies (i.e. Stream Channel Stability and Riparian Vegetation Condition) within the Project Area and on the CNF have concluded that the rangelands are functioning with an upward trend. Thus, the cumulative effect from grazing to fisheries and aquatic resources in the CEA should be minor.

As previously reported in **Section 5.5**, according to CNF data, approximately 2,150 acres of timber harvest has occurred in the CEA (**Table 5.4-1**). Removal of trees and vegetation and associated timber harvest activities increase the potential for sedimentation into nearby aquatic environments through runoff and decreasing infiltration. Logging roads can alter water flow on the soil surface, creating impervious surfaces that concentrate runoff and increase erosion. The primary effect of these activities on the aquatic systems is increased erosion with the secondary effect of increased sediment loading in downstream surface waters. However, the 2002-2003 CTNF Monitoring and Evaluation Report (USFS 2003e) indicated that audits of 10 timber sale disturbances in the CNF showed BMPs appeared to be effective in controlling soil erosion and stream sedimentation. The monitoring report also discussed the 13 miles of new roads constructed in the CNF in the previous 5 years and described that timber sale roads were typically being built on land types capable of this use, and no road failures or unmitigated problems were reported. The report concluded that, when planned and administered properly, timber harvesting and associated roading has had little observable effects to stream water quality due to soil erosion and sedimentation. It is expected that the foreseeable future timber sales proposed for the CEA (**Table 5.4-2**) would have similar, minimal effects to soil resources and stream water quality that could ultimately have a cumulative effect on the fisheries and aquatic resources in the CEA.

Whirling disease and non-native fish issues are other past and present impacts to the fisheries and aquatic resources that have occurred or are occurring in the CEA. Regarding whirling disease, it was discovered in the Salt River drainage in the mid-1990s and was reported in Crow Creek in 2004 (personal correspondence with Louis Berg, CNF Fisheries Biologist, email dated 10/24/05). According to the Idaho Fish Health Center, most cases of whirling disease in the wild are classified as “light infections” and are not considered life threatening to adult fish. In terms of non-native fish, brook trout, rainbow trout, and brown trout are considered a threat to the Yellowstone cutthroat trout (YCT). These three non-native trout species either compete for habitat with the YCT, interbreed with native YCT, or prey on them directly (USFS 2003b).

The proposed mining activity itself is not expected to result in noticeable surface water discharges of sediment to the surface streams due to the application of BMPs that contain all runoff and sediment on the mine site. This retention of runoff from the mine disturbances would also temporarily decrease water yields to the South Fork Sage Creek and Deer Creek watersheds. Haul/access roads are predicted to increase the sediment load in the affected watersheds as described in **Section 4.3 and Appendix 4A,** representing a potential maximum increase of 3 percent above current baseline in any of the HUC 6 watersheds with fisheries and aquatic resources, depending upon the Transportation Alternative selected and approved.

Increased levels of selenium and some trace metals in water and forage have occurred as a result of past and current mining activities and natural processes, particularly in the Pole Canyon Creek watershed. According to NewFields (2005), stream sediments above and below the existing Smoky Canyon Mine operations were sampled and analyzed in 2004. Concentrations of COPCs were greater than site-specific reference (baseline) levels at lower Smoky Creek, Lower Smoky Spring, Roberts Creek, lower Pole Canyon Creek, North Fork Sage Creek, and Sage Creek just above Crow Creek. Only cadmium and nickel in lower Pole Canyon Creek and cadmium in Lower Smoky Spring exceeded the IDEQ removal action levels established to support aquatic life. Selenium concentrations in stream sediment were different above and below the Phosphoria formation outcrop. Stream sediment selenium concentrations upstream of the Phosphoria outcrop at Smoky Creek, Pole Canyon, Sage Creek, and South Fork Sage Creek were 0.51, 0.46, 0.78 and 0.47 mg/Kg respectively. The concentrations downstream of the Phosphoria outcrop in the same streams were: 1.3, 58.1, 1.8, and 1.2 mg/Kg, respectively. These data clearly show an impact to stream sediment selenium concentrations in lower Pole Canyon Creek where the ratio downstream to upstream is about 126. For the other streams, the ratio of downstream to upstream selenium concentrations ranged from about 2.3 to 2.6. This is comparable to the ratio of selenium in stream sediment measured during the Panels F and G baseline studies at SW-NFDC-500 upstream of the Phosphoria formation (0.5 mg/Kg) and downstream at SW-DC-500 (1.3 mg/Kg) (ratio = 2.6).

During the Site Investigations for Smoky Canyon Mine, aquatic invertebrate samples were obtained from 12 locations with distributions upstream and downstream of the Phosphoria formation outcrop and the Smoky Canyon Mine (NewFields 2005). These locations were also where fish were collected. Selenium concentrations in aquatic invertebrates exceeded the background range only at Hoopes Spring and lower Pole Canyon Creek. NewFields (2005) also stated that all other COPCs were elevated in invertebrates from lower Pole Canyon Creek, probably reflecting the contribution of both water quality and sediments from lower Pole Canyon Creek.

Fish tissue samples were collected from nine stream reaches upstream and downstream of the Phosphoria formation outcrop and the Smoky Canyon Mine (NewFields 2005). Concentrations were generally similar among the locations for each COPC. The COPC concentrations in fish were generally not consistent with concentrations in stream sediment or surface water. Selenium concentrations in fish were below regional background levels except for fish in Hoopes Spring and lower Sage Creek downstream of Hoopes Spring, which is consistent with the water quality data indicating selenium in surface water, do not exceed removal action levels except at these same locations. The only samples obtained in the same stream both upstream and downstream of the Phosphoria formation outcrop and Smoky Canyon Mine operations were from Sage Creek. There was little difference in selenium concentrations in fish upstream (avg. 0.949 mg/Kg ww) and downstream (avg. 0.965 mg/Kg ww) of the Phosphoria formation, and Smoky Canyon mining operations in Sage Creek.

Covering all areas of seleniferous overburden with at least 4 feet of chert and a layer of topsoil is expected to protect surface runoff from COPCs contained in the seleniferous overburden.

Therefore, surface water quality in the Deer Creek and South Fork Sage Creek watersheds is not expected to be affected by COPCs in runoff from the mine areas.

The primary impact of the proposed mining operation on surface water and, subsequently, the fisheries and aquatic resources in the CEA would be construction of seleniferous overburden pit backfills and external overburden fills as part of Panels F and G. The permeable chert/topsoil cap used in the Proposed Action and Alternatives A through C would allow significant percolation of annual recharge water through the seleniferous overburden fills introducing COPCs into the Wells formation aquifer beneath these areas. As described in **Section 4.3**, the transport of the COPCs in the Wells formation to points of groundwater discharge at the surface is estimated to result in peak concentrations of selenium in lower Deer Creek, Crow Creek, South Fork Sage Creek, and lower Sage Creek (**Table 4.3-15**). Under these alternatives, selenium concentrations in lower Deer Creek and South Fork Sage Creek that are currently well below the surface water standard would increase to approximately twice the surface water standard of 0.005 mg/L. Lower Sage Creek between the confluence with South Fork Sage Creek and Crow Creek, which now contains total selenium above the surface water standard only during low flow conditions, would contain selenium concentrations that are estimated between 0.008 to 0.009 mg/L during all times of the year. Crow Creek immediately downstream of Sage Creek under these alternatives is estimated to be at or slightly above (0.006 mg/L) the surface water standard for selenium year-round. Dilution and attenuation in Crow Creek is expected to reduce total selenium concentrations downstream of Sage Creek to less than 0.005 mg/L before the stream leaves the CEA. Where impact analyses predict exceedances of applicable standards for selenium in groundwater and surface water, none of the above alternatives would be chosen by the Agencies without additional measures designed to limit releases.

Under Alternative D, lower Deer Creek and South Fork Sage Creek would maintain total selenium concentrations just below the surface water standard, but the added selenium load would result in increasing the selenium concentration in lower Sage Creek between South Fork Sage Creek and Crow Creek to approximately 0.007 mg/L year-round. The total selenium concentration in Crow Creek downstream of Sage Creek is estimated to be approximately 0.005 mg/L or less year-round.

It should be noted that the timeframe for the peak selenium concentrations at lower Deer Creek and South Fork Sage Creek are about 50 and 100 years, respectively. After these peaks, the concentrations are estimated to gradually decrease over periods of hundreds of years. In addition, the estimated concentrations in Sage Creek downstream of South Fork Sage Creek assume that the existing, seasonal concentrations continue unchanged. These concentrations are due to contributions of selenium from Hoopes Spring, which are attributed to leaching of selenium from the Pole Canyon Overburden Fill at the Smoky Canyon Mine. This is currently being addressed through the AOC between Simplot and the Agencies. Mitigation measures that would be employed at the Smoky Canyon Mine to reduce the selenium in Hoopes Spring are expected to reduce the estimated cumulative effects to Sage Creek from the Proposed Action and Alternatives.

Since selenium risk in aquatic biota appears to be correlated with surface water quality (NewFields 2005), the potential increase in the selenium concentrations in several of the creeks in the CEA over a period of time would subsequently likely increase the concentrations in the sediment, aquatic invertebrates, and fish in these aquatic systems and result in a cumulative effect on these resources.

In terms of cumulative impacts to populations of the YCT, according to USFS (2003b), the Palisades/Salt Yellowstone Cutthroat Trout Metapopulation is robust, with a low risk of local population extinction. In addition, USFS (2003b, Appendix D-209) further states that there is an excellent potential for this metapopulation to exist over both the short and long term even after an evaluation of threats to this population was conducted as part of the RFP. Although some direct and indirect impacts would occur as described above to this species from the Proposed Action and Alternatives, these impacts are generally expected to be minor or in some instances moderate. Therefore, when these impacts are added to the past, present, and reasonably foreseeable impacts in the CEA, cumulative effects would occur, but a determination of "May Impact Individuals or Habitat but Will Not Likely Contribute to a Trend Toward Federal Listing or Cause a Loss of Viability to the Population or Species" for the YCT would still apply.

5.10 Grazing Management

CEA Boundary

The CEA boundary for grazing management (**Figure 5.10-1**) includes the full extent of the seven allotments that are potentially impacted by the Proposed Action and Alternatives – Manning Creek Sheep Allotment, Deer Creek Sheep Allotment, Green Mountain Sheep Allotment, Sage Creek Sheep Allotment, Sage Valley Cattle Allotment, Wells Canyon Allotment, and the State section. The total area of this CEA is 25,595 acres.

Rationale: Portions of each of these allotments occur within the Direct Effects Study Area and could be impacted by the Project.

Cumulative Effects

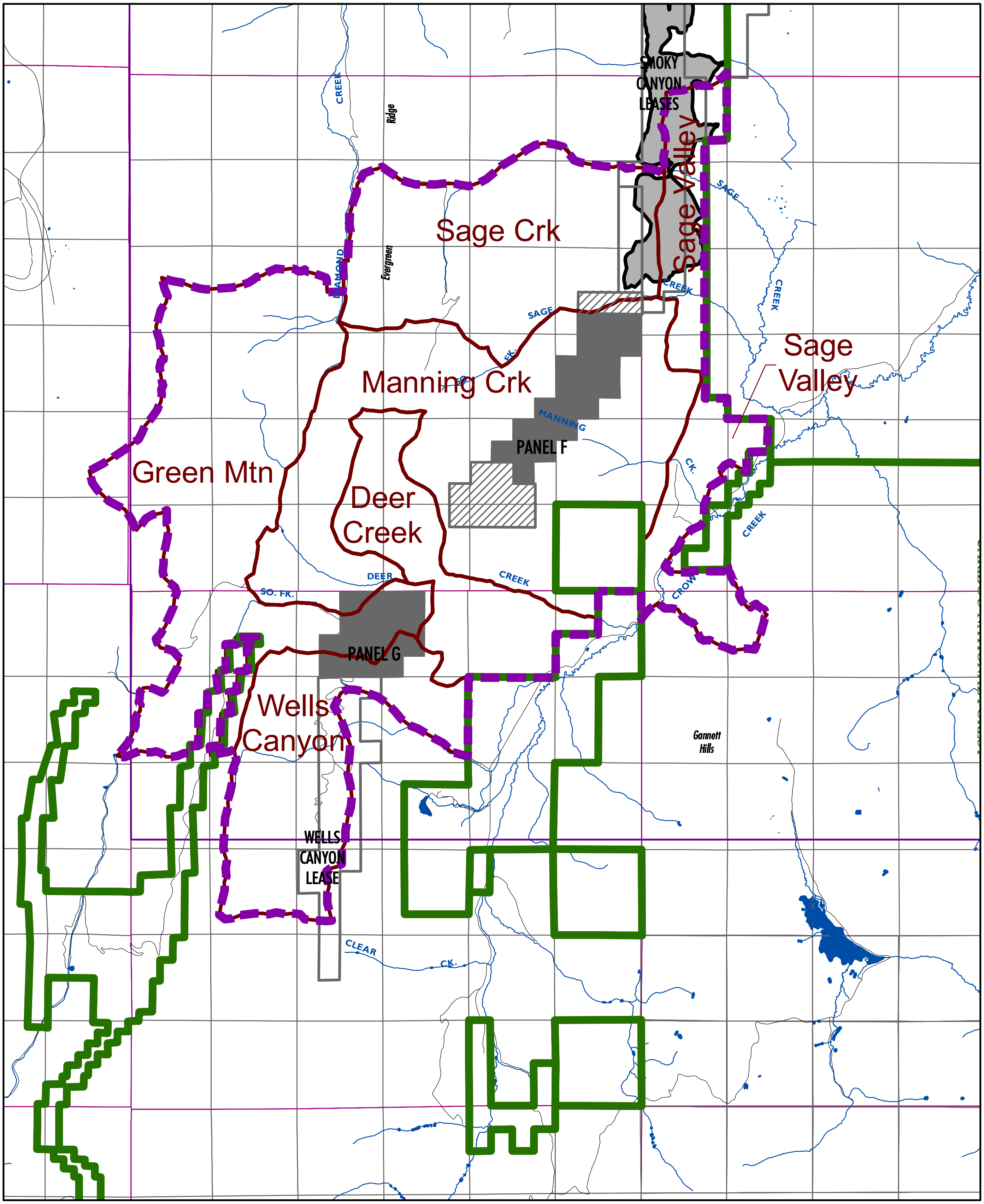
Cumulative effects to grazing in the CEA primarily occur from mining and timber harvesting. Recreation and road building can also affect grazing but to a negligible extent compared to the other two land uses. Restrictions have been placed in the past on grazing permit holders in the CNF as a result of mining and timber sales on the affected allotments. Currently, grazing is not allowed on active mine areas, livestock trailing is limited across mine areas, and no watering is allowed in runoff detention ponds or water flowing from mine overburden seeps. No grazing is allowed in new timber plantations. The grazing permit holder is required to use only certified weed-free hay or straw on USFS lands. **Table 5.10-1** shows the past and present disturbance areas within the CEA.

TABLE 5.10-1 PAST AND PRESENT DISTURBANCE IN THE GRAZING CEA

DISTURBANCE TYPE	AREA (ACRES)
Smoky Canyon Mine	712
Mining Exploration	62
Timber Harvests	743 [1]
Roads [2]	45 (37 miles)

1 Approximately 100 acres of this area is still restricted from grazing.
2 Road width assumed to average 10 feet

Grazing is currently not approved by the USFS on the Smoky Canyon Mine, although some grazing of reclaimed areas has been reported. The mining exploration areas are reclaimed and open to grazing. The timber harvest areas within the CEA date back to the 1970s, so grazing would be allowed in these areas.



Note: Base data from Caribou National Forest GIS data sets.

Figure 5.10-1
Cumulative Effects Area for Grazing Management
Smoky Canyon Mine Panels F and G

The foreseeable future disturbances within the grazing CEA, excepting the Panels F and G Proposed Action and Alternatives, includes a proposed 191-acre Timber Sale (Twin Creek) scheduled for 2006-2007.

Mining disturbance can affect a grazing allotment by directly disturbing the ground surface within the mining area. Within this footprint area, all forage vegetation is typically removed until reclamation of the disturbed area restores the forage resource. Grazing on the reclaimed areas is restricted until the agencies accept the reclamation as being ready for grazing. In addition to this temporary restriction on grazing within the mine footprint, mining disturbances and mine roads can also restrict movement of livestock within an allotment.

The combination of Panel F and G action alternatives with the greatest disturbance (Mining Alternative D with Transportation Alternative 3) would disturb approximately 1,468 acres, which is about 5.7 percent of the area within the CEA. When combined with the past, present and other foreseeable disturbances in the CEA, the total disturbance within the CEA would be about 10 percent of its area. Livestock grazing in this area would be temporarily displaced to adjacent parts of the affected allotments. The removal of the currently suitable grazing acres in the mine footprint may also result in the CNF decreasing the permitted stocking rates in the affected allotments. The Wells Canyon Allotment includes 2,163 suitable acres for sheep and is currently vacant. It could be combined with the Deer Creek Allotment or Green Mountain allotments if necessary to help accommodate the displaced grazing use from the mine disturbances. The FS would have to go through the grant priority process for the Wells Canyon Allotment, and there is no guarantee that the allotment would go to the Deer Creek or Green Mountain allotments to help accommodate the displaced grazing from the mine disturbance.

Some vegetation growing in seleniferous growth media at phosphate mines in southeast Idaho is known to bioaccumulate selenium. Consumption of selenium-enriched plants by livestock can result in selenium poisoning as the element is further concentrated in the organs of the animal. The Panels D and E of the existing Smoky Canyon Mine occur within the CEA. The Panel D area within the CEA is 320 acres, and the area of Panel E is 430 acres. This will also be the approximate final disturbance area of the existing mine within the CEA. Soil and vegetation studies on the existing reclamation areas by Simplot in support of the Panels B and C SEIS described selenium concentrations in reclamation vegetation on Panels D and E (JBR 2001c). The average vegetation selenium concentration of the test sites on Panel D was 7.1 mg/kg dw where reclamation consisted of topsoil over ROM overburden. The species-specific data for this study indicated that most of the selenium in the vegetation cover was contained in the forbs and less was contained in the grass. The average selenium concentration in reclamation vegetation over Panel E was 0.36 mg/kg dw where reclamation consisted of covering ROM overburden with chert and then salvaged topsoil. The IDEQ removal action level for selenium in vegetation for protection of wildlife and livestock is 5 mg/kg dw (IDEQ 2004a). None of the other COPCs investigated in this study exceeded their respective removal action levels.

Simplot studied the chemistry of vegetation at the Smoky Canyon Mine again in 2004 for the CERCLA site Investigation (NewFields 2005). These studies indicated that reclamation vegetation in Panel D that was growing in 12 inches of topsoil had average selenium contents of just over the removal action level (5.7 mg/kg dw). The vegetation growing in the Panel A and Pole Canyon Overburden Fill areas had mean selenium concentrations of 20.2 mg/kg dw and 9.9 mg/kg dw respectively. The average selenium content of the Panel E reclamation vegetation was less than 5 mg/kg dw. There were also limited areas of elevated selenium concentrations in terrestrial vegetation growing in the two seleniferous seeps at Panel E and one such seep at Panel D.

Both of the past studies at Smoky Canyon Mine indicate that reclamation vegetation rooted in salvaged topsoil over a chert cap has selenium concentrations at or below background and well below the IDEQ removal action level. The proposed Panel F and G mine activities and all mining alternatives within the CEA would conform to BMPs proposed to mitigate bioaccumulation of selenium in reclamation vegetation by covering all seleniferous overburden with a cap of chert and salvaged topsoil (**Section 2.5**). Thus, the reclaimed mine areas of the Proposed Action and Alternatives would not add to the current area within the CEA that has elevated selenium concentrations in some reclamation vegetation (Panel D).

Presently, livestock are not permitted to graze on the reclaimed areas of the Smoky Canyon Mine until these areas area accepted by the BLM and USFS for bond release. The areas of the Smoky Canyon Mine where current reclamation vegetation has elevated selenium concentrations would need to be mitigated to bring these concentrations below acceptable levels before grazing would be allowed.

Another potential effect on grazing within the CEA is reduction in water availability. In the higher elevations of the CEA, lack of water is a limitation on potential grazing productivity. As described in **Section 4.3**, the Proposed Action and Alternatives would result in reduction or elimination of a number of isolated spring or seep water sources. If any water sources become either temporarily or permanently unavailable for stock watering due to mining, the RFP requires the mining company to supply alternate water sources in sufficient quantity, quality, and location for continued use (USFS 2003a:4-82). When added to past, present, and future activities in the CEA, there would be no cumulative effect from the separate effects to isolated water sources.

The CEA is currently roaded with a number of Forest Routes providing good access for trailing grazing animals into the allotments. The Proposed Action and Alternatives include a variety of access and haul/access roads that could be built, depending on the selected combination of alternatives. These proposed roads would not be fenced or built in a manner that would absolutely restrict crossing by livestock. No past, present, or future activity has or will affect trailing routes for livestock in the CEA; therefore, there would be no cumulative effects to those disclosed as direct effects in Chapter 4.

The use of the mine panel areas would temporarily remove them from grazing but would also present a barrier to movement of livestock across them. Panel G would largely be located in the far eastern portion of the Green Mountain Allotment and would not present a barrier to movement of animals in the rest of that allotment or the adjacent allotments in the CEA. The Panel F disturbance would bisect the Manning Creek Allotment and disturb east-west movement of animals in that allotment but would not affect movement of animals in the rest of the CEA. Simplot has indicated they would work with the permittees to provide necessary trailing access across the mine panels. It should also be noted that concurrent reclamation in the mine panels would reduce the total area closed to trailing access by livestock. No past, present or future activity has or will create movement barriers for livestock in the CEA; therefore, there would be no cumulative effects to those disclosed as direct effects in Chapter 4.

Except for specific locations with sufficient clearance under the conveyor for livestock crossing, the proposed conveyor alternative (Alternative 6) would create a linear barrier to east-west movement of livestock through the CEA from Panel G in the eastern part of the Green Mountain Allotment northeast bisecting the Deer Creek and Manning Creek allotments. It would separate the very western portion of the Sage Valley Allotment from the rest of that allotment to the east.

It would likely restrict east-west livestock movement within the Manning Creek Allotment, except at existing FS trails where there would be sufficient clearance under the conveyor. However, that area of the allotment would also be divided by the mine panels for Panel F. Grazing and trailing access to all of the affected parts of the CEA bisected by this conveyor is available from both the east and west sides of the CEA, so the cumulative effects on the CEA from the conveyor would be minor. No past, present, or future activity has or will create movement barriers for livestock in the CEA; therefore, there would be no cumulative effects to those disclosed as direct effects in Chapter 4. If the conveyor alternative was selected by the Agencies, additional crossing locations under the conveyor could be required by the FS.

The allotments in the northern portion of the CEA have been affected by introduction of noxious weeds. CNF requires that grazing, recreation, OHV travel, timber harvest, and mining activities minimize introduction of noxious weeds, but continued grazing and mining related use of the CEA does have the potential for further encroachment by noxious weeds on grazing lands.

5.11 Recreation and Land Use

CEA Boundary

The CEA boundary for recreation and land use (**Figure 5.11-1**) includes the Direct Effects Study Area, as well as the full extent of the Sage Creek and Meade Peak Inventoried Roadless Areas and a one-half mile buffer along: Crow Creek Road to the mouth of Crow Creek, Wells Canyon Road, Diamond Creek Road (Forest Route 1102) to the intersection of Timber Creek Road (Forest Route 110) and east to the Forest Service boundary along the Smoky Canyon Road. In addition, the CEA would include the full extent of the Wells Canyon Lease to the south and east from this lease to the Crow Creek Road.

Rationale: Recreation should not be significantly affected beyond this area; people recreating outside of the identified CEA would not likely be impacted by this Project.

Cumulative Effects

The CEA for recreation and land use includes approximately 102,500 acres, mostly in Idaho (**Table 5.11-1**).

TABLE 5.11-1 LAND OWNERSHIP IN THE LAND USE AND RECREATION CEA

OWNERSHIP TYPE	AREA (ACRES)	PERCENT OF CEA
U.S. Forest Service	79,291	77.2
U.S. Bureau of Land Mgmt.	1,319	1.3
State	1,614	1.5
Private	20,494	20

Public recreation is generally available on the public lands in the CEA, which amount to about 80 percent of all the land in the CEA. The public land administered by the CNF makes up about 77 percent of the land within the CEA. The recreation management plan for the CNF land in the CEA is shown in **Table 5.11-2**.

TABLE 5.11-2 CNF RECREATION OPPORTUNITY SPECTRUM FOR THE RECREATION LAND USE CEA

RECREATION OPPORTUNITY SPECTRUM	AREA (ACRES)	PERCENT OF CEA
Roaded Modified	18,397	17.9
Roaded Natural	19,391	18.9
Semi-Primitive Motorized	27,934	27.2
Semi-Primitive Non-motorized	13,570	13.2

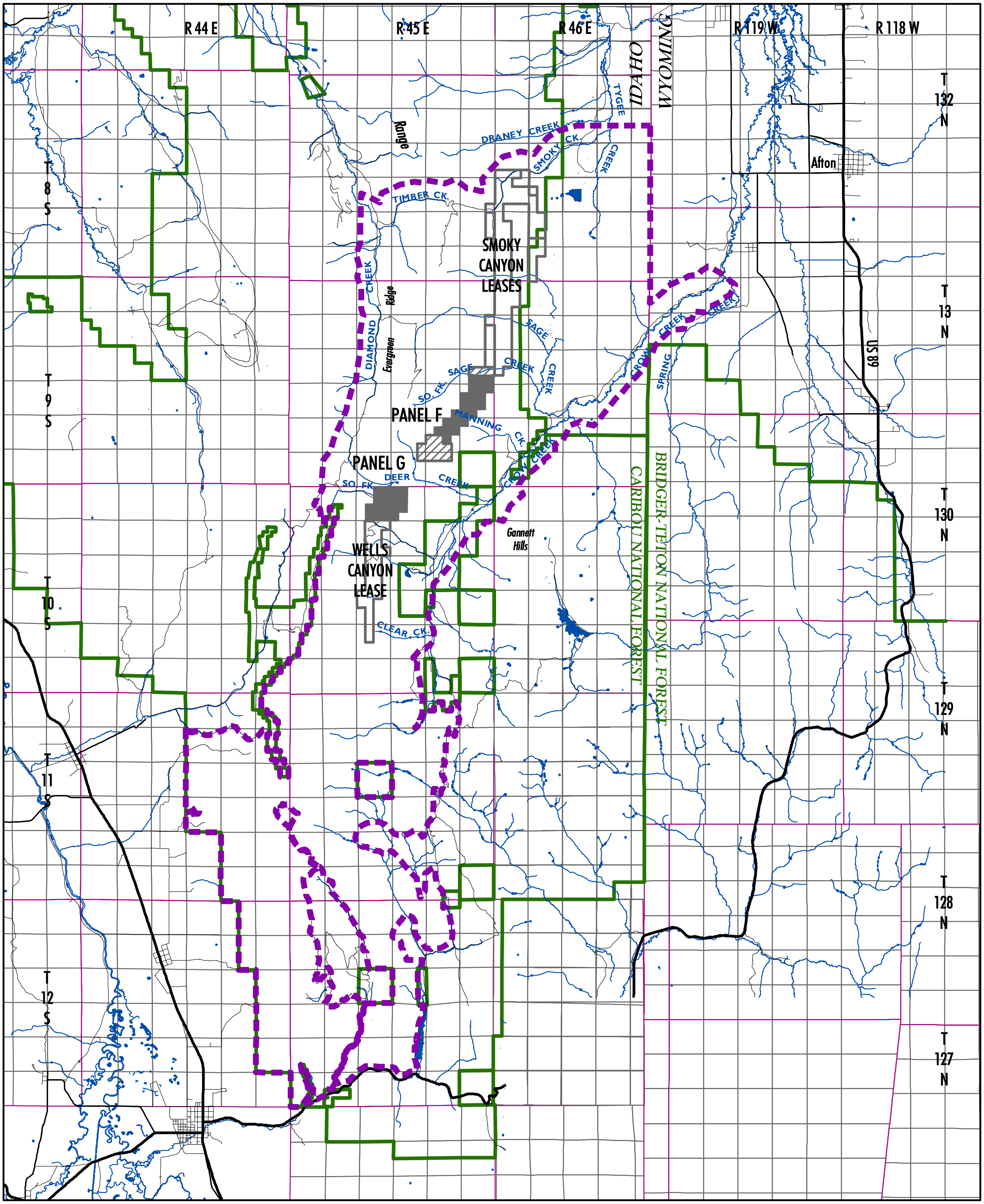
Enjoyment of the recreation opportunities within the CEA depends upon a reasonable degree of public access, either motorized or non-motorized as the case may be, to the various Recreation Opportunity Spectrum areas along existing roads or trails. Once the forest visitor is within the public lands, their enjoyment of the recreation depends, in part, on the relative level of introduced disturbance from other land uses, particularly in the semi-primitive areas.

A land use within the CEA that has a major effect on recreation is mining at the existing Smoky Canyon Mine. Active mining areas are off limits to public motorized access and recreation for the duration of mining and reclamation activities. Non-motorized access and recreation is allowed across mining areas except for active mine operation areas that might present a safety hazard to visitors. The currently approved Smoky Canyon Mine disturbance area includes 553 acres of private land (tailings pond) and 1,884 acres on CNF land. Visitors to the CNF adjacent to the active mining areas could notice the sight or sound of mining activities, which could detract from the recreational activity. Following completion of reclamation activities, all mine areas on CNF land would be open to recreation and should not present an ongoing distraction for recreationists.

The implementation of the Proposed Action or Alternatives could temporarily impact recreation as described above on up to 1,468 acres of CNF that are currently used for Roaded Modified and Semi-primitive Motorized recreation. The Proposed Action area does not offer unique recreational opportunities that are not also found elsewhere in the immediate vicinity. When added to the currently approved disturbance of CNF land by the existing Smoky Canyon Mine, approximately 3 percent of the CEA would be temporarily restricted from recreational use by phosphate mining.

As described in **Section 4.11**, three FS trails would be impacted by the mining components of the Proposed Action or mining alternatives. Previous mining in the CEA (Smoky Canyon Mine) has already impacted six FS trails. Following reclamation at current mines and the proposed project, impacts to trails would be minimal.

During the proposed mining operations, all disturbed areas would be open to non-motorized access except those areas where active mining operations may present a safety concern to visitors. Non-motorized access along existing trails would be allowed across all the haul/access transportation routes and most of the other mining disturbed areas. In addition, motorized access along existing public roads would not be prohibited. Upon successful reclamation of the Proposed Action or Alternatives, all disturbed areas would be available for recreation. Therefore, no long-term cumulative effects are anticipated to recreation on the public lands as a result of implementation of the Proposed Action and Alternatives.



Note: Base data from Caribou National Forest GIS data sets.

Cumulative Effects Study Area
Panel F and G Lease Areas
Lease Modification Areas
National Forest Boundary
Roads
Perennial Stream

0 Miles 5

Figure 5.11-1
Cumulative Effects Area for
Recreation and Land Use
Smoky Canyon Mine Panels F and G

A dominant recreational use within the CEA is big game hunting. During the conductance of mining and timber harvest activities, big game would likely move to other areas with less disturbance. However, upon the cessation of timber harvest and mine land reclamation, deer and elk are likely to return to previously mined areas, mostly on the forest edge (forest to grass land) to forage. Long-term cumulative impacts to hunters are anticipated to be minimal.

5.12 Inventoried Roadless Areas

CEA Boundary

The CEA area for IRAs (**Figure 5.12-1**) includes the extent of the Inventoried Roadless Areas (IRAs) within the known phosphate mining areas on the CNF, including KPLAs in Bear Lake and Caribou Counties.

Rationale: Including all IRAs within the known phosphate mining area gives an overall, big picture approach of potential cumulative impacts to IRAs in the area.

Cumulative Effects

The CEA for IRAs encompasses approximately 161,500 acres and represents only the acreage contained in the following eight IRAs (north to south): Stump Creek, Schmid Peak, Dry Ridge, Huckleberry Basin, Sage Creek, Gannet Spring, Meade Peak, and Red Mountain. Within the CEA (eight IRAs), there are approximately 14,000 acres of KPLAs, approximately 6,300 acres of phosphate mining leases, of which approximately 1,300 acres are active leases, and 110 acres of phosphate mines. In addition, approximately 700 acres of timber harvests have occurred within the CEA (eight IRAs) and approximately 74 miles of roads and approximately 6 miles of rights-of-way exist within the CEA (eight IRAs). In addition, approximately 44 acres of temporary disturbance has occurred from phosphate exploration activities within the Huckleberry Basin IRA.

Specific to the Sage Creek and the Meade Peak IRAs, the only IRAs within the CEA that would directly be impacted by the Proposed Action or Alternatives, **Table 5.12-1** quantifies past and present disturbances within each of these IRAs. In addition to the list of disturbances in **Table 5.12-1**, other disturbances within these IRAs that are not quantifiable include impacts from livestock grazing and recreation. The greatest amounts of past and present impacts are a result of mining at the existing Smoky Canyon Mine and phosphate exploration activities in the Deer and Manning Creek lease areas. These impacts to the IRAs have largely been temporary in nature, as the majority of the disturbance caused by the exploration activities has been reclaimed.

TABLE 5.12-1 PAST AND PRESENT DISTURBANCES IN THE SAGE CREEK AND MEADE PEAK IRAS

DISTURBANCE	IRA	AREA (ACRES)
Smoky Canyon Mine	SCRA	43
Manning Creek Lease Exploration	SCRA	40
South Manning Lease Modification Exploration	SCRA	7.8
Deer Creek Lease Exploration	SCRA	20
Existing Roads	SCRA	12 (10 miles X 10' wide)
	MPRA	5 (4 miles X 10' wide)
Timber Harvests	SCRA	251
	MPRA	27

Note: The total area within the SCRA is 12,710 acres and the total area in the MPRA is 44,585 acres.

As previously described in **Section 4.11**, the Proposed Action or Alternatives would result in direct and indirect impacts to most of the roadless and wilderness attributes as many of these attributes relate to the resources described throughout this EIS. Approximately 8 percent of the SCRA and less than 1 percent of the MPRA would be impacted by the Proposed Action or Alternatives. Past and present disturbance within the SCRA totals approximately 366 acres (**Table 5.12-1**). This figure, when added to the largest potential disturbance from the Proposed Action or Alternatives, represents a cumulative impact of almost 12 percent of the total SCRA, a large portion of which has or eventually would be reclaimed.

Within the MPRA, past and present disturbance totals approximately 32 acres (**Table 5.12-1**). This figure, when added to the largest potential disturbance from the Proposed Action or Alternatives within the MPRA, still represents a cumulative impact of less than 1 percent of the total MPRA.

5.13 Visual and Aesthetic Resources

CEA Boundary

The CEA boundary for visual resources (**Figure 5.4-1**) is the same as described for surface water (**Section 5.4**) that encompasses portions of the Gannett Hills area, east of Crow Creek. This CEA includes 148,956 acres.

Rationale: The CEA boundary is selected for simplicity and the fact that vantage points from which the Proposed Action and Alternatives, and other past, present, and reasonably foreseeable disturbances that can be discerned are generally contained within these watersheds. Visual resources should not be significantly affected beyond this area, and travelers in this area are not likely to see areas beyond this CEA because of the topographic features that delineate the boundary and restrict vision.

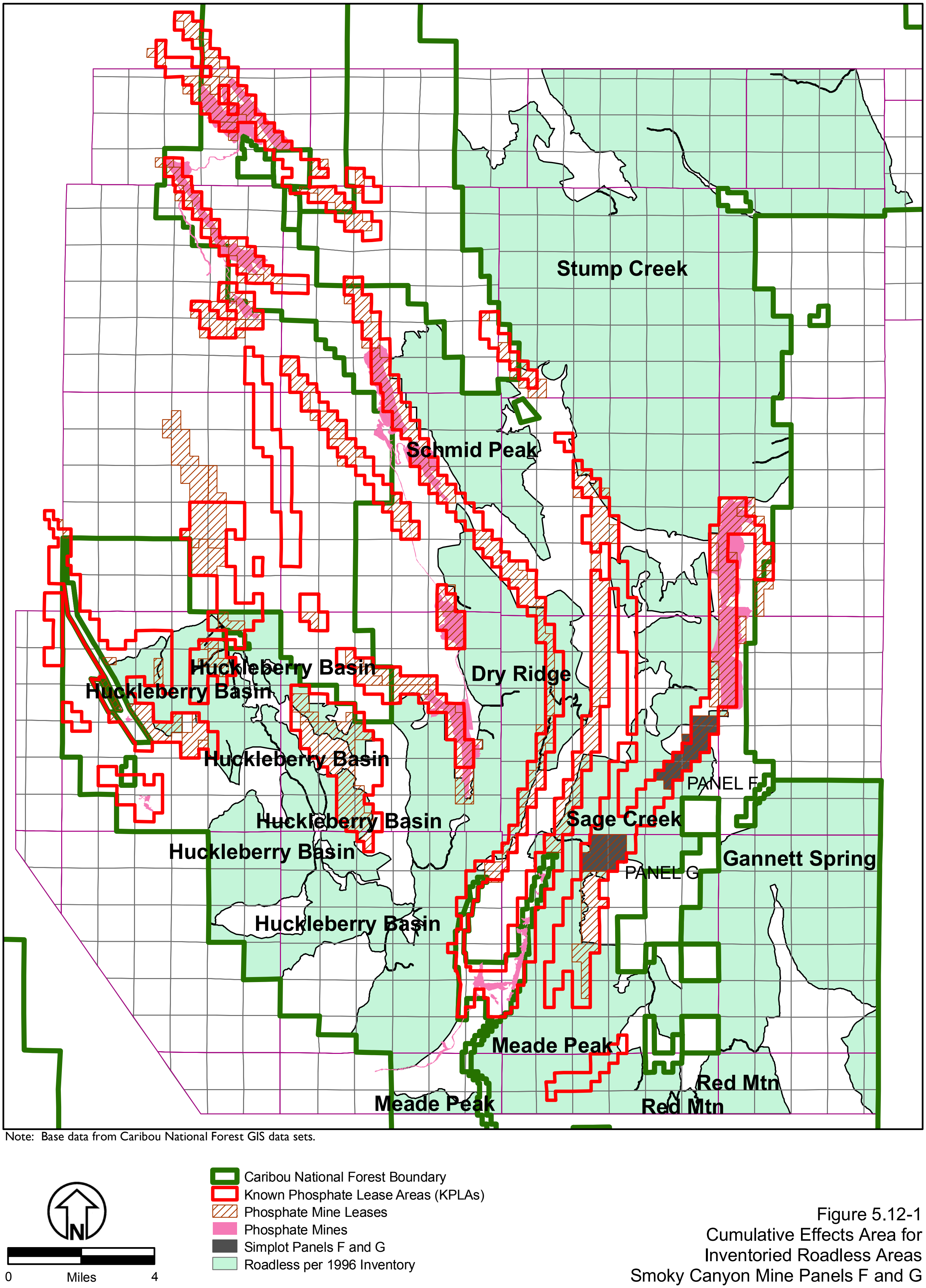


Figure 5.12-1
Cumulative Effects Area for
Inventoried Roadless Areas
Smoky Canyon Mine Panels F and G

Cumulative Effects

The CEA is within a region of generally north to northwest-trending mountain ranges and valleys. The most common of landforms in the area are foothills, which are cut at fairly regular intervals by small creeks and drainages. Although scenic variety exists in the topography and densities, arrangements, and colors of vegetation, no visually distinct landscapes are found in the CEA. The visual quality objectives of all CNF lands within the CEA are Modification or Partial Retention, with no areas of Retention and a small area of Preservation located in the Elk Valley area of the Gannett Hills (USFS 2003b). The VQO categories that exist within the CEA are shown in **Table 5.13-1**.

TABLE 5.13-1 CNF VISUAL QUALITY OBJECTIVES IN THE CEA

VISUAL QUALITY OBJECTIVE	AREA (ACRES)	PERCENT OF CNF IN THE CEA
Modification	55052	62
Partial Retention	33558	38
Retention	0	0
Preservation	264	<0.3

Source of information: USFS 2003b, RFP FEIS data sets

The CEA is generally not disturbed visually other than for timber harvests and mining; visual modifications have been in the form of timber cuts, roads, mining operations, range improvements, power lines, and pipelines. **Table 5.13-2** lists past and present disturbances to areas within the CEA; the largest type of disturbance is phosphate mining and exploration activity related to the existing Simplot Smoky Canyon Mine. Reclamation of the mine areas would mitigate much of the visual impact.

TABLE 5.13-2 EXISTING DISTURBANCES WITHIN THE VISUAL RESOURCES CEA

DISTURBANCE TYPE	DISTURBANCE AREA (ACRES)
Mining	2349
Mineral Exploration	62
Timber Harvests	2150
Burned Areas	483
Agriculture Areas	6018
Utilities	9 miles

Source of information: USFS 2003b, RFP FEIS data sets, Idaho GAP, Wyoming GAP

Mining activities are ongoing in Panels B, C, and E of the Smoky Canyon Mine; Panels A and D are mined out. The total permitted mine disturbance for the Smoky Canyon Mine and tailings pond is 2,437 acres. The only other mining activity that has been proposed to date in the CEA is the Panels F and G mine expansion. Exploration has occurred in the Wells Canyon Lease, but no mine plan has yet been proposed for that lease. Mining the Proposed Action could potentially add up 1,468 acres of initial disturbance to the CEA, of which all but 71 acres would be reclaimed. Reclamation would reduce the visual contrast of bare earth in the disturbed areas with adjacent forest vegetation. The reclaimed areas would be revegetated primarily with grass and forbs and patches of shrubs and trees. The reclaimed areas would still be visible but would not be as obvious a visual impact as the mining activities themselves. The total disturbed area for the Proposed Action combined with the rest of the Smoky Canyon Mine disturbance would represent about 2.6 percent of the total CEA, and the unreclaimed area for the entire mine would represent about 0.06 percent of the total CEA.

Views of the current and proposed mining activity in the CEA are blocked from the west by the Webster Range, although visitors to the higher elevation trails of the Webster Range would have views of the mining activity east of the ridge and views to the west where past mining disturbances may be noticeable. Portions of the proposed mining disturbance would be visible from locations along the Crow Creek Road, Wells Canyon Road, and from trails within the CEA. The general mine area from Smoky Creek on the north to Deer Creek on the south is a distant (about 10 miles) view for travelers on Highway 89 in Star Valley and the intervening Gannett Hills obscure most of the mine area.

The surface area of the tailings ponds (ultimate permitted area of 553 acres on private lands) has added to the permanent landscape change. The surface water-pond element was not present in the area prior to the creation of the tailings ponds. The continual expansion of these facilities will occur visually as a gradual change. There is a low level of sensitivity to this expansion due to lack of public access to views of the tailings ponds. Views from a distance are possible by recreationists or hunters on Tygee Ridge or Draney Peak.

5.14 Cultural Resources

CEA Boundary

The CEA boundary for cultural resources (**Figure 5.4-1**) is the same as described for surface water (**Section 5.4**).

Rationale: The Project should not affect cultural resources outside the Direct Effects Study Area, so the CEA was chosen mainly for simplicity purposes.

Cumulative Effects

Over thirty cultural resource inventories have been conducted within the CEA. These projects are associated with phosphate mine expansion and exploration, timber sales, utilities, land exchange, and stock pond development. These projects were completed between 1979 and 2005. The previous inventory information for the CEA was compiled from data collected for the Smoky Canyon Mine expansions and is likely not all-inclusive; even so, this information provides a general description of site types and site density found in the CEA.

These projects indicate that at least twenty known cultural resource sites are located within the CEA, including prehistoric campsites and lithic scatters, and historic sites such as a salt works facility, cabins, a sawmill, and arborglyphs (tree carvings). The prehistoric sites are generally eligible due to the paucity of sites of this type in this high elevation area. Four sites are within previous mine disturbance areas; these include one multi-component site (prehistoric and historic) on the north edge of Panel A, a historic site within Panel A, a historic site within Panel B, and another historic site within Tailings Pond 2. An additional site, prehistoric in nature, is on the north and west edge of Panel D, near Pole Canyon Creek. This site was considered eligible for the NRHP and avoidance or mitigation measures were recommended.

During the 2003 Smoky Canyon Mine Environmental Monitoring (Cunningham 2004), as required by the 2002 ROD for the Smoky Canyon Mine Panels B and C Project, it was noted that the sawmill site was destroyed.

A review of historic (pre-1950) GLO maps reveals numerous features that were historically present within the CEA including several named roads, homesteads, houses/structures, ranching facilities, ditch systems, and utility lines. The current on-the-ground status of the majority of these features has not been confirmed, but some may still exist intact and could possibly be indirectly impacted by the proposed activities.

Past, present, and reasonably foreseeable impacts to cultural resources in the CEA are the result of mining activities, timber harvesting, road development, archaeological excavation, livestock grazing, private development, and likely vandalism and artifact collection. Recreational use of the area is expected to increase four percent annually; thus increasing the potential for vandalism and/or artifact collection at sites (see **Section 3.10**). Potential historic features within the CEA may incur indirect impacts as a result of the Proposed Action or Alternatives and would constitute minor cumulative impacts when added to past and present impacts to cultural resources.

5.15 Native American Concerns and Treaty Rights Resources

CEA Boundary

The CEA for tribal treaty rights impacts is Southeastern Idaho (no figure).

Rationale: This area is chosen because it encompasses the majority of the area currently used by tribal members.

Cumulative Effects

The ability of Native Americans to practice their traditional culture in the CEA has been reduced through loss of “unoccupied lands” and degradation of the resources over time. Dams along the Snake River affected salmon runs and limited the availability of salmon for consumption. Development of open space, access restrictions, and land disposals reduced unoccupied lands for practicing tribal treaty rights. Fire suppression, grazing, mining, and timber harvest have changed the vegetation and affected water quality. The Idaho National Engineering and Environmental Laboratory (INEEL) restricted access to vast acreages of federal lands.

In recent years, however, these trends are slowly being reversed. Elk, moose, and white-tailed deer numbers have increased. Federal and State agencies are enhancing native fish and wildlife habitat. In the shift towards ecosystem management, federal land managers have reintroduced more natural processes such as fire across the landscape. These efforts to improve the condition of natural resources collectively serve to protect and begin restoration of tribal treaty rights.

The Project Area is a very small part of the CEA. Due to the distance of the Project Area from the Shoshone-Bannock reservation at Fort Hall and its location near an existing active mine, it is unlikely that the Project Area is utilized intensively for the exercise of treaty rights. As described in Chapter 4, the Project would produce a local, temporary, and negligible impact to land access by Tribal members for exercising Treaty Rights and so would present a negligible cumulative impact when added to other past, present, and reasonably foreseeable land management activities in the CEA.

The Shoshone-Bannock Tribe has requested an analysis of the direct and indirect impacts of the proposed operations on the traditional uses of the Project Area by Tribal members. To do this, a scenario was developed that would represent a typical exposure of a Tribal member to the environmental impacts of the operations. The scenario assumes an infrequent visit to the Project Area by the tribal member to hunt vegetation, small mammals, fish, and an occasional deer or elk. The Tribal member (visitor) would drive to the west side of the Project Area along the Diamond Creek Road and then hike or ride horseback eastward into the area.

During mining, the visitor could encounter an active haul/access road that would cross the countryside. This road would replace previous surface resources along the corridor with road fills, cuts, and traveled roadway. The road would be crossable at many locations to access the Forest on the other side. The natural forest environment would be impacted by the road disturbance and the appearance and noise of regular haul truck traffic on the road. Hunting traditional flora and fauna in the road corridor would not be possible, and the road disturbance would likely displace small mammals and big game in the immediate vicinity into adjacent suitable habitat. Fishing would be eliminated at any road crossings of creeks, but fishing on either side of the crossings would be possible. Culverts placed at the stream crossings would be designed to allow passage of fish so that natural upstream-downstream movement would occur.

Approaching the active mine panels the visitor would likely hear noise from the mining activity, primarily mobile equipment noise with blasting noise as described in **Section 4.2**. The mine disturbance would eliminate certain springs and other water sources (**Section 4.3**), which could affect the distribution of wildlife in the nearby areas. These would be replaced by other water sources provided by Simplot in locations off the mine panels, which could potentially attract wildlife into the vicinity of these water sources. Timber, under story vegetation, and soil would be undisturbed in the area around the active mine area, but within the mine panel footprint these resources would be removed (**Sections 4.4 and 4.5**). Wildlife would also be displaced from within the mine panel footprint area into adjacent suitable habitat (**Section 4.7**). In the area immediately adjacent to the mine area, wildlife would be disturbed by the nearby activity. Some wildlife would eventually adjust to the disturbance and would populate these areas. The degree to which small mammals and big game would be displaced in the area outside the mine footprint is uncertain.

Reclaimed or undeveloped mine panels would be crossable on foot or horseback anywhere it is safe to do so. The presence of unreclaimed pit highwalls and active mining operations could inconvenience the visitor in finding a safe route across the mining operation. After reclamation, depending on the selected mining alternative, the mine pits and highwalls would be backfilled, and overburden fills would be regraded. This would make safe crossing of the mine areas more convenient.

During mining, direct disturbance of perennial streams would be minimized so access to fishing in the undisturbed reaches would be unaffected. The mining operations would be designed with mitigation measures to minimize chemical and sedimentation impacts on aquatic plants and wildlife. Sediment increases of a few percent over background are possible in the perennial streams with potential negative impacts on fish in downstream reaches.

Concentrations of selenium may increase in South Fork Sage Creek, Sage Creek, Crow Creek, and lower Deer Creek, due to groundwater discharges, which could affect aquatic life in these streams. With the exception of lower Deer Creek, these concentrations would be within existing water quality standards established for protection of aquatic life. In lower Deer Creek, selenium concentrations are seasonally higher than the water quality standard; this situation would be worsened by the proposed mining. The anticipated selenium concentrations in any of these streams would not present a human health hazard to the visitor unless bioaccumulation in fish could occur to the point where limitation on consumption of the fish would be advisable. This is more likely for chronic consumption of fish by children than by adults.

After mining in specific areas, the visitor would encounter regraded pits and overburden fills that are in different stages of reclamation, ultimately leading to a condition where grass and forb coverage is restored. Depending on the final seed and plant mix selected, reclamation vegetation may contain species with traditional values. Small mammals and big game would gradually re-occupy the reclaimed mine areas. The new patterns of vegetation (forest and grassland) along the reclaimed mine panels would present new wildlife habitat patterns as well, which could result in increased use of the reclaimed areas by big game, small mammals, and raptors. Increased use by wildlife could positively affect the long-term hunting success of the visitor.

The design of the cap in areas of seleniferous overburden fills would prevent the bioaccumulation of selenium and other COPCs from the overburden in the vegetation growing on the reclaimed areas. This cap would also prevent the accumulation of COPCs in the surface water and wildlife of the immediate area, so there should be no increased toxic effects on the visitor from traditional uses of vegetation and wildlife that is hunted in the reclaimed mine areas. The only toxicological effects would be from wildlife that may consume COPCs and travel to this area from existing releases at existing mine sites.

When no longer needed, haul/access roads would be largely reclaimed to approximate natural contours and revegetated with grasses and forbs. Road fills in drainages would be removed along with any culverts and the previous stream channels and riparian vegetation would be restored. Aquatic life would eventually be re-established in any restored perennial stream channels. Access across the reclaimed road corridors for hiking or horseback riding would be fully restored with exceptions of isolated road cuts and fills that would not be fully regraded because of steep terrain. Vegetation with traditional uses, small mammals, and big game would gradually re-occupy the reclaimed road corridors.

5.16 Transportation

CEA Boundary

The CEA boundary for transportation (no figure) includes existing transportation routes into the Smoky Canyon Mine and Panel G via Highway 89 and 237 in Wyoming, including Crow Creek Road, Wells Canyon Road, Diamond Creek Road, and Georgetown Canyon Road.

Rationale: Transportation into the Project Area and adjacent terrain east of Freeman Ridge will continue to primarily be from the east via established access routes. Transportation resources should not be significantly affected outside of these major roads.

Cumulative Effects

Under the Proposed Action and all action Alternatives except Transportation Alternative 7, access to the Smoky Canyon Mine in the future would be the same as past and present conditions with no change in cumulative effects.

Under Transportation Alternative 7, the mine access to Panel G for employees and vendors would be along upgraded Crow Creek and Wells Canyon access roads. The cumulative effect of this added traffic to the existing traffic would be noticeable to residents along this access route and would lead to other environmental effects such as increased noise, dust, and possible increases in traffic accidents. The upgrading of these access roads to a wider, all season condition compared to the current status would improve access and make the roads generally safer. Increased utilization of the portion of the CNF accessed via these upgraded access roads could change recreation use patterns in the Forest.

5.17 Social & Economic Conditions

CEA Boundary

The CEA boundary for socioeconomics (no figure) includes Lincoln County, Wyoming and Bannock, Bear Lake, Bingham, Caribou, and Power Counties, Idaho. The positioning of the Simplot Smoky Canyon Mine and Don Plant fertilizer facilities in the U.S. and global phosphate rock and fertilizer markets will also be described.

Rationale: Caribou and Bear Lake Counties contain most of the southeastern Idaho phosphate mines and processing facilities. Smoky Canyon Mine employees live in Lincoln County. The Don Plant and/or its employees are located in Bannock, Bingham, and Power Counties. Simplot competes with other phosphate rock and fertilizer producers in the United States. Foreign fertilizer sources compete with U.S. producers in foreign markets.

Cumulative Effects

Because this Project is a continuation of existing mining at the Smoky Canyon Mine, implementation of the Proposed Action or Alternatives would not contribute adverse effects on public services beyond existing levels. No major changes to population, housing, employment, or private and public income would occur as a result of the Proposed Action or Mining Alternatives. Continued phosphate mining would result in future private and public income at levels approximately the same as past and present conditions. This would add to the continued economic stability within the CEA that results from multiple industries and several viable facilities within an industry. The detailed discussion of the potential direct, indirect, and cumulative economic impacts of the Proposed Action and Alternatives, including No Action, for the CEA is already contained in **Section 4.16.**

If the No Action Alternative was selected and closure of the Smoky Canyon Mine occurred, closure of the Don Plant in Pocatello would also be likely. This would result in the loss of most of the jobs at these facilities. Job loss would contribute an adverse cumulative effect by increasing the unemployment rate within the CEA, which puts a greater burden on federal, state, and county public services (i.e. unemployment wages, Medicare/Medicaid, etc.). There would be a local loss in private and public income and a wider loss in secondary income to vendors and suppliers of the closed facilities. If the Project Area were not utilized for phosphate mining, it would continue to be available for other activities such as logging, grazing, and recreation that would result in socioeconomic benefits within the CEA, but these would be minor to negligible relative to implementation of the Proposed Action.

Smoky Canyon Mine
Panels F & G Draft EIS

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Chapter 6
Consultation and Coordination

6.1 Public Participation Summary

6.1.1 Public Scoping Period and Meetings

Initial Scoping

The public was provided a 30-day scoping period at the beginning of the EIS process to identify potential issues and concerns associated with the Proposed Action. The Notice of Intent (NOI) for the Smoky Canyon Mine Panels F and G Extension Environmental Impact Statement (EIS) was published in the Federal Register on September 15, 2003. A copy of this NOI is included in the *Public Scoping Summary, Smoky Canyon Mine, Panels F & G Extension* (Scoping Summary Report) (JBR 2004a). A legal notice was published in local newspapers as follows:

Idaho State Journal	Pocatello, Idaho	September 19, 2003
Star Valley Independent	Afton, Wyoming	September 25, 2003

A news release was published in local newspapers and presented in media as follows:

Idaho State Journal	Pocatello, Idaho	September 17, 2003 and October 9, 2003
Idaho Statesman	Boise, Idaho	September 18, 2003
KTVB TV		September 18, 2003

The public mailing list was compiled and 115 letters sent to interested individuals, agencies, and groups. The EIS scoping mailing list is included in the Scoping Summary Report (JBR 2004a).

A meeting with Lincoln County, Wyoming and Caribou County, Idaho county commissioners was held on September 25, 2003. The purpose of the meeting was to introduce commissioners to the Project and discuss Crow Creek Road improvements associated with the conveyor alternative.

Two public meetings were held as scheduled in Pocatello, Idaho at the Pocatello Airport meeting room on October 7, 2003 and in Afton, Wyoming on October 8, 2003 at the Star Valley High School. The open house meetings provided a Project description, photo displays of the Project Area, and a forum for exchange of information and ideas or concerns related to the Project. Comment forms were available at the meetings. Agency, Project proponent, and consultant representatives were present including: James Blair of the Bureau of Land Management (BLM), Scott Gerwe and Jeff Jones of the United States Forest Service (USFS); Brian Buck and Greg Brown of JBR Environmental Consultants, Inc., and Lori Hamann and Dennis Facer of Simplot. Lists of individuals who signed attendance sheets at the public meetings are included in the Scoping Summary Report (JBR 2004a).

Comments were requested to be received on or before October 20, 2003. By the close of the scoping period on October 20, 2003, 49 comment letters, 3 comment sheets, and 130 e-mails had been received for the Smoky Canyon Mine Project. In addition, 47 comment e-mails were received after the end of the scoping period for a total of 229 comments. These letters included

143 standardized comment letters (about 62 percent) of four types (Standardized Letters A-D). Some of the standardized letters did contain additional commentary that was not part of the template. Copies of all written comment letters, forms, and e-mails are included in the Scoping Summary Report (JBR 2004a).

Standardized letters generally fitting Form A, which originated with the proponent, were generally in favor of the Project. The letters discuss several topics including: the Project in relation to current USFS and BLM operating plans and the Roadless Area Conservation Rule (RACR), socioeconomic impacts of phosphate mining, the importance of fertilizers, and the selenium issue. Standardized Letter A was mailed and/or e-mailed by 52 individuals. Standardized letters generally fitting Form B originated on the Greater Yellowstone Coalition website and were often against the Project or aspects of the Project (such as mining in Inventoried Roadless Areas), but at the same time urged that any approval stress protection of air, water, and wildlife habitat. Standardized letters generally fitting Form B were e-mailed by 68 individuals. Standardized letters generally fitting Form C are similar to Standardized Letter B, stating that the BLM must respect the 9th Circuit Court of Appeals in upholding the roadless rule. In addition, these letters state that the agencies must explore and evaluate all reasonable alternatives before permitting the Project. Standardized Letter C was e-mailed by 17 individuals. Standardized letters generally fitting Form D originated with a supplier of the proponent and are in favor of the Project. These letters discuss the socioeconomic impacts of phosphate as fertilizer and the impacts to suppliers if the Project is not approved. Standardized Letter D was e-mailed by six individuals. All other concerns included in these standardized letters were noted for analysis as well as the standardized comments.

A number of e-mails and letters were received from local landowners and their family members and friends from the Crow Creek Valley. They were very concerned about the impacts of mining and transportation alternatives close to their properties and the effects it would have on water and air quality; fish, vegetation, and wildlife; scenic integrity; property values; and heritage issues.

Comments received in response to solicitations, including names and addresses of those who commented, are considered part of the public record on this proposed action and are available for public inspection. The mailing list for the Project was revised to add those persons who provided comments in response to scoping, requested to be on the mailing list, or signed a scoping meeting list.

6.1.2 EIS Mailing List

An EIS mailing list of interested persons was assembled from mailing lists maintained at the BLM Pocatello Resource Area Office, USFS Caribou-Targhee National Forest Office, and the mailing list from the previous Simplot Smoky Canyon Mine Project, Panels B & C. This list was supplemented by addresses of scoping participants. Additional parties have been added to the mailing list as individuals or groups have contacted the agencies. All parties and agencies on the mailing list were sent a postcard and/or email on August 3, 2005 and/or September 8, 2005 requesting that they complete and return a postage-paid card indicating level of interest in receiving a copy of the Draft and Final EIS. The mailing list for the Draft and Final EIS was adjusted accordingly.

6.1.3 Distribution of the Draft EIS

A 60-day Draft EIS review period was initiated by publication of the Notice of Availability for the Draft EIS in the Federal Register.

The Draft EIS was distributed as follows:

- A Notice of Availability was published in the Federal Register specifying dates for the comment period and the date, time, and location of the public comment meetings.
- A news release was provided by the agencies at the beginning of the 60-day comment period on the Draft EIS. The news release was submitted to the same news organizations as for the initial public scoping announcement.
- The Draft EIS was distributed to interested parties identified in the updated EIS mailing list, as described above, and made available via the internet.

Public meetings will be held in Afton, Wyoming and Pocatello and Soda Springs, Idaho to obtain comments on the Draft EIS and to answer questions that the public has regarding the Project or the EIS process.

6.1.4 Final EIS Distribution

The Final EIS distribution will be completed after consideration is given to comments received on the Draft EIS. A 30-day Final EIS review period will be initiated by publication of the Notice of Availability for the Final EIS in the Federal Register. The Final EIS will be released as follows:

- Notice of Availability will be published in the Federal Register.
- Copies of the Final EIS will be sent to addresses on the updated mailing list and made available via the internet.
- A news release will be issued to the same newspapers used for previous Project announcements.

6.1.5 Record of Decision

Subsequent to the 30-day review period for the Final EIS, the USFS will make recommendations to the BLM and BLM will prepare a Record of Decision. The BLM Record of Decision will be distributed to people and organizations identified on the updated Project mailing list. A Notice of Availability will be published in the Federal Register. A news release will be made to the same newspapers used for previous Project announcements.

6.2 Criteria and Methods by Which Public Input will be Evaluated

Letters and oral comments received by the agencies on the Draft EIS will be reviewed and evaluated by the agencies to determine if information provided in the comments would require a formal response or contains new data that may identify deficiencies in the EIS. Steps will be initiated to correct any such deficiencies and to incorporate information into the Final EIS.

6.2.1 Consultation with Others

The following state and federal agencies were consulted during preparation of the EIS:

Idaho Conservation Data Center
Idaho Department of Environmental Quality
Idaho Department of Fish and Game
Idaho Department of Lands
Idaho Department of Water Resources
Wyoming Department of Environmental Quality
U.S. Army Corps of Engineers
U.S. Environmental Protection Agency
U.S. Fish and Wildlife Service
U.S. Geological Survey

The following tribal organizations were consulted:

Northern Shoshone Bannock Tribe, Fort Hall

6.2.2 Consultation with Idaho Department of Environmental Quality

The BLM and USFS requested that the Idaho Department of Environmental Quality (IDEQ) be a cooperating agency for this Project. IDEQ accepted this status and the BLM and USFS coordinated with the IDEQ during the preparation of the Draft EIS and in reviewing the information in the document. IDEQ participated in the bi-weekly Project conference calls and Project meetings as needed.

6.3 List of Preparers and Reviewers

Lead Agency: Bureau of Land Management (BLM), Pocatello Field Office

Joint Lead Agency: Caribou-Targhee National Forest (CTNF/USFS), Montpelier Ranger District

Cooperating Agency: Idaho Department of Environmental Quality (IDEQ)

Interdisciplinary Team (IDT) and Technical Specialists:
EIS Project Manager, Geologist: Bill Stout, BLM (previously James Blair)
ID Team Leader, Geologist: Scott Gerwe,USFS
Mining Engineer, Geologist: Jeff Cundick, BLM
Forest Planner, Litigation Coordinator: Cheryl Probert, USFS
Montpelier District Ranger: Dennis Duehren, USFS
Archaeologists: Ali Abusaidi, Randy Thompson, USFS
Botanist: Rose Lehman, USFS
Civil Engineers: Leon Bleggi, Randy Tate, USFS
Fisheries Biologists: James Capurso, Louis Berg, USFS
Forester: Wayne Beck, USFS
Geologist: Jeff Jones, USFS
Hydrologist: James Laprevote, USFS
Hydrologist: Lee Leffert, USFS
Land Architect: Debrah Tiller, USFS
Range Conservationist: Heidi Heyrend, USFS
Soil Scientist: Catherine Foos, John Lott, USFS
Wildlife Biologist: Ann Keysor, USFS
Regional Mining Coordinator: Mary Kauffman, IDEQ

Simplot Corporation
EIS Project Manager: Lori Hamann
Smoky Canyon Mine General Manager: Dennis Facer
Smoky Canyon Mine Engineer: Scott Lusty
Smoky Canyon Mine Engineer: James Louis
Smoky Canyon Mine Engineer: Chris McCourt
Senior Environmental Manager: Bruce Winegar

THIRD PARTY CONTRACTOR – JBR ENVIRONMENTAL CONSULTANTS, INC.		
PROJECT MANAGER Ground Water	Brian Buck, PG JBR Salt Lake City	MS Geological Engineering BS Geology 28 Years Experience
ASSISTANT PROJECT MANAGER Inventoried Roadless Area Transportation	Greg Brown JBR Salt Lake City	BS Natural Resources 13 Years Experience
EDITOR Visual Resources/Recreation	Linda Matthews JBR Salt Lake City	BS Environmental Studies 22 Years Experience
DOCUMENT CONTROL Cultural Resources Treaty Rights	Jenni Prince Mahoney JBR Salt Lake City	BS Anthropology MC NEPA 14 Years Experience
Wildlife/Fisheries/TES/BA/BE	Eric Holt JBR Salt Lake City	MS Wildlife Management BS Wildlife Resources 12 Years Experience
Air Quality/Noise	Erin Hallenburg, EIT JBR Salt Lake City, UT	BS Biology BS Civil Engineering 18 Years Experience
Socioeconomics	Allan Isaacson University of Utah Salt Lake City	BS Mechanical Engineering MBA 17 Years Experience
Mining Engineering/Reclamation	Bill Fuller JBR Salt Lake City, UT	MS Systems Management BS Mechanical Engineer 32 Years Experience
Administrative Assistant	Heather Haan JBR Salt Lake City, UT	3 Years Experience
Soils	Karen Kinsella JBR Elko, NV	BS Resource Management, Soils AS Biology/Computer 8 Years Experience
Surface Water Hydrology Land Use	Karla Knoop, CPH JBR Price, UT	BS Watershed Science 23 Years Experience
Infiltration Modeling	James Kunkel Knight Piesold	PhD Water Resources MS Civil Engineer BSCE Civil Engineer 35 Years Experience
Ground Water, Geochemistry, and Modeling	Alan Mayo PhD Alan Mayo Associates Orem, UT	MS Geology BS Geology PhD Hydrogeology 27 Years Experience

THIRD PARTY CONTRACTOR – JBR ENVIRONMENTAL CONSULTANTS, INC.		
Graphics	Connie Pixton JBR Salt Lake City, UT	34 Years Experience
Vegetation	Greg Sharp JBR Salt Lake City, UT	BS Fisheries & Wildlife Biology 12 Years Experience
Geochemistry	Ron Schmiermund, PhD Knight Piesold	PhD Geochemistry MS Geochemistry BS Geology 28 Years Experience
Wetlands/Riparian	Dave Worley JBR Reno, NV	MS Zoology BS Biology 20 Years Experience

SIMPLOT BASELINE CONTRACTOR – MAXIM TECHNOLOGIES, INC.		
Project Manager	Terry Grotbo Maxim Helena, MT	BS Earth Science 28 Years Experience
Water Resources	Doug Rogness Maxim Helena, MT	MS Hydrology BS Geology 19 Years Experience
Geochemistry	Lisa Kirk Maxim Bozeman, MT	BS Geology 14 Years Experience
Vegetation	Holly Beck Maxim Boise, ID	MS Botany BS Ecology 8 Years Experience
Wildlife **Wetlands/Riparian** **Aquatics/Amphibians**	Walt Vering Maxim Boise, ID	MS Natural Resources BA Biology 8 Years Experience
Soils	Judd D. Stark Maxim Boise, ID	BS Land Rehabilitation/Soil Science 6 Years Experience
Cultural Resources	Dale Gray Frontier Historical Consultants	MA History BA History 20 Years Experience
Land Use, Access, Recreation, and Grazing	Joseph N. Murphy Maxim Helena, MT	BA Geography 31 Years Experience

6.4 Mailing Lists

6.4.1 Mandatory Mailing List

The following mandatory mailing list was compiled using both Forest Service and Bureau of Land Management mandatory distribution lists. The number in parenthesis is the number of hardcopies required.

Advisory Council on Historic Preservation
Office of Program Review and Education (*)
1100 Pennsylvania Ave, NW, Ste. 809
Washington D.C. 20004

Army Corps of Engineers (2)
Northwestern Division
Chief, Planning Division
P.O. Box 2870
Portland, OR 97208

Bureau of Reclamation (2)
Denver Federal Center
Bldg. 67 (D-5000)
P.O. Box 25007
Denver, CO 80225-0007

Environmental Protection Agency (1)
Region 10
1200 Sixth Avenue, ow-133
Seattle, WA 98101

Environmental Protection Agency (5)
Office of Federal Activities
EIS Filing Station
Airel Rios Building (South Oval Lobby)
Room 7220
1200 Pennsylvania Ave. NW
Washington D.C. 20004

Federal Aviation Administration (*)
Northwest Mountain Region
Regional Administrator
1601 Lind Avenue, SW
Renton, WA 98055-4056

Federal Highway Administration (*)
Idaho (HDA-ID)
Division Administrator
3050 Lakeharbor Lane, Suite 126
Boise, ID 83703-6243

Fort Hall Business Council (1)
Shoshone-Bannock Tribes
P.O. Box 306
Pima Drive
Fort Hall, ID 83203

HQ-USAF/LEEV (2)
Environmental Division
Boiling AFB, Bldg. 516
Washington D.C. 20330-5000

Natural Resources Conservation Service
National Environmental Coordinator (*)
US Department of Agriculture
P.O. Box 2890, Room 6158-S
Washington D.C. 20013-2890

National Marine Fisheries Service (*)
Habitat Conservationists Division
Northwest Region
525 NE Oregon, Suite 500
Portland, OR 97232

National Park Services (4)
Environmental Quality Division
1201 Eye Street NW
Washington D.C. 20005

Northwest Power Planning Council (*)
851 S.W. 6th Avenue
Suite 1100
Portland, OR 97204-1348

Office of Deputy A/S of the USAF (1)
Environment, Safety, and Occupational Health
SAF/RQ Room 4C916, Pentagon
Washington, D.C. 20330-0001

US Department of Energy (2)
Office of NEPA (EH-2)
1000 Independence Ave. SW
Washington D.C. 20585

US Department of Agriculture PPD/EAD (*)
4700 River Road, Unit 149
Riverdale, MD 20737-1238

USDA, National Agricultural Library (1)
Head, Acquisitions & Serials Branch
10301 Baltimore Blvd., Rm 002
Beltsville, MD 20705

US Department of the Interior
Fish & Wildlife Service (3)
Assistant Director, Endangered Species
1849 C St. NW
Washington D.C. 20240

US Coast Guard (USCG) (*)
Environmental Impact Branch
Marine Environmental and Protection Division
G-MEP
2100 2nd Street, SW
Washington, D.C. 20593

US Department of the Interior (3)
Geological Survey
Environmental Affairs Program
National Center (423)
Reston, VA 20192

US Department of the Interior (3)
Minerals Management Service
Chief, Environment Ops and Analysis Branch
381 Eldon Street
Herndon, VA 20170-4817

US Department of the Interior (3)
Natural Resources Library
1849 C. Street NW
Washington D.C. 20240

US Department of the Interior (5)
Director, Office of Environmental Policy and Compliance
1849 C Street, NW (2342)
Washington D.C. 20240

US Department of the Interior (1)
Office of External and Intergovernmental Affairs
1849 C Street NW
Washington DC 20240

J.R. Simplot Company (1)
P.O. Box 912
1150 West Highway 30
Pocatello, ID 83201

(*) – no hardcopy needed, will access from the web

6.4.2 Interested Parties Mailing List

The Interested Parties mailing list is divided into Federal agencies, State agencies, and others. This list was compiled through agency maintained lists, the previous Simplot Smoky Canyon Mine Project Panels B & C mailing list, and the scoping process.

FEDERAL AGENCIES:

Army Corps of Engineers (1)
Walla Walla District
Idaho Falls Regulatory Office
James Joyner
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Idaho Falls, ID 83402

Bureau of Land Management (1)
Pocatello Field Office
Field Manager
4350 Cliffs Drive
Pocatello, Idaho 83204

Bureau of Land Management (1)
Idaho State Office
1387 South Vinnell Way
Boise, ID 83709

Bureau of Land Management (1)
Upper Snake Field Office
Field Manager
1405 Hollipark Drive
Idaho Falls, ID 83401-2100

Department Of Water Resources (1)
Eastern Region
900 N. Skyline Drive
Idaho Falls, ID 83402-1718

Environmental Protection Agency (1)
Idaho Operations Office
1435 N. Orchard Street
Boise, ID 83705

Natural Resource Conservation Service (1)
USDA, Larry Mickelsen
390 East Hooper Avenue
Soda Springs, ID 83276

US Fish & Wildlife Service (1)
Eastern Idaho Field Office Supervisor
4425 Burley Dr., Suite A
Chubbuck, ID 83202

US Fish & Wildlife Service (1)
Snake River Basin Office
1387 S. Vinnell Way, Rm. 368
Boise, ID 83709

USFS Caribou/Targhee National Forest (2)
Soda Springs District
410 East Hooper Ave.
Soda Springs, ID 83246

USFS Caribou/Targhee National Forest (1)
Forest Supervisor
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Idaho Falls, ID 83403

USFS Grey's River Ranger District (1)
P.O. Box 339
Afton, WY 83110

USFS Montpelier Ranger District (1)
District Ranger
322 N. 4th Street
Montpelier, ID 83254

USFS Palisades Ranger District (1)
3659 Ririe Highway
Idaho Falls, ID 83401

USFS Intermountain Region (4)
Bio-Physical Resources
Barry Burkhardt
324 25th Street
Ogden, UT 84401

STATE AGENCIES

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Southwest Area Office
Tim Kennedy
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Boise, ID 83703

Idaho Department of Lands
3563 Ririe Highway
Idaho Falls, ID 83401

Idaho Department of Lands
Minerals Division
954 West Jefferson
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Idaho Department of Environmental Quality
Mary Kauffman (2)
444 Hospital Way #300
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Idaho Department of Environmental Quality
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224 South Arthur
Pocatello, ID 83204

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Selenium Project Officer (1)
15 West Center Street
Soda Springs, ID 83276

Idaho Department of Fish & Game
Region 5 Supervisor, Jim Mende
1345 Barton Road
Pocatello, ID 83204

Idaho Department of Health and Welfare
Bureau of Environmental Health and Safety
Towers Building, 4th Floor
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Idaho Department of Recreation
Jeff Cook
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Boise, ID 83272-0065

Idaho Transportation Department
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Office of the Governor, State of Idaho
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State of Wyoming
Department of Environmental Quality
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Cheyenne, WY 82002

Wyoming Game and Fish Department
Jackson/Pinedale Region
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360 N. Cache
Jackson, WY 83001

Wyoming State Clearinghouse (6)
Office of Federal Land Policy
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Idaho Conservation League
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Pres. ID Trail Machine
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7.2 Index

7.3 Acronyms

ABA	Acid Base Accounting
AGP	Acid-Generating Potential
AIRFA	American Indian Religious Freedom Act
AIZ	Aquatic Influence Zone
AMP	Allotment Management Plan
AMSL	Above Mean Sea Level
ANFO	Ammonium Nitrate/Fuel Oil
ANP	Acid-Neutralizing Potential
ANPR	Advanced Notice of Proposed Rulemaking
AOC	Administrative Order on Consent
AOI	Annual Operating Instructions
AQI	Air Quality Index
ARD	Acid Rock Drainage
ARPA	Archaeological Resource Protection Act
ASQ	Allowable Sale Quantity
ATSDR	Agency for Toxic Substances and Disease Registry
ATV	All-Terrain Vehicle
AWC	Available Water Capacity
BA	Biological Assessment
BE	Biological Evaluation
BERA	Baseline Ecological Risk Assessment
BLM	Bureau of Land Management
BLS	Bureau of Labor Statistics
BMP	Best Management Practices
BURP	Beneficial Use Reconnaissance Program
CC	Crow Creek
CCC	Criteria for Continuous Concentration
CCD	Census County Division
Cd	Cadmium
CDC	Conservation Data Center
CEA	Cumulative Effects Area
CEC	Cation Exchange Capacity
CEQ	Council of Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHC	Criteria for Human Consumption
CFR	Code of Federal Regulations
CMC	Criteria for Maximum Concentration
CNF	Caribou National Forest
CO	Carbon Monoxide
COC	Contaminants of Concern
COPC	Contaminants of Potential Concern
CTNF	Caribou-Targhee National Forest
CWA	Clean Water Act
DAP	Diammonium Phosphate
DC	Deer Creek
DEIS	Draft Environmental Impact Statement

DFC	Desired Future Condition
DL	Detection Limit
DO	Dissolved Oxygen
DOI	Department of Interior
DOT	Department of Transportation
EA	Environmental Assessment
EC	Electrical Conductivity
EE/CA	Engineering Evaluation/Cost Analysis
EIS	Environmental Impact Statement
EO	Executive Order
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1972
FEIS	Final Environmental Impact Statement
FHA	Federal Housing Administration
FR	Forest Road
FS	Forest Service
FSEIS	Final Supplemental Environmental Impact Statement
FSH	Forest Service Handbook
GIS	Geographic Information Systems
GLEC	Great Lakes Environmental Center
GLO	General Land Office
GPS	Geographic Positioning System
GYE	Greater Yellowstone Ecosystem
HGM	Hydrogeomorphic Methodology
HUC	Hydrologic Unit Code
IARC	International Agency for Research on Cancer
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
IDL	Idaho Department of Lands
IDWR	Idaho Department of Water Resources
IGS	Idaho Geological Survey
IMA	Idaho Mining Association
IMNH	Idaho Museum of Natural History
INEEL	Idaho National Engineering and Environmental Laboratory
IPM	Integrated Pest Management
IRA	Inventoried Roadless Area
ISCOT	Industrial Source Complex Short Term
ISHPO	Idaho State Historic Preservation Office
ISHS	Idaho State Historical Society
ISO	International Organization for Standardization
IWI	Index of Watershed Indicators
JBR	JBR Environmental Consultants, Inc.
KPLA	Known Phosphate Lease Area
LAU	Lynx Analysis Unit
LDS	Church of Jesus Christ of Latter Day Saints
LOM	Line of Mine
MAP	Monoammonium Phosphate
Maxim	Maxim Technologies, Inc.

MDT	Montana Department of Transportation
MIS	Management Indicator Species
MP	Management Prescriptions
MPRA	Meade Peak Roadless Area
MSHA	Mine Safety and Health Administration
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industrial Classification System
ND	Not Detected
NEPA	National Environmental Policy Act
NFDC	North Fork Deer Creek
NFS	National Forest System
NHPA	National Historic Preservation Act
NOI	Notice of Intent
NO_x	Nitrogen Oxide Compounds
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
NWI	National Wetland Inventory
OHV	Off-Highway Vehicle
OHWM	Ordinary High Water Mark
OMRD	Open Motorized Road Density
ORP	Oxidation-Reduction Potential
OSHA	Occupational Safety and Health Administration
PA	Proposed Action
Pb	Lead
PEL	Permissible Exposure Limit
PEM	Palustrine Emergent
PFC	Proper Functioning Condition
$PM_{2.5}$	Particulate Matter Smaller than 2.5 Microns
PM_{10}	Particulate Matter Smaller than 10 Microns
PPI	Producer Price Index
PR	Partial Retention
PSD	Prevention of Significant Deterioration Air Quality Program
PSS	Palustrine Scrub-Shrub
RACI	Roadless Area Conservation Initiative
RACR	Roadless Area Conservation Rule
RARE	Roadless Area Review and Evaluation
RCRA	Resource Conservation and Recovery Act
RFP	Revised Forest Plan
RM	Road-Modified
RMP	Resource Management Plan
RNA	Research Natural Area
ROD	Record of Decision
ROM	Run of Mine
ROS	Recreation Opportunity Spectrum
ROW	Right of Way
RS	Revised Statute
SC	Specific Conductance
SCRA	Sage Creek Roadless Area

SDI	Stream Diatom Index
Se	Selenium
SEIS	Supplemental Environmental Impact Statement
SeWG	Selenium Working Group
SFDC	South Fork Deer Creek
SFI	Stream Fish Index
SFSC	South Fork Sage Creek
SHI	Stream Habitat Index
SI	Site Inspection/Investigation
SIC	Standard Industrial Classification
SIO	Scenic Integrity Objective
SIP	State Implementation Plan
Simplot	J.R. Simplot Company
SMI	Stream Macroinvertebrate Index
SMS	Scenery Management System
SO_2	Sulfur Dioxide
SO_4	Sulfate
SOPA	Schedule of Proposed Action
SPA	Super Phosphoric Acid
SPCC	Spill Prevention Control and Countermeasure Plan
SPM	Semi-Primitive Motorized
SSL	Soil Screening Level
SUA	Special Use Authorization
SUP	Special Use Permit
SWANCC	Solid Waste Agency of Northern Cook County
SWEQ	Snow Water Equivalent
SWPPP	Storm Water Pollution Prevention Plan
TCP	Traditional Cultural Property
TDS	Total Dissolved Solids
TEC	Threshold Effect Concentration
TEPC	Threatened, Endangered, Proposed, and Candidate
TEPCS	Threatened, Endangered, Proposed, Candidate, and Sensitive (Species)
TMDL	Total Maximum Daily Load
TRC Mariah	TRC Mariah Associates, Inc.
TSP	Triple Sugar Phosphate
TSS	Total Suspended Solids
TST	Tentatively Sustainable Timber
TtEMI	Tetra Tech EM Inc.
UN	United Nation
USACE	United States Army Corps of Engineers
USC	United States Code
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
VES	Visual Encounter Surveys
VMS	Visual Management System
VOC	Volatile Organic Compound
VQO	Visual Quality Objective

WBAG	Water Body Assessment Guidance
WC	Wells Canyon
WEG	Wind Erodibility Group
WEPP	Water Erosion Prediction Project
WOUS	Waters of the US
WPPA	Wet Process Phosphoric Acid
WRCC	Western Regional Climate Center
WUS	Waters of the US (acronym used by Maxim)
WYNDD	Wyoming Natural Diversity Database
Zn	Zinc
ZnS	Sulfide Mineral Sphalerite

7.4 Units of Measure

BCY	bank cubic yards
C	Celsius
cfs	cubic feet per second
dB	decibel
dBA	A-weighted decibel sound scale
dw	dry weight
F	Fahrenheit
ft	feet
g	grams
gal	gallon
gpm	gallons per minute
ha	hectares
in	inch
kg/ha	kilograms per hectare
kV	kilovolt
kW	kilowatt
lb	pound
LCY	loose cubic yards
m	meters
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
mi	miles
mm	millimeters
MM	million
mph	miles per hour
ppm	parts per million
%	percent
µmhos/cm	micromhos per centimeter
$\mu g/m^3$	micrograms per cubic meter

7.5 Glossary

Acre-feet. The volume required to cover 1 acre to a depth of 1 foot, which is equivalent to 43,560 cubic feet.

Acid Generation Potential (AGP). The concentration of acid generating minerals in a rock or soil material, measured in tons of $CaCO_3$ equivalents per kiloton of rock.

Acid Neutralization Potential (ANP). The concentration of acid neutralizing minerals in a rock or soil material, measured in tons of $CaCO_3$ equivalents per kiloton of rock.

Acute. Severe; having a sudden onset, sharp rise, and short duration.

Acid Rock Drainage (ARD). Water with pH less than 5, elevated TDS, SO_4, and trace metal concentrations that result from the oxidation of acid generating sulfide minerals with subsequent dissolution and transport of the oxidation products.

Alluvial. Pertaining to material or processes associated with transportation or deposition of soil and rock by flowing water (e.g., streams and rivers).

Alluvium. Soil and rock deposited by flowing water (e.g., streams and rivers); consists of unconsolidated deposits of sediment, such as silt, sand, and gravel.

Alteration. A geochemical process involving mineralogic and geochemical changes due to reaction with fluids moving through rock or soil under natural conditions, particularly in association with mineral deposits. Transformation of feldspar minerals to clay through chemical weathering is considered alteration.

Ambient. Surrounding, existing, background conditions.

Anticline. A fold in rock where the interior of the fold is comprised of rocks older in age than the rocks on the exterior of the fold.

Assay. Qualitative or quantitative analysis of a substance (e.g., ore body).

Basic Elements (visual). The four major elements (form, line, color, and texture) that determine how the character of a landscape is perceived.

Best Management Practices (BMPs). Vegetative and structural methods to control erosion and sedimentation.

Biological Assessment. Information prepared by or under the direction of the federal agency concerning listed species that may be present in the action area and the evaluation of potential effects of the action on such species and habitats. The purpose of the biological assessment is to evaluate the potential effects of the action on listed or proposed species or designated or proposed critical habitat, and determine whether any such species and habitats are likely to be adversely affected by the action. Biological Assessments are conducted for major federal construction projects requiring an EIS.

Biological Evaluation. A Forest Service document of activities in sufficient detail to determine how an action or proposed action may affect any threatened, endangered, proposed, or sensitive species.

Capillary Break. A layer of specified material (usually cobble-sized) used to prevent capillary movements of fluids from one material to another.

Cation Exchange Capacity. The number of sites on a solid surface where reversible cation adsorption and desorption can occur.

Chert. A hard, dense microcrystalline or cryptocrystalline sedimentary rock, consisting chiefly of interlocking crystals of quartz less than about 30 Φm in diameter; it may contain amorphous silica (opal). It has conchoidal fracture, and may be white or variously colored. Chert occurs principally as nodular or concretionary segregations, or nodules in limestone and dolomite, and less commonly as layered deposits, or beded chert; it may be an organic or inorganic precipitate or a replacement product.

Chronic. Marked by long duration or frequent recurrence.

Column Test. A leaching laboratory test where water or other leaching solution is percolated through a vertical column of earth material and the resulting leachate is collected and analyzed for dissolved parameters.

Contrast (visual). The effect of a striking difference in form, line, color, or texture of the landscape features within the area being viewed.

Critical (Crucial) Habitat. Habitat that is present in minimum amounts and is a determining factor for population maintenance and growth.

dBA. The sound pressure levels in decibels measured with a frequency weighing network corresponding to the A-scale on a standard sound level meter. The A-scale tends to suppress lower frequencies (e.g., below 1,000 Hz).

Decant. To remove or pour off a liquid without disturbing associated sediment or solids.

Decibel (dB). One-tenth of a Bel is a measure on a logarithmic scale that indicates the ratio between two sound powers. A ratio of 2 in power corresponds to a difference of 3 decibels between two sounds. The decibel is the basic unit of sound measure.

Dissolution. The process of dissolving.

Electrical Conductivity (or Specific Conductance). The ability of a water or a soil-water paste to transmit electrical current, used to estimate ion concentration.

Endangered Species. Species in danger of extinction throughout all or a significant portion of its range.

Eolian. Soil and silt deposited by wind, such as loess.

EPA Synthetic Precipitation Leachability Procedure (SPLP) – Method 1312. A weak acid bottle roll extraction conducted to simulate metal release from mined material due to exposure to ambient conditions.

Ephemeral Stream. A stream or portion of a stream which flows briefly in direct response to precipitation in the immediate vicinity, and whose channel is at all times above the water table.

Evapotranspiration (ET). The portion of precipitation returned to the air through evaporation and transpiration by plants.

Fate and Transport. Description of the movement of a contaminant through a groundwater system which may include the effects of dilution, dispersion, attenuation and various chemical reactions.

Floodplain. The low and relatively flat areas adjacent to rivers and streams. A 100-year floodplain is that area subject to a 1 percent or greater chance of flooding in any given year.

Flux. Volume of groundwater per unit time that travels through a solid permeable medium, such as alluvium and bedrock.

Folds. A bend in planar features in rocks - like an extended wrinkle. A fold is usually the product of geologic deformation.

Forage. Vegetation used for food by wildlife, particularly big game wildlife and domestic livestock.

Forbs. Any herbaceous plant other than a grass.

Fry. The young of fish.

Game Species. Animals commonly hunted for food or sport.

HELP3 Model. A computer model written by Paul Schroeder et al at the U.S. Army Corps of Engineers Waterways Experiment Station and distributed by the U.S. Environmental Protection Agency that estimates the water balance (water inputs and outputs) of landfills.

Hertz (Hz). The unit of frequency (i.e., sound) formerly designated as cps - cycles per second.

Host Rock. A rock body or wall rock enclosing mineralization.

Hydraulic Conductivity (K). A coefficient of proportionality describing the rate at which water can move through a permeable medium.

Hydraulic Gradient. For groundwater, the rate of change of total head per unit of distance of flow at a given point and in a given direction.

Hydrograph. A graph that shows some property of groundwater or surface water as a function of time.

Hydrophytic Vegetation. The total of macrophytic plant life that occurs in areas where the frequency and duration of inundation or soil saturation produce permanently or periodically saturated soils of sufficient duration to exert a controlling influence on the plant species present.

Hydrostratigraphic Unit. A formation, part of a formation, or group of formations in which there are similar hydrologic characteristics allowing for grouping into aquifers or confining layers.

Intermittent Stream. Stream that flows only part of the time or during part of the year; some segments of the stream may flow year-round.

Isopleth. A line, on a map or chart, drawn through points of equal size or abundance.

Key Observation Point (KOP). An observer position on a travel route used to determine visible area.

Land Use Plan. The organized direction or management of the use of lands and their resources to best meet human needs over time, according to the land's capabilities.

Limestone. A sedimentary rock consisting chiefly of the mineral calcite (calcium carbonate, CaCO3), with or without magnesium carbonate. Common impurities include chert and clay. Limestone is the most important and widely distributed of the carbonate rock and is the consolidated equivalent of limy mud, calcareous sand, and/or shell fragments. It yields lime on calcination.

Lithic Scatter. A discrete grouping of flakes of stone created as a byproduct in the tool-making process. Often includes flakes used as tools as well as formal stone tools such as projectile points, knives, or scrapers.

LRMP. Land and Resource Management Plan. Document that established direction for future decisions of the use of lands and resources in the planning area to best meet human needs over time, according to the land and resource capabilities.

Maximum Credible Earthquake. The largest conceivable earthquake that could occur in an area.

MCL. Maximum Contaminant Level. The highest level of a contaminant that is allowed in drinking water.

Mesic. Moist habitats associated with springs, seeps, and riparian areas.

Mitigation. Actions to avoid, minimize, reduce, eliminate, replace, or rectify the impact of a management practice.

Modified Mercali Scale. Logarithmic scale of earthquake intensity.

Overburden. Sub-economic non-ore rock or soil associated with a mineral deposit.

Oxidation. A geochemical process involving chemical and mineralogic changes to rock or soil under chemical weathering conditions. Oxidation is typically associated with exposure of buried materials to atmospheric oxygen and water. The process occurs naturally, but is accelerated by mining activity.

Peak Flow. The greatest flow attained during melting of winter snowpack or during a large precipitation event.

Perennial Stream. A stream that flows throughout the year and from source to mouth.

Permeability. The capacity of porous rock, sediment, or soil to transmit a fluid.

pH. The negative $\log_{10}$ of the hydrogen ion activity in solution; measure of acidity or alkalinity of a solution.

$PM_{2.5}$. Particulate matter less than 2.5 microns in aerodynamic diameter.

PM_{10}. Particulate matter less than 10 microns in aerodynamic diameter.

Probable Maximum Precipitation (PMP). The greatest depth of precipitation for a given duration that is physically possible over a given storm area at a particular location at a certain time of year.

Raptor. A bird of prey (e.g., eagles, hawks, falcons, and owls).

Richter Magnitude. Logarithmic scale of earthquake intensity.

Riparian. Situated on or pertaining to the bank of a river, stream, or other body of water. Riparian is normally used to refer to plants of all types that grow along streams, rivers, or at spring and seep sites.

RMP. Resource Management Plan. Document that establishes direction for the use of resources to best meet the needs of humans over time, according to the resource potential or capability.

Run-of-Mine Overburden. Sub-economic rock mined from the phosphate deposit, which is and placed in surface dumps or as pit backfill.

Salinity. Measure of solute concentration, in grams per kilogram; “saltiness”.

Scoping. Procedures by which agencies determine the extent of analysis necessary for a proposed action, (i.e., the range of actions, alternatives, and impacts to be addressed; identification of significant issues related to a proposed action; and the depth of environmental analysis, data, and task assignments needed).

Sediment Load. The amount of sediment (sand, silt, and fine particles) carried by a stream or river.

Seepage Collection System. A system of drains, ponds, and pumps to collect and return tailing impoundment and embankment seepage.

Sensitive Species. Those plant or animal species that are susceptible or vulnerable to activity impacts or habitat alterations.

Shale. A fine-grained detrital sedimentary rock, formed by the compaction of clay, silt, or mud. It has a finely laminated structure, which gives it a fissility along which the rock splits readily, especially on weathered surfaces. Shale is well indurated, but not as hard as argillite or slate. It may be red, brown, black, or gray.

Significant. As used in NEPA, requires consideration of both context and intensity. Context means that the significance of an action must be analyzed in several contexts such as society as a whole, and the affected region, interests, and locality. Intensity refers to the severity of impacts (40 CFR 1508.27).

SPLP Test. Synthetic Precipitation Leachability Procedure. A laboratory testing procedure established by the U.S. Environmental Protection Agency where a prescribed amount of solid material is mixed for a set time with a prescribed amount of acidified water. The leachate is then separated from the solid and analyzed for parameters of interest.

Sodium Adsorption Ratio (SAR). Ratio of dissolved sodium to calcium+magnesium in water; provides a prediction of cation exchange reaction potential.

Storage Coefficient (S). Volume of water that an aquifer absorbs or releases from storage per unit surface area of aquifer per unit decline in the component of hydraulic head normal to the surface; S is dimensionless.

Sulfides. That part of a lode or vein not yet oxidized by air or surface water and containing sulfide minerals.

Sulfide Oxidation. Chemical conversion of reduced sulfide compound to an oxidized sulfate compound, with associated release of iron and formation of secondary iron oxide mineralization.

Swell. The increase in volume exhibited by certain soils and rocks on absorption of water; an enlarged place in an orebody; a general, imprecise term for dome or arch.

Syncline. A folded rock sequence where the interior of the fold is younger than the rock on the exterior.

Threatened Species. Any species of plant or animal which is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Total Suspended Particulate (TSP). Particulates less than 100 microns in diameter (Stokes equivalent diameter).

Total Dissolved Solids (TDS). Total amount of dissolved material, organic or inorganic, contained in a sample of water.

Total Suspended Solids (TSS). Undissolved particles suspended in liquid.

Transmissivity (T). The rate at which water will flow through a vertical strip of aquifer of one unit width and extending through the full saturated thickness, under a hydraulic gradient of 1.0.

Ungulate. A hoofed mammal.

Visual Quality Objective (VQO). A desired level of excellence based on physical and sociological characteristics of an area. Refers to degree of acceptable alteration of the characteristic landscape.

Watershed. Drainage basin for which surface water flows to a single point.

Wetlands. Areas inundated by surface water or groundwater with a frequency sufficient to support vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction.

Wetland Functions. Dynamic biological, chemical, and physical processes that characterize wetland ecosystems.

Wetland Values. Based on societal properties by which wetlands are determined to be useful, or impart public good.

7.6 Explanations of Impacts

Negligible – The impact is at the lowest levels of detection

Minor – The impact is slight, but detectable

Moderate – The impact is readily apparent

Major – The impact is a severe or adverse impact or of exceptional benefit

APPENDICES

Appendix 2A
Stream Crossing Analysis

Stream Crossing Analysis
Simplot's Proposed Mining at Panels F & G
Technical Memo

1.0 Introduction

Ecological connectivity refers to the capacity of a landscape to support the movement of organisms, materials, and energy (Peck 1998 *as cited in* Porior 2003). In terms of stream crossing design, connectivity is the linkage of organisms and processes between upstream and downstream channel reaches. The health of aquatic populations ultimately depends on the health of their ecosystem, which in large part depends on such connections. Biotic linkage within an aquatic system includes the upstream-downstream movement of fishes, amphibians, insects, debris, sediment, and migration of channel patterns (Porior 2003). Stream crossings, when designed correctly, can provide good passage for aquatic species and debris. Stream crossing structures can be divided into four general types: bridge, circular culvert, pipe arch culvert, and open bottom structures. Descriptions of each crossing type are provided in the following sections.

Ecological functions such as biotic linkage may be blocked by undersized or improperly designed stream crossings. In terms of fish passage, the most common reasons for crossing structure ineffectiveness involve alterations to stream flow, such as insufficient water depths, increased water velocities, and vertical drops (Zwirn 2002). For each structure type, specific features can be designed to accommodate characteristics of the site as well as passage goals of the structure. Goals may include the passage of all fish species and size classes at any time of the year, passage of adult fishes during the spawning period, passage of all fish and other aquatic species, etc. The primary goal for stream crossings associated with Simplot's proposed Panels F&G Mine Expansion Project is to allow for passage of spawning cutthroat trout and to maintain up- and down-stream channel stability by maintaining the ability to accommodate 100-year flood events. The stream crossings associated with the Project would be temporary (approximately 16 years) and designed to support loaded haul trucks (approximately 1200 tons).

2.0 Crossing Types

2.1 Bridge

Description

Bridges are structures erected over a depression or obstruction (such as a stream) that have a floor for carrying traffic and other loads (WCT 2002). Bridges crossing streams are generally designed to have abutments and/or piers located outside the stream, so that the stream flows unobstructed below (Porior 2003). Large bridges needing to support loads such as haul trucks typically require bank armoring (Bates 2003) and other additional structural measures to ensure strength.

Pros

- high level of channel retention and stability (Bates 2003, QDPIF 2005)
- minimal impact on fish passage (BCMF 2002)

- no inherent dimensional limitations (Bates 2003)
- minimal debris problems (Porior 2003)

Cons

- may be most expensive option available (ODFW 2005, Baggett et al. 2001, Salmon Nation 1999, Gibson et al. 2005)
- elaborate design requirements needed to support heavy loads (Blair 2005)
- requires civil engineering or geotechnical expertise (Salmon Nation 1999)

2.2 Circular Culvert

Description

A culvert is a conduit or passageway under a road, trail, or other obstruction, which is generally used to divert a stream or rainfall runoff to prevent erosion or flooding of the obstruction (WCT 2002). A circular culvert is the traditional culvert shape, consisting of a simple rounded pipe either smooth or corrugated (White 2003), unbroken (entire) in cross-section, and made of metal, concrete, plastic, or clay (WCT 2002). Circular culverts are typically covered with embankment around their entire perimeter, and the lower portion may or may not be buried in stream substrate. For this Project, it is assumed that circular culverts would be designed, using the best available technology and information, to simulate a natural stream bottom and to pass fish.

Pros

- low risk of foundation failure (Porior 2003)
- may be least expensive option (Porior 2003, Gibson et al. 2005)
- easiest assembly, installation, and removal (Porior 2003)
- materials widely available (Zwirn 2002)
- strongest of any pipe material (Gibson et al. 2005)

Cons

- can't be built on rock foundations (Porior 2003)
- "stream simulation" requires extra designing effort (Porior 2003)
- may constrict stream flow if not properly designed (Baggett et al. 2001)
- flows inside tend to accelerate if not properly designed; turbulence common (Warren and Pardew 1998, Baggett et al. 2001)
- baffles may not be as effective on rounded bottoms (Zwirn 2002)

2.3 Pipe Arch Culvert

Description

Pipe arch culverts are pipes that have been factory deformed from a circular shape, such that the width (span) is larger than the rise. Pipe arch culverts have a continuous circumference and take the shape of a rounded triangle, the lower portion of which may or may not be buried (WCT 2002). Like circular culverts, pipe arch culverts are typically covered in embankment around their entire perimeter. The wider bottom of a pipe arch allows the culvert to better fit the lower portion of the stream cross-section, allocating more water through the culvert without creating a substantial change in hydraulics (Zwirn 2002).

Pros

- low risk of foundation failure (Porior 2003)
- slightly better "stream simulation" potential than circular culverts (Porior 2003)
- doesn't need to be embedded as deeply as circular culverts (Porior 2003)
- flat bottom retains backwater influence and reduces water velocity (Zwirn 2002)
- lower profile advantageous for low-clearance situations or where upstream water stage must be minimized (Zwirn 2002)
- may require less road fill than circular culvert (Comfort 2001)

Cons

- can't be built on rock foundations (Porior 2003)
- more difficult to install than circular culvert (NLDEL 1992)
- may require concrete footings (Gibson et al. 2005)
- more expensive than circular culvert (Gibson et al. 2005)
- eight percent less capacity than equivalent circular culvert (Comfort 2001)
- must be deformed at 30-foot intervals, so long culverts must be assembled on-site, ideally the sections match each other, but in practice, it seldom happens (Porior 2003)
- limited in high traffic loads, relative to circular culvert, due to non-concentric shape (QDPIF 2005, Gibson et al. 2005)

2.4 Open Bottom Culvert

Description

Unlike circular or pipe-arch culverts, open-bottom culverts are discontinuous in profile. Like bridges, open-bottom culverts span the stream channel with supports and allow natural stream features to be retained (Zwirn 2002, Baggett et al. 2001). Like closed culverts, fill must be placed over and around the structure (BCMF 2002). The widths of open-bottom culvert footings increase as load bearing needs increase; the stability of footings is essential to the effectiveness of the structure and is the primary cause of failure (Salmon Nation 1999). Profiles of open-bottom culverts may be square, rectangular, or arched; made of corrugated metal pipe, metal plate, pre-cast concrete, cast-in-place concrete, wood, or clay (WCT 2002).

Pros

- retains natural streambed substrate and channel conditions (Lang et al. 2004, Zwirn 2002)
- minimal impact on fish passage (Zwirn 2002)
- practical for steeper sites or when bedrock is near the surface (Porior 2003, Baggett et al. 2001)

Cons

- high risk of foundation failure if not built on rock or concrete (Salmon Nation 1999, Porior 2003)
- foundations need to be erosion-resistant; sensitive to scour damage (Porior 2003).
- relatively expensive (Salmon Nation 1999, Porior 2003, Gibson et al. 2005).
- requires substantial initial disturbance for culvert footings excavation (Zwirn 2002)

- relatively difficult installation (Salmon Nation 1999)
- requires civil engineering or geotechnical expertise (Salmon Nation 1999)

3.0 Summary of the Analysis for the Existing Sage Creek Haul Road Crossing

The following information can be found in the Mine and Reclamation Plan for Panel E (BLM and USFS 1997), located approximately two miles northeast of Proposed Panel F.

Four crossing designs were considered for the Sage Creek haul road: 1) steel plate arch, 2) bridge, 3) an elliptical culvert, and 4) a circular culvert. An engineering review concluded that the steel plate arch and elliptical culvert were impractical for a structure needing a 50-foot depth of fill to support haul trucks. The bridge option was rejected for similar reasons, in that a large amount of surface disturbance from construction equipment would be necessary to construct footings and a bridge span large enough to support 150-ton haul trucks. In addition, the cost of such a large bridge was estimated at $2.3 million, approximately 100 times more than an equivalent circular culvert.

The final fish passage structure chosen for the Sage Creek haul road crossing was selected from two circular culvert designs proposed by a BLM engineer. The first design proposed a 266-foot long corrugated metal pipe eight feet in diameter. The second design proposed a shorter culvert (200 feet) that included an embankment retaining structure. Both proposed culverts were designed to accommodate a 200-year flood event, and were modified by installing fish passage structures (24-inch high stainless steel weirs) to allow passage of all age classes of fish. In addition, a plunge pool at the outlets of each culvert were designed in order to dissipate the energy of the water flowing through the pipe, thus allowing fish to enter the culverts more easily from the downstream end. Both culverts were designed to function for a minimum of 20-30 years.

The shorter culvert design alternative was eventually rejected in favor of the longer culvert. Although the shorter design alternative involved fewer impacts to the streambed (66 fewer feet of stream channel disturbance) and riparian habitat (0.1 fewer acres of wetland disturbed), additional construction costs were required to build the retaining walls needed to stabilize the channel. It was determined that reducing the culvert length would have only slightly lessened the sediment impacts associated with the second crossing design. This degree of change in sediment impacts was deemed immeasurable between design alternatives in terms of water quality.

4.0 Case Studies

According to surveys in Oregon and California, thousands of existing culverts are total or partial barriers to fish migration (Mirati 1999, SCC 2004). Most are corrugated metal pipes (circular culverts). A 2002 survey of 47 culverts along 210 km of the Trans Labrador Highway (Labrador, Canada) found that 53% posed problems to fish passage (Gibson et al. 2005). All but two of the culverts surveyed were corrugated metal pipes.

Older, circular culverts are largely ineffective for fish passage (Furniss et al. 1991) because culverts were traditionally designed for passing water only (Porior 2003). Fish biologists frequently recommend open-bottom culverts or bridges for stream crossings because fish passage through open structures is generally guaranteed (e.g., Bates 2003, Porior 2003, ODFW 2005). Relative to closed culverts, however, bridges and open-bottom structures are relatively expensive (ODFW 2005, Baggett et al. 2001) and involve complex installations (Salmon Nation 1999, Labrador Métis Nation 2002). Baggett et al. (2001) report that the Georgia Department of Transportation experienced many difficulties with the installation of the footings for an open bottom arch culvert. Browning's (1990) survey of culverts in Oregon reported that open-bottom culverts, more often than not, had serious undermining which threatened the stability of the fill around the structure (Browning 1990 *as cited in* Salmon Nation 1999). Bridges have a relatively low risk of failure, but in terms of materials and construction costs, bridges are typically the most expensive crossing structure type (Baggett et al. 2001).

The most frequent causes of impasse at circular culverts are a drop (perch) at the culvert inlet or outlet and excessive water velocity inside the culvert. The dynamic nature of stream channels (as well as erosion from culvert installation) has caused perched inlets or outlets to develop around closed culverts that prevent fish from entering (Lang et al. 2004). In addition, narrow inlets and smooth bottoms of many closed culverts causes an increase in water velocities. Several studies document these problems in terms of culvert design.

Lang et al. (2004) studied leaping performance of anadromous salmonids in four "perched" culverts, and found that although leaping ability was site-specific, it was generally proportional to drop height. Adult fish successfully entered culverts that were 2-3 feet high less than 15% of the time, and less than 1% of attempts were successful at a culvert 5 feet high. A widely-cited laboratory study by Stuart (1962) concluded that a pool depth of at least 1.25 times the leap height is needed to reach swim speeds fast enough to make a successful leap.

Warren and Pardew (1998) found fish passage through closed culvert types in Arkansas was an order of magnitude lower than through open bottom structures and natural reaches, and that the difference could be attributed to faster water velocities in closed culverts. Velocities in closed culverts ranged from 1-4 feet per second, whereas velocities in open structures and natural reaches were consistently below one foot per second. Belford and Gould (1996) tested six relatively long circular culverts (>140 feet) in Montana for trout passage effectiveness and concluded that velocity must be inversely proportional to culvert length for fish to successfully pass through. Anadromous salmonids can only sustain heightened swimming speeds, needed to pass some culverts, for limited periods (Furniss et al. 1991). Belford and Gould (1996) found cutthroat trout could pass through a 295-foot circular culvert as long as mean water velocity inside was less than 2.0 feet/second. The longest two culverts surveyed along the Trans Labrador Highway (132.5 and 133 feet) were both observed to successfully pass young trout (Gibson et al. 2005).

Consideration of fish passage during the planning and design of stream crossings can greatly reduce or eliminate the barrier affect that crossing structures can have (Furniss et al. 1991). Published design requirements for closed culverts that accommodate fish passage are now widespread (e.g., NMFS 2001, Porior 2003, ODFW 2005). Culvert design criteria documents prescribe ways to avoid the problems most commonly associated with improperly designed closed culverts. Most list minimum speeds for water velocities that decrease with culvert length (NMFS 2001, CDFG 2002, Bates 2003, Porior 2003, Scottish Executive Consultants 2005, ODFW 2005). The design of longer culverts (>200 feet), therefore, depends largely on controlling water velocity (Scottish Executive 2005), although adding illumination may also be necessary (ODFW 2005).

QDPIF (2005) concedes that fish may be affected by light conditions in culverts but that more research is needed; Scottish Executive (2005) claims light inside culverts is not an issue. Water volume, velocity, and depth are generally considered the most important elements of culvert design. To reduce water velocities, baffles and weirs are frequently installed to provide pools and resting areas for fish, particularly if the culvert is on a slope (Porior 2003). The practice of embedding culverts, a measure to prevent the development of hydraulic drops, increase water depth, and improve "stream simulation," is also a prescribed standard (BCMF 2002, Porior 2003).

Barnard (2003) found that stream simulation culverts, whether round, pipe arch, or bottomless, are reliable and create similar passage conditions compared to the adjoining channel. All culverts in his study with a width ratio of >1.3 (culvert bed width to channel width) and slope ratio of <1.3 (slope of culvert to channel slope) were not significantly different than natural reaches, regardless of culvert type, demonstrating the importance of site choice and design over culvert type per se. In some cases, conditions inside open and closed culverts may differ, but the differences do not necessarily affect fish passage. Another study by Wellman et al. (2000) compared bridges and (box) culverts in 41 Tennessee streams, and found that although sediment conditions differed between streams with culverts and streams with bridges, no differences in fish diversity, abundance, or richness were evident.

In 2004, NewFields (2005) conducted electrofish surveys in Sage Creek, above and below the circular culvert built in 1998, and recorded the presence of cutthroat trout both below and above the crossing. However, since resident cutthroat populations can exist upstream of barriers, these data alone do not answer the question, "does the crossing allow for passage of spawning cutthroat trout?" Thus, to better understand and document the effectiveness of this culvert, additional monitoring data will be collected during early 2005. These data will be included in this technical memo when available. This 266-foot culvert contains weirs to slow water velocity inside the channel, a surge basin at the outlet for fish to rest, and has been designed to accommodate a 200-year flood event (BLM and USFS 1997).

5.0 Summary

In terms of stream crossings associated with this Project, it has been determined that bridges are not feasible due to cost and extensive disturbance in the uplands during construction and removal. Pipe arch and open bottom culverts were determined to be impractical given the amount of fill and weight of haul trucks that the structure would need to support. It has been decided that circular culverts designed to simulate natural stream bottom and to allow for the passage of spawning cutthroat trout would be used at all fish-bearing stream crossings.

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Appendix 2B

EnvironmentalCommitments and BMPs for Haul/Access Roads

Haul and Access Roads

Environmental Commitments
and
Best Management Practices
to
Ensure that Water Quality and Fish Passage are Maintained

Along with standard engineering practices, additional design, construction, and maintenance commitments would be made to protect stream, soil, and aquatic resources. These commitments take the form of environmental protection measures and/or Best Management Practices (BMPs) that would be implemented where appropriate. They are based upon sound, tested techniques from established sources, including, but not limited to, U.S. Forest Service Road-Water Interaction publications (Furniss, 1997; Copstead, 1998; Flanagan, 1998; Johansen, 1997; Moll, 1999); the recent draft *Selenium Management Practices* publication (Agrium et al, 2004); Idaho Department of Lands (1992); Idaho Forest Practices Commission (2004); and the Caribou National Forest Plan (USFS 2003). While these measures will be taken into account during the final road design process, the permitting agencies will have the authority to approve or disapprove any specific aspect of the design.

DESIGN BMPS

Drainage Crossings

- Proper engineering design would ensure that the existing channel configurations immediately up- and downstream of culverts are maintained to the maximum extent possible. This would include maintaining cross sectional dimensions, width-depth ratio, stream gradient (longitudinal profile), velocity, floodplain accessibility and flow patterns. Removing existing riparian vegetation would be restricted to the minimum necessary for equipment maneuvering and the actual necessary permanent disturbed footprint. Where possible, stream bank and floodplain areas needed for working outside the permanent fill/dredge footprint would have approved mots or woven geotextile covered by a temporary fill pad (1-2' thick) to form a working surface.

- Channel crossing culverts would be designed to pass the peak flow associated with the 100-year flow event plus sediment and debris, without headwater above the top of the culvert. A minimum of 10% of the culvert diameter will be buried below the channel bed and the buried portion not counted for the purpose of estimating culvert capacity. Calculation of the 100 year flows will use the higher prediction of the regression methodologies specified in Quillian an Hadenberg (1982) and by Blakemore et al (1994). Culvert gradient shall mimic stream gradient. In general a distance of at least two full meaner lengths (but not less than 50') both upstream and downstream should be used.

- Culverted crossings of streams in which fish have been found and where perennial streams may occur would be designed to pass appropriate or expected species and life-stages during appropriate times of the years during both high and low flow conditions. The final designs would be submitted to BLM, IDEQ, Idaho Department of Water Resources and USFS fisheries biologists for approval. On Forestland, the guidance at the time of initial construction for aquatic organism passage would be followed. Flow depth, flow velocity, and grade would are some of the items the final design would take into consideration. Water velocity on fish-bearing streams would not exceed 2 feet-per-second, or mean stream velocity, whichever is greater.

- In the interest of passing sediment and debris, and facilitating maintenance, minimum culvert diameter would be 18 inches. Where a road footprint requires a long drainage crossing culvert (>40 ft), the specified culvert diameter would also take into account the need for a safe and efficient means to access and clean accumulated debris and sediments.

- In non-fishbearing crossings, culvert inverts would be placed several inches under the bed surface, along grade, whenever possible. This would allow a natural substrate to bed the culvert to provide aquatic benefits as well as reduce the potential for up- and downstream channel changes. Provide riprap or other grade control methods to prevent head and down-cutting

- Road fills at culvert inlets would be protected through the use of riprap up to the flow depths associated with the 100-year peak flow.

- Energy dissipating rock aprons would be used at culvert outlets to return flows to an acceptable velocity and depth as they exit the culvert. The distance downstream that the aprons would extend would be based upon site conditions.

- Unless specific conditions are prohibitive, culverted crossings would be placed perpendicular to the roadway, in other words with the road approaching the natural channel alignment at a 90 degree angle. However, where the road alignment cannot accommodate this, the channel would not be realigned, and thus the angle would not be perpendicular.

- The width of the road fill at the crossing would be limited to the minimum necessary for the crossing. For example, pull out lanes, wide shoulders, etc. would not occur in these areas unless required for safety.

- All requirements and conditions of the relevant Army Corps of Engineers Permit for Road Crossings will be followed at crossings for which the permit applies. However, more stringent requirements and conditions than Approved by the Army Corps of Engineers, may be required by the BLM USFS, and/or Idaho Department of Water Resources.

- Culverts would be installed and maintained to avoid inlet scouring and to prevent erosion of downstream banks. This includes such items as use of rock aprons, protected fills, installation along grade but slightly below bed elevation and other items discussed in this section. Culverts will not be designed based on inlet control hydraulics.

- The bottom of the designed vertical curve should never be located above the culvert for the drainage crossing, so that water from the low spot in the road on the bridge does not drain directly above the culvert.

- Where beavers are present, if possible, the low spot of the crossing will be situated so that it is over the floodplain and not over the culvert and fill. Appropriately sized rock will cover the downstream slope of the crossing fill to minimize erosion of the fill should the culvert become plugged or overtopped.

- Drainage ditch lengths along roads that drain to stream crossings will be minimized by adding cross-drains or daylight culverts placed on the crossing approaches. The minimum sized culverts shall be 18 inches in diameter.

- For fish-bearing reached, culvert geometry will be appropriately chosen so as to maintain a suitable depth of flow in the culvert, i.e. "squash" shaped culverts will not be used where they result in very shallow flow depths in the culverts.

Road Drainage Network

- Ditch relief cutouts would be installed as needed at spacings adequate to manage runoff, and armored/lined for stability as needed. The cutouts will be located so that any drainage from them will be directed toward sediments ponds constructed for this purpose. The cutouts will be designed to minimize erosion or scouring of fill slopes. Down-drains may also be used. Settling ponds will be located and designed to manage runoff from all sources routed to the ponds.

- Rerouting or transferring up-gradient runoff water via roadside ditches to adjacent basins, even on a small sub-basin scale, which would result in a cross-basin diversions that could alter natural flow and sediment regimes, would be avoided.

- Runoff from road surfaces would be discharged in a manner so as to avoid directly converging with stream channels wherever possible, minimizing or eliminating hydrologic connectivity between the road drainage network and the stream channels. This would be done by: (1) properly locating ditch lines and ditch relief cutouts; (2) by grading slopes away from channel networks; and/or (3) by allowing sufficient distance for flows leaving ditch relief cutouts to re-infiltrate and deposit sediments away from stream channels and their floodplains. Where it is not possible to prevent a ditch or cross drain from draining more or less directly to a channel, the ditch would be armored until reaching the next upstream ditch relief.

- Where possible, cross drains and ditch turn outs would be located on gently sloping, stable terrain such as where rock or stable vegetation is found. Discharge areas would be located to release water on convex slopes where possible, so that water would be dispersed rather than channeled; concave slopes would be avoided wherever possible.

- As needed, ditch relief cutout outflow areas would be armored with riprap, turf reinforcement mat, gabions, or similar types of materials and configured to reduce velocity by providing dispersal and velocity reduction. This armoring would occur wherever needed due to grade and/or substrate characteristics.

- As needed, sediment traps would be used to treat road runoff where there is not sufficient buffering distance or dispersal between the outflow and a stream channel.

- With consideration given to safety concerns as well as drainage considerations, road surfaces will be designed as crowned, insloped, or outsloped as most appropriate for a given road segment.

- Sediments mucked out of drainage ditches and ponds would be placed pit-backfills used for seleniferous waste.

Channel Realignment or Roadfill/channel interactions

- Any in-channel work, whether related to stream bank realignment, crossing, or other purpose would result in reestablishment of original channel gradient, bank width, bank slope, re-compaction of disturbed banks, and width-depth ratio.

- Where channel realignment cannot be avoided, the natural channel's pattern and geometry would be mimicked where possible, including radius of curvature of meanders, stream gradient and width-depth ratio, bank slope and compaction, substrate diameter, habitat features. Runs and glides will be proportioned to the same ration to bank-full depth and slopes as in an identified reference reach.

- Realigned or reconstructed streams would be designed to carry bank full flows in-channel, with flood flows dispersed on floodplains.

- At the upstream and downstream ends of realigned reaches, appropriate transitions to the undisturbed channel reaches would be designed.

- Where appropriate, rather than using riprap, new channel banks would be treated with appropriate material to encourage and enhance both herbaceous and woody vegetation growth. This would occur where banks have non-rocky substrate that would allow such treatments to be effective and develop natural functioning banks.

- Any in-stream structures to be proposed shall be reviewed by the Forest Hydrologist.

Fill Slopes and Cut Slopes

- Where necessary, cut or fill slopes will be benched when feasible from an engineering standpoint in order to reduce runoff velocities, prevent erosion, maximize infiltration and facilitate revegetation.

- Where a fill slope toes out within 50 feet of a perennial stream, silt fences or similar sediment collection treatments, such as sediment traps, straw bales, coir wattles would be used during construction and until sufficient vegetation exists to prevent erosion. Such devices would similarly be used where fill slopes come within 300 feet of a perennial stream when the toe of the slope is within 50 feet of a drainage directed toward that stream.

- Where original ground is steeper than a 2h:1v (50%), roads should be constructed by completely cutting into the hillside (100% cut), without using any fill.

- In areas where the original ground slope is greater than 2.5h:1v, (40%) a catch bench or toe bench will be cut to prevent fill material from running or rolling excessively down slope.

CONSTRUCTION BMPS

- Road construction materials and methods that would minimize the probability for selenium leaching would be used where appropriate as recommended in the *Selenium Management Practices* draft publication (Agrium, et al, 2004).

- Under no circumstances would center waste shale, or other highly seleniferous material be used for road construction fill material. Rex chert may be used for road construction if it can be demonstrated to the satisfaction of BLM and Forest Service that it will not release unacceptable amounts of selenium, i.e.: only “clean” chert or other material will be used. Seleniferous material which is cut from slopes to build roads will be placed in mine dumps with other seleniferous waste.

- Minimize the time of exposure of bare soils when feasible, before reseeding or other reclamations techniques are implemented.

- Erosion control measures will be in place prior to initiation of construction.

- When feasible, construction near or in drainages would be restricted to normal low flow seasons (late July through October) and would be temporarily halted during runoff events.

- Length of construction time in/near the stream channel would be minimized by segregating that work task to occur as rapidly as possible in a sequential manner; area of disturbance would also be minimized, by restricting equipment to a narrow construction corridor while maintaining a safe running surface.

- As construction near a stream channel is completed, loose material that remains within the flow path of flood events would be removed and placed away from flow paths and floodplains

- Riparian vegetation would remain undisturbed wherever possible, and its disturbance would be limited to that necessary in the actual footprint as well as the minimum necessary for equipment work in the established construction corridor. This would also apply to large woody debris.

- Topsoil will be salvaged and stockpiled for later use in reclamation.

- If blasting is required, control methods will be utilized to minimize material that is deposited outside the disturbance boundaries.

- All the terms and requirements of Simplot's National Pollutant Discharge Elimination System (NPDES) Permit for Storm Water Discharges from Construction Activities would be followed. These are not reproduced here, but are incorporated by reference.

- Contractors responsible for constructing the road would be responsible for maintaining spill kits on site and would train their personnel on how to respond to an emergency spill.

- Fuel, oils, or other hazardous materials would not be stored or stockpiled within 200 feet of perennial streams.

- Live water shall be piped, pumped or otherwise routed around channel work. No excavation activities shall occur in live water.

RECLAMATION BMPS

Road Corridor and Cut/Fill Slopes

- Once reclamation treatments have occurred, they would be monitored and maintained until they are deemed successful.

- Larger stumps and slash that are by necessity removed during road clearing would be used as temporary sediment filter windrow barriers at the base of road fill slopes or below ditch relief culverts or other locations to provide sediment trapping and runoff velocity control. Stumps and slash would not be used as fill material in fill slopes. Stumps and slash will not be placed in stream channels.

- Cut-slope reclamation would be performed to the safe physical limitations of equipment for spreading topsoil, which is approximately 3h:1v. Figures illustrating where this will be necessary will be provided for analysis and review.

- Fill would be pulled back to the level of the original ground on slopes steeper that 3h:1v down to the point at which the fill width is 20 feet. Once that 20 foot width is reached, an additional pass with a backhoe another 20 feet down to pull fill back to original ground level. Figures illustrating where this will be necessary will be provided for analysis and review.

OPERATIONAL BMPS

Winter Deicing BMPs

- Sand with added salt or salt substitutes would be used when necessary to provide safe winter driving conditions.

- Winter maintenance shall avoid discharge of snow or road material into stream channels.

Miscellaneous

- Mine personnel would be trained to properly respond to and report spills of fuel, waste rock, ore, or other materials that threaten surface water.

- Inspection, maintenance and/or repairs to drainage crossings, slopes, road drainage network, etc. would occur in a timely manner to prevent continuing or extensive erosion/sedimentation problems.

- Inspection reports/logs will be available to regulatory agencies, including IDEQ. Inspections will occur on a daily basis (at a minimum) during runoff events.

Maintenance

- Conduct regular preventative maintenance inspections to ensure proper functioning of all drainage structures, culverts, etc. Inspections should occur AT LEAST every spring following snowmelt, following major summertime precipitation events and prior to winter snowfall. Maintenance and/or repairs to drainage crossings, slopes, road drainage network, etc. would occur in a timely manner to prevent continuing or extensive erosion/sedimentation problems.

- Hauling and other vehicular traffic should be minimized during wet road conditions to reduce impacts to road surfaces/subgrade and drainage structures.

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Appendix 2C
BMPs for Erosion, Sedimentation, and Selenium Control

Best Management Practices for Erosion, Sedimentation and Selenium Control at the Smoky Canyon Mine Panels F and G

Various design and management practices have been recognized by regulatory agencies and the mining industry to be effective in controlling environmental impacts from mining operations. Some of these practices have wide applicability throughout the industry and have a significant history of proven effectiveness when properly implemented. These widely accepted and proven management practices are herein referred to as “Best Management Practices” (BMPs). BMPs that are potentially applicable to this project are found in published lists by government agencies including: *Best Management Practices for Mining in Idaho* (IDL 1992), *Catalog of Stormwater BMPs for Idaho Cities and Counties* (IDEQ 2005), *Forest Stewardship Guidelines for Water Quality* (IFPC 2005), and *BMP Fact Sheets from EPA* (EPA 2005). These BMPs are widely used and accepted for control of erosion and sedimentation.

The requirements for BMP implementation often defer to other industry resources with broad experience. Use of existing BMPs for control of selenium mobilization and migration from phosphate mines was reviewed by the Idaho Mining Association (IMA) and described in two publications: *Existing Best Management Practices at Operating Mines* (IMA 2000a), and *Best Management Practice Guidance Manual for Active and Future Mines* (IMA 2000b). These two IMA manuals also described adaptations of accepted BMPs for control of selenium and proposed some new management practices for selenium control that had not been previously published. The BMPs described in the IMA manuals are a mixture of proven management practices, such as those published by the IDL, and other management practices that may be widely practiced but their effectiveness has not yet been fully proven to the regulatory agencies. Because of the wide application and familiarity of the management practices described by IMA, these are still referred to herein as BMPs.

In March 2004, a cooperative document entitled *Selenium Management Practices (Draft)* was prepared by: Agrium Conda Phosphate Operations, Astaris LLC, Bureau of Land Management, Idaho Department of Lands, J.R. Simplot Company, Monsanto Company, and U.S. Forest Service (Agrium et al 2004). This document describes are variety of management practices that can reduce impacts from selenium and other contaminants of potential concern (COPCs) and which have been used already on phosphate mining properties in Southeastern Idaho.

The Smoky Canyon Mine has proposed site-specific BMPs for its operations at Panel B and C that have been previous reviewed and approved by the federal agencies (BLM 2002). Many of these same BMPs are also applicable to the proposed Panels F and G.

Mining activities associated with the Smoky Canyon Mine Panels F and G must also follow the direction of the Revised Forest Plan (RFP) for the Caribou National Forest (USFS 2003). Applicable standards and guidelines for the Project fall under the categories of General Mining (RFP page 3-12) and Drastically Disturbed Lands (RFP pages 3-13 to 3-14). With regard to selenium, standards associated with General Mining in the Revised Forest Plan dictate that, "*BMPs shall continue to be developed, refined, and implemented to ensure that no release of hazardous substances into the environment exceeding established state and/or federal standards occurs*".

Due to the variability among physical mining environments, any one BMP cannot be universally implemented. Good engineering practices dictate that BMPs are selected and implemented "as applicable," with respect to site conditions. General descriptions of the BMPs in this document have been published either by the EPA, IDL, IMA, or USFS and are considered herein to likely be effective at the Smoky Canyon Mine Panels F and G.

Following is a list of BMPs and associated "effectiveness determinations" for the control of erosion, sedimentation, and selenium mobilization that would be implemented for mining activities at the Simplot Smoky Canyon Mine Panels F and G. A separate and complimentary set of BMPs would be followed for the haul/access roads related to Panels F and G.

Two types of effectiveness evaluations would be performed for BMPs. The first type consists of on-going evaluations of the BMPs to ensure that they are functioning as designed. The second type consists of an annual review of overall BMP effectiveness. Data used to evaluate the effectiveness of BMPs and any new management practices is collected through a number of existing Smoky Canyon Mine monitoring plans, which would be modified to include Panels F and G, as well as information provided by routine visual inspections. Responsibilities for BMP effectiveness evaluations have been assigned to specific department staffs at the mine including: Engineering, Production, and Environmental. Annual reviews of BMP effectiveness would also be conducted by the mine Storm Water Pollution Prevention (SWPPP) Plan team in accordance with the mine Storm Water Pollution Prevention Plan.

Overburden Fill Grading

Final grading should be completed as soon as possible following overburden disposal. During reclamation, the fill slopes should graded at a maximum 3h:1v (horizontal: vertical) slope to reduce surface water run-off velocity.

Effectiveness Determination: Production and Environmental staff shall inspect overburden fill areas for evidence of ponding. Ponding should not be evident 24-hours after the conclusion of a storm event. If ponding is observed, Production and Engineering staff will review surveyed profiles to mitigate the area of concern. Corrective action will be reported in the annual environmental report.

Haul Road Run-Off Controls

Grading and other controls on haul roads controls run-off and minimizes erosion and sedimentation. Haul roads should be graded away from fill slopes, or crowned, so that concentrated flow is not allowed to run along or across and erode the roads. Berms shall be maintained to prevent run-off. Other controls such as appropriately located rolling dips, water bars, and water deflectors could be used to reduce erosion of the road surface or road base.

Effectiveness Determination: Production and Environmental staff shall inspect roads for presence of collection and diversion ditches, dips, and water bars as needed. There should be minimal evidence of concentrated flow erosion of road surfaces or fills.

Construction of Fills for Roads and Facilities

Fills, road or parking areas should be constructed of chert or other non-seleniferous material and designed with stable slopes. Slopes with topsoil should have temporary vegetation.

Effectiveness Determination: Production staff shall document on shift reports inspections of fills for road and other facilities for construction material type and evidence of erosion. Slopes should be constructed of durable rock. This BMP only applies to roads and fills outside of disturbed pit limits.

Snow Removal

Man-made accumulations of additional snow on active external overburden areas should be avoided, to the extent practicable, by disposing of snow that is picked up for any purpose in designated areas where the snow and snow melt will not be incorporated into an active external overburden disposal facility. Snow disposal areas should be located where snow-melt would flow to sediment control ponds or open pits to prevent sediment being released outside run-off control areas.

Effectiveness Determination: Production and Environmental staff shall inspect for evidence that snow storage and disposal areas are uphill of control ponds or open pits. There should be minimal spring runoff from snowmelt within the mine disturbance area that is not routed through sediment control ponds or silt traps.

Concurrent Reclamation

Reclamation of disturbed areas that are no longer needed for active mining operations should be conducted concurrent with other mining operations.

Effectiveness Determination: Engineering staff shall review annual reports to determine if areas no longer needed for mining are being reclaimed. Production staff shall ensure that reclamation of such areas commence when they are no longer needed for active mining operations.

Soil Salvage and Reuse

Salvaging topsoil and vegetation growth medium from disturbed areas prior to mining is important for the long-term reclamation success of these areas. Topsoil should be removed and either is direct hauled to regraded surfaces ready to receive topsoil or is placed in topsoil stockpiles for temporary storage.

Effectiveness Determination: Production staff shall inspect areas being stripped of vegetation and topsoil to determine if all suitable topsoil is being removed to the extent reasonable. Engineering staff shall conduct an annual inspection of all topsoil storage piles to ensure that soil salvage quantity meets baseline objectives. There should be minimal erosion of topsoil storage piles. Production staff shall ensure that temporary crops of vegetation are established on stockpiles to reduce soil loss.

Reuse of topsoil should follow the selenium guidelines published by the USFS. A layer of approximately one to three feet of topsoil should be placed over external and/or backfill overburden disposal areas at the time of final reclamation. Environmental staff shall inspect areas shortly after they are topsoiled to ensure coverage with topsoil thickness of at least 12 inches.

Soil Stabilization

Stable reclaimed areas are promoted through the use of stabilization techniques such as: placement of soil on slopes that are 3h:1v or less; scarifying soil surfaces to reduce run-off; seedbed preparation to enhance the germination rate of seeds; incorporation of fertilizer and other methods to enhance successful growth of vegetation and/or direct run-on/run-off.

Effectiveness Determination: Production and Engineering staff shall review regrading surveys to determine that all final slopes are 3h:1v or less. The Production, Engineering, and Environmental staff shall conduct a late spring or early summer inspection of all reclaimed areas to ensure they are topsoiled and reseeded and that a significant portion of each is protected with applicable soil stabilization methods and is not susceptible to excessive erosion. There should be minimal evidence of erosion and off-site transport of sediment from reclaimed areas.

Capping Seleniferous Overburden

Seleniferous overburden can contribute selenium in runoff and contribute to bioaccumulation in vegetation. Reclamation techniques seek to cover seleniferous overburden with a minimum of four feet of low-seleniferous chert on Panels F and G. Topsoil would then be spread on top of the chert layer to complete the cap.

Effectiveness Determination: Production staff shall inspect capped areas after they are constructed to ensure 100% of seleniferous shale overburden is covered with chert cap. Engineering will obtain and review survey information indicating chert cap is at least 4-feet thick over each capped area on Panels F and G, check areas of topsoil cover to ensure 100% of all capped areas are covered with topsoil, and check topsoil cover to ensure 95% of each area is covered with at least 12-inches of topsoil.

Pit Backfilling

Pit backfilling and subsequent revegetation helps restore these areas to stable and productive post-mining uses. Pit backfilling in the F and G Panels would allow these areas to be revegetated and support the post-mining land use.

Effectiveness Determination: Engineering staff shall review annual reports to ensure compliance with approved backfilling plans.

Riprap and Gabions

Chert riprap can be placed in areas subject to erosion, such as below culverts, drainage outlets and ditches thereby reducing erosion and sedimentation. Gabion walls made of chert could also be selectively used to protect road fills from erosion by flowing water.

Effectiveness Determination: The SWPPP team will annually inspect all culvert and drainage outlets to ensure they are protected as needed with riprap or comparable erosion control methods. Gabion walls will be inspected at least once during construction by engineering staff to ensure they are built with non-seleniferous, durable rock.

Run-on Collection/Runoff Control (Control of Surface Water)

Drainage and diversion channels are constructed as necessary to divert run-on water around disturbance areas and collect runoff from disturbed area to route it to settling ponds and other sediment control features. Ditches are excavated with a berm placed on the downhill side of the ditch and should pass the 100-year, 24-hour storm event without damage or erosion.

Effectiveness Determination: After their construction, engineering staff shall inspect the run-on diversion ditches for compliance with design dimensions, grade, and erosion protection. The SWPPP team will inspect other run-on and runoff collection and diversion ditches annually to ensure they are functioning properly and are stable from excessive erosion.

Sediment Controls

Construction of sediment traps, silt fences, catch basins and sediment settling ponds reduce the velocity of flowing water and allow sediment in water to settle out in a controlled manner. To the extent possible, these features are located off areas of seleniferous overburden. Sediment ponds are designed to contain the runoff and sediment from the 100-year, 24-hour storm event. Maintenance of the ponds would be done to provide the design capacity for sediment and water at all times. Management of these controls includes periodic repairs and cleaning to remove sediment and restore capacity or functionality.

Effectiveness Determination: Environmental staff shall inspect all ponds as conditions allow on a monthly basis. The SWPPP team shall annually inspect the entire perimeter of active and reclaimed mining areas to ensure that runoff from disturbed areas is directed to sediment ponds or silt traps. These inspections are documented in the SWPPP records. An annual storm water evaluation report will be prepared by Simplot Corporate personnel.

Seeding and Revegetation (Reclamation and Revegetation)

Revegetation of disturbed slopes reduces run-off quantity and velocity that would otherwise contribute to runoff volumes. As soon as practicable, disturbed areas would be graded, topsoiled and reseeded with techniques and seed mix that are acceptable to the USFS. Infiltration is also reduced as plants consume water, which leads to transpiration.

Effectiveness Determination: Engineering staff shall obtain the proper seed mix according to USFS recommendations. Production staff will inspect reclaimed areas to ensure appropriate seeding coverage and that seed drilling techniques were used.

Range Management

Livestock grazing in reclaimed areas should be controlled until the reclaimed areas have become stabilized and are deemed ready for grazing by Simplot and the USFS. The USFS is responsible for ensuring appropriate alignment of grazing allotments.

Effectiveness Determination: Environmental staff shall conduct routine inspections of reclaimed areas. The presence of livestock will be documented by mine personnel and reported in the annual environmental monitoring report to the USFS and BLM.

Avoid Perennial Drainage Channels

Avoiding placement of mine overburden in perennial drainage channels helps reduce infiltration of stream flow into the overburden. Permanent placement of seleniferous overburden material in perennial channels should be avoided, but crossing drainages with temporary road fills is required to access the mining areas. These crossings would be built from chert and designed so they can be reshaped during reclamation to resemble the surrounding area.

Effectiveness Determination: Engineering staff shall review the annual operations report information to ensure that placement of seleniferous mine overburden in perennial channels is avoided.

Avoid Ephemeral Drainage Channels

Avoidance of ephemeral and intermittent drainage channels in the location of seleniferous overburden disposal sites reduces the effects of infiltration on the overburden. Mine panels and their external overburden disposal sites that are located on drainage divides can avoid most ephemeral drainage channels. Ephemeral channels that cross the proposed mine disturbance would be collected and diverted in ditches around the active mining area. Permanent placement of seleniferous overburden material in ephemeral drainages should also be avoided to the extent practicable. Road crossings should be built from non-seleniferous material and designed so they can be reshaped to resemble the surrounding area.

Effectiveness Determination: Engineering staff shall review the annual operations report information to ensure that placement of seleniferous overburden in ephemeral drainages is avoided to the extent practicable. When road fills are constructed over ephemeral drainages, Production staff shall ensure they are built with non-seleniferous material.

Characterization and Selective Handling of Seleniferous Overburden

Geochemical assays, extraction tests, and column leach tests on Phosphoria Formation rocks at the Smoky Canyon Mine have demonstrated that the Meade Peak member shales have interbedded intervals of high to low selenium content. For the purpose of proper application of these BMPs, the mine considers all shale overburden from the stratigraphic interval extending from the Hanging Wall Mudstone to the Fish scale Shale to be seleniferous overburden. Rex Chert (including limestone) has been demonstrated by testing to be essentially non-seleniferous. Seleniferous overburden should be placed in approved pit backfills and external dumps and then capped with non-seleniferous materials.

Effectiveness Determination: Production staff shall track the origin and placement of overburden materials. Environmental staff shall verify with periodic testing or visual inspections during mining that overburden materials have been properly handled. Determinations will be verified by reviewing assay data.

Modification or Elimination of Low Permeability Foundation Material

Low permeability layers of soil or shale in foundations of external overburden disposal area slopes should be modified or removed to avoid the perching of water to prevent seeps at the face of external overburden disposal sites. Low permeability horizons in topsoil and subsoil under specific areas of overburden fills should be removed during topsoil stripping.

Effectiveness Determination: Engineering staff shall inspect foundation areas of external overburden fill slopes to ensure low permeability soil is removed to the extent practicable. Environmental staff will annually inspect the entire perimeter of all down gradient toes of external overburden fills in early summer looking for evidence of overburden seeps or springs.

Control of Groundwater Impacts

Where groundwater quality impacts are predicted from infiltration of seepage from seleniferous overburden fills, control of these impacts has been investigated. Groundwater monitoring should be done according to agency-approved monitoring plans.

Effectiveness Determination: Environmental and Engineering staff shall oversee installation of groundwater monitoring devices in compliance with approved monitoring plans. Environmental staff shall oversee collection of monitoring data from the groundwater monitoring system in accordance with approved monitoring plans and review groundwater monitoring data for compliance with applicable standards. Monitoring data will be submitted to regulatory agencies according to approved monitoring plans.

Permanent Drainage Channels over Overburden

Where drainage channels must be permanently routed over overburden fills there is a concern for potential future erosion of the channel into underlying overburden and that seepage from the channels will enter the underlying overburden and potentially leach contaminants of potential concern from the overburden. Such channels should be designed to be stable without damage for the peak flow from the 100-year, 24-hour storm on top of snowmelt. To prevent seepage into underlying seleniferous overburden, the a clay liner should be installed under the channel or the overburden directly underlying the channel bottom and for a distance of 50 feet on either side of the channel should consist of chert or other non-seleniferous overburden. The channel surface should be protected from erosion with chert riprap.

Effectiveness Determination: Production staff will monitor pit backfills and external overburden fills during construction to verify that the proper material is placed under the alignment of any proposed permanent channels over these areas. Environmental staff will verify with photographs that a clay liner or chert is placed under the channels and that the channels are protected from erosion with riprap and vegetation.

Sediment Controls around Overburden Disposal Sites

Water-retaining features designed to control runoff and sedimentation at mine sites, including sediment ponds and silt traps should be located off seleniferous overburden fills.

Effectiveness Determination: Environmental staff shall inspect all ponds as conditions allow on a monthly basis. The SWPPP team shall annually inspect the entire perimeter of active and reclaimed mining areas to ensure that runoff from disturbed areas is directed to sediment ponds or silt traps. These inspections are documented in the SWPPP records. An annual storm water evaluation report will be prepared by Simplot Corporate personnel.

References:

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Appendix 3A
Water Resources

Historic Stream Flow Measurement Summary
and
2003 and 2004 Stream Flow Measurement Data

Historic Stream Flow Measurement Summary – South Fork Sage Creek

LOCATION	DATA REFERENCE	PERIOD OF RECORD	SPRING SEASON RANGE (cfs) (# of values)	FALL SEASON RANGE (cfs) (# of values)
Upper South Fork Sage Creek	TRC Mariah (2001)	1992-2000	0.0-16.6 (8)	0-0.52 (6)
	Montgomery Watson (1999, 2000)	1998, spring 2000	4.6-5.0 (2)	0.16 (1)
	Maxim (2001)	2000	0.53 (1)	0.0 (1)
Lower South Fork Sage Creek	TRC Mariah (2001)	1992-2000	4.8-37.6 (7)	4.4-14.5 (8)
	Montgomery Watson (1999, 2000)	1998, spring 2000	19.3 (1)	7.0 (1)
	Maxim (2001)	2000	6.97 (1)	6.33 (1)

2003 and 2004 Streamflow Measurement Data (cfs) – Mainstem Deer Creek

STATION ID	MAY-JUNE 2002	AUG-SEPT 2002	MAY 2003	JULY 2003	AUG 2003	OCT 2003	FEB 2004	MAY 2004	JUNE 2004	AUG 2004
SW-DC-200	----	----	1.16	----	0.03	Flowing	----	0.39	0.14	0.04
SW-DC-300	1.49	Dry	7.23	----	Dry	Dry	----	2.33	-----	Dry
SW-DC-400	5.94	Dry	7.22	----	Dry	Dry	----	2.68	-----	Dry
SW-DC-500	6.28	----	9.26	----	0.35	0.15	----	3.79	-----	0.49
SW-DC-800	----	----	9.67	2.76	1.68	1.52	1.25	5.4	6.76	1.89

Summary of Surface Water Data

TABLE A-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
CROW CREEK														
SW-CC-50	7/29/2003	0.82	20.2	8.44	--	437	356	153	12.25	3.4	--	252	7	--
SW-CC-50	5/19/2004	1.57	13.54	6.88	8.39	457	e% 432	144	9.79	U 185	H 1.42	283	e <5	--
SW-CC-50	8/24/2004	0.91	13.7	8.38	8.36	449	451	158	5.1	2.99	H 1.55	H 241	H <5	--
SW-CC-100	8/15/2003	1.84	15.8	8.36	8.39	324	416	-39	6.91	1	0.424	226	5	--
SW-CC-100	10/29/2003	10.8	6	8.3	8.3	264	436	63	10.3	--	0.881	222	6	--
SW-CC-100	5/19/2004	10.025	14.78	6.99	8.44	424	e% 408	153	10.49	U 168	H 1.22	268	e <5	--
SW-CC-100	8/24/2004	2.1	11.6	8.31	8.37	440	440	154	9.01	1	H 0.479	H 230	H <5	--
SW-CC-300	5/20/2003	29.33	15	8.51	8.7	453	527	84	9.1	0	qe% 3.2	288	e 7	--
SW-CC-300	7/29/2003	8.51	12.6	8.38	--	625	486	171	10.8	0.77	--	352	<5	--
SW-CC-300	8/12/2003	10.37	19.17	8.41	8.59	532	570	128	10.08	--	Hqe% 1.27	e% 292	<5	--
SW-CC-300	5/19/2004	16.81	8.85	6.55	8.31	529	e% 496	205	11.25	U 91	H 0.971	293	e 5	--
SW-CC-300	8/24/2004	12.1	13.6	8.58	8.45	653	651	153	10.45	1.74	H 0.391	H 335	H <5	--
SW-CC-800	5/20/2003	54.23	15.5	8.59	8.9	516	590	125	11.5	6.4	qe% 3.4	333	e 9	--
SW-CC-800	8/15/2003	24.59	21.4	8.71	8.67	443	560	58	7.8	1	0.974	308	5	--
SW-CC-800	5/19/2004	28.93	9	6.28	8.38	650	e% 370	201	10.75	U 3.8	H 2.09	372	e <5	--
SW-CC-800	8/24/2004	30.4	15	8.81	1.36	638	32700	188	5.1	1.64	H 0.216	H 350	H 20	--
SP-UTCC-50	7/29/2003	0.065	14.7	7.95	--	379	286	174	7.43	0.79	--	233	<5	--
SP-RIEDE	7/30/2003	No Flow	11.3	7.92	--	424	353	92	8.8	--	--	237	<5	--
SP-BOOKS	6/5/2003	--	--	--	7.6	--	498	--	--	--	1.1	264	11	--
SP-BOOKS	7/30/2003	1.74	14.5	7.88	--	441	392	105	8.9	1.31	--	218	<5	--
SP-BOOKS	8/14/2003	2.91	13.85	7.73	8.35	400	430	-5	11.51	--	Hqe% 0.596	He% 207	<5	--
SP-BOOKS	5/19/2004	2.36	12.4	6.7	8.07	465	e% 445	130	11.03	U 182	H 0.212	261	e <5	--
SP-BOOKS	8/24/2004	1.95	12.2	8.11	8.2	463	460	195	8.48	0.5	H 0.352	H 232	H <5	--
SP-CC-500	7/30/2003	0.003	14	8.13	--	629	536	93	8.24	2.46	--	392	7	--

TABLE A-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
SP-QH-800	10/30/2003	0.0038	1.89	8.24	8.16	270	392	12	10.1	--	Hq 0.746	258	62	--
SOUTH FORK SAGE CREEK														
SW-SFSC-200	5/20/2003	2.6	2.2	6.69	7.5	71	64	--	8.8	3.7	qe% 2.4	49	e 6	--
SW-SFSC-200	8/12/2003	0.0067	11.3	8.2	8.23	286	359	3	7	0	0.142	H 178	<5	--
SW-SFSC-500	5/20/2002	3.78	8	7.7	8.3	140	214	--	10.4	3	1.4	125	8	--
SW-SFSC-500	8/12/2003	0.0089	11.4	8.42	8.41	281	348	-39	6.43	0	H 0.184	H 144	<5	--
SW-SFSC-800	8/12/2003	5.78	11.5	7.54	7.88	311	400	10	6.57	0	H 0.386	H 198	<5	<25
SW-SFSC-800	5/18/2004	5	11.65	6.55	8.29	362	408	83	6.8	U 677	H 0.512	221	<5	--
SP-UTSFSC-100	5/21/2002	0.01	2	8.3	8.4	320	394	--	9.8	4	0.13	228	8	--
SP-UTSFSC-100	8/6/2002	0.001	14	7.7	8.5	290	397	--	7	0	0.8	220	e% 7	--
SP-UTSFSC-100	5/20/2003	0.02	2.7	8.1	8.3	340	434	119	10.4	0.6	qe% 0.4	238	e <4	--
SP-UTSFSC-100	8/12/2003	0.006	13.25	7.7	8.04	352	426	157	6.9	--	Hqe% 33	e% 209	70	--
SP-SFSC-100	10/28/2003	0.01	4	7.7	8.04	168	299	10	5.5	--	He% 0.737	152	e% <5	--
SP-UTSFSC-200	9/23/2002	0.002	4	7.3	7.7	220	358	180	8.3	7.9	29	231	36	--
SP-UTSFSC-200	5/20/2003	0.02	3.4	7.36	7.9	376	445	97	10.1	3.6	qe% 2	252	e 19	--
SP-UTSFSC-200	8/12/2003	0.012	10.63	7.63	8.08	382	454	174	8.14	--	Hqe% 2.88	e% 223	13	--
SP-UTSFSC-200	10/29/2003	0.0014	6	7.9	8.09	300	490	--	7.6	1	0.572	237	<5	--
SP-SFSC-750	7/28/2003	3.88	11.4	7.4	--	370	281	187	6.4	0.7	--	221	<5	--
SP-SFSC-750	8/12/2003	4.39	11.4	7.49	7.83	297	394	33	5.85	0	H 0.182	H 198	<5	--
SP-HOOPES	7/28/2003	4.508	11.8	7.36	--	447	333	178	5.53	0.16	--	276	<5	--
SP-UTSC-850	5/18/2004	0.0007	14.09	6.62	8.05	410	461	58	5.87	U 27.4	H 2.26	245	7	--
MANNING CREEK														
SP-MC-300	5/21/2002	0.16	4	8	8.2	310	417	--	9.9	1	2.3	243	8	--
SP-MC-300	5/20/2003	0.01	5.9	7.58	7.9	337	398	117	9.3	1.5	qe% 0.93	216	e 4	--
SP-MC-300	8/25/2004	0.006	6.1	7.8	8.25	386	416	209	8.34	87.6	H 6.58	H 212	H 235	--

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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
DEER CREEK														
SW-DC-200	5/18/2003	1.16	7	8.66	8.2	184	257	62	11.8	9	e% 1.3	154	e% 4	--
SW-DC-200	8/14/2003	0.028	7.95	7.65	8.1	296	368	137	8.67	--	Hqe% 0.168	e% 195	<5	--
SW-DC-200	5/20/2004	0.394	5.09	6.55	8.24	307	e% 291	118	10.68	U 123	0.476	156	e <5	--
SW-DC-200	8/25/2004	0.04	9.12	8.2	8.27	361	357	172	5.64	4.6	H 0.737	170	<5	--
SW-DC-300	5/22/2002	1.49	--	--	8.6	--	305	--	--	--	2.5	182	6	--
SW-DC-300	5/19/2003	7.23	4.2	8.61	8.5	231	290	78	12.5	6.4	e% 2	167	e% 13	--
SW-DC-400	5/22/2002	5.94	--	--	8.3	--	292	--	--	--	2	132	7	--
SW-DC-400	5/19/2003	7.22	7.9	8.31	8.4	224	275	115	10.7	3.8	e% 1.7	189	e% 6	--
SW-DC-400	5/17/2004	2.677	8	6.51	8.36	298	327	166	6.65	U 166	H 0.504	162	<5	--
SW-DC-500	5/23/2002	6.28	--	--	8.4	--	315	--	--	--	0.9	153	4	--
SW-DC-500	8/7/2002	--	--	--	8.6	--	372	--	--	--	2.9	213	e% 5	--
SW-DC-500	5/19/2003	9.26	8.8	9.3	8.5	224	300	--	11.8	--	e% 1.6	185	e% 6	6
SW-DC-500	8/13/2003	0.35	18.9	8.32	8.5	305	382	105	6.67	8	H 8.87	H 164	19	--
SW-DC-500	10/28/2003	0.15	9	8.3	8.41	290	394	--	8.4	3	He% 0.671	208	e% <5	--
SW-DC-500	5/17/2004	3.79	7.48	6.49	8.43	321	354	212	7.01	U 57.1	H 2.8	239	<5	--
SW-DC-500	8/26/2004	0.49	9.1	8.46	8.41	376	393	167	8.3	4.6	H 1.04	217	12	--
SW-DC-800	5/19/2003	9.67	12.2	8.5	8.6	273	326	85	9.4	5.1	e% 1	209	e% 17	--
SW-DC-800	7/29/2003	2.76	12.6	8.15	--	378	306	178	10.7	1.13	--	194	<5	--
SW-DC-800	8/12/2003	1.68	17.52	8.51	8.57	270	376	112	9.32	--	Hqe% 0.339	e% 214	<5	--
SW-DC-800	10/30/2003	1.52	2.36	8.3	8.34	234	456	58	12.4	--	Hq 25.7	170	6	--
SW-DC-800	5/19/2004	5.397	8.12	6.56	8.32	373	e% 349	172	10.3	U 250	H 0.411	205	e <5	--
SW-DC-800	8/24/2004	1.89	11.8	8.71	8.41	380	384	182	9.1	1.77	H 0.401	H 166	H <5	--
SP-DC-100	10/29/2003	0.0044	5	7.7	7.94	240	336	--	5.3	--	0.189	188	<5	--
SP-DC-350	8/8/2002	0.01	--	--	8.6	--	294	--	--	--	0.21	178	e% <5	--

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BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
SP-DC-350	5/19/2003	0.61	4.7	7.62	7.9	113	159	102	10.7	2	e% 1.9	101	e% 1	--
SP-DC-350	8/13/2003	0.038	5.35	7.26	7.95	238	305	196	11.6	--	Hqe% 0.15	e% 159	<5	--
SP-DC-350	5/17/2004	0.243	5.43	6.2	8	203	229	154	6	U 218	H 0.891	132	<5	--
SP-DC-350	8/25/2004	0.013	6.5	8.04	8.26	280	300	219	9.91	6.46	H 0.734	186	21	--
SP-UTDC-700	5/19/2003	0.003	--	--	7.7	--	138	--	--	--	e% 0.43	114	e% 5	--
SP-UTDC-700	8/14/2003	No Flow	15.7	6.56	7.97	183	221	-153	5.24	1	Hqe% 51.4	e% 131	156	--
SP-UTDC-700	10/28/2003	0.002	--	7.1	7.46	109	232	12	4.7	--	He% 86.1	134	e% 109	--
SP-UTDC-700	5/17/2004	0.0036	4.65	6.28	8.2	376	392	168	8.57	U 228	H 8.21	218	20	--
SP-UTDC-700	8/26/2004	0.0015	6.1	8.45	8.23	460	464	221	7.8	79.8	H 0.376	250	38	--
SP-UTDC-800	9/25/2002	0.001	--	--	7.4	--	382	--	--	--	22	285	54	--
SP-UTDC-800	5/19/2003	0.003	2.9	7.46	7.7	189	257	118	13.1	1.3	e% 1.1	153	e% <1	--
SP-UTDC-800	8/13/2003	0.0001	5.47	7.31	7.89	392	377	176	9.7	--	Hqe% 0.432	e% 259	<5	--
SP-UTDC-800	10/28/2003	0.0014	7	7.5	8.01	296	488	16	6.7	--	He% 20.6	270	e% 61	--
SP-UTDC-800	5/17/2004	0.0044	9.74	6.51	7.88	176	179	120	7.32	U 334	H 21.6	88	76	--
NORTH FORK DEER CREEK														
SW-NFDC-200	5/19/2003	0.33	6.9	9.59	8.3	241	347	52	12.2	0	e% 0.86	213	e% 3	--
SW-NFDC-500	5/22/2002	1.49	3	8.5	8.4	280	365	--	8.2	0	0.5	174	<4	--
SW-NFDC-500	8/7/2002	0.55	12	7.5	8.7	260	360	34	7.9	3	2.9	203	e% 5	--
SW-NFDC-500	5/19/2003	2.36	6.2	9.23	8.4	258	357	43	13	11	e% 1.2	226	e% 8	--
SW-NFDC-500	8/13/2003	0.34	11.9	8.04	8.15	296	379	68	6.99	2	H 0.804	H 187	6	--
SW-NFDC-500	10/28/2003	0.148	7	7.8	8.13	280	386	--	7.8	3	He% 1.22	206	e% 9	--
SW-NFDC-900	6/18/2002	1.47	--	--	8.5	--	337	--	--	--	2.8	209	8	--
SW-NFDC-900	8/7/2002	0.43	12	7.8	8.6	270	368	118	8.3	1	3.3	218	e% 10	--
SW-NFDC-900	5/19/2003	2.53	4.1	9.14	8.4	264	361	8	14.6	11	e% 3.1	217	e% 26	--
SW-NFDC-900	8/13/2003	0.43	17.4	8.31	8.47	303	387	127	7.43	5	H 1.69	H 206	<5	--

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FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
SW-NFDC-900	10/28/2003	0.28	9	8.2	8.29	290	414	--	8.1	3	He% 0.457	216	e% <5	--
SW-UTNFDC-510	9/24/2002	0.001	--	--	8.5	--	377	--	--	--	2.9	192	6	--
SW-UTNFDC-510	5/19/2003	0.16	5.1	9.54	8.5	302	421	67	12.3	0	e% 0.6	233	e% 6	--
SW-UTNFDC-510	8/13/2003	0.011	10.2	8.13	8.29	304	438	-9	7.48	5	H 1.63	H 223	10	--
SW-UTNFDC-700	9/23/2002	0.05	8	7.6	7.4	230	251	202	8.4	6	26	121	5	--
SW-UTNFDC-700	5/19/2003	0.12	5.4	9.51	8.5	237	332	58	13.1	12	e% 1.3	207	e% 10	--
SW-UTNFDC-700	8/13/2003	0.12	7.7	8.33	8.33	273	345	10	10.2	1	H 0.238	H 168	<5	--
SW-UTNFDC-700	10/28/2003	0.049	5	7.7	--	250	--	--	8.4	3	--	--	--	--
SW-UTNFDC-800	9/23/2002	0.009	13	8	8.4	260	342	205	7.1	9	0.56	196	3	--
SW-UTNFDC-900	9/23/2002	0.011	9	8.3	8.4	210	226	194	4.8	1	1.2	159	4	--
SW-UTNFDC-950	9/23/2002	0.009	10	7.5	8.2	390	304	198	7.1	10	3.3	179	69	--
SP-NFDC-50	10/29/2003	0.0012	5	7.7	7.91	310	434	--	5.8	--	0.357	239	<5	--
SP-NFDC-700	6/18/2002	0.11	--	--	7.8	--	404	--	--	--	<0.2	264	<4	--
SP-NFDC-700	8/7/2002	0.25	15	7.8	8.6	270	442	69	7.5	1	0.18	239	e% <5	--
SP-NFDC-700	5/19/2003	0.2	5.8	8.45	7.8	285	411	27	9	0	e% 0.33	258	e% 1	--
SP-NFDC-700	8/13/2003	0.024	8.5	7.43	7.76	353	435	30	4.3	1	H 0.139	H 222	<5	--
SP-UTNFDC-400	5/21/2002	0.004	2	8.3	8.2	110	153	--	8.6	5	44	109	52	--
SP-UTNFDC-400	5/20/2003	0.02	4.7	8.47	8	124	165	--	10.1	0	qe% 4.2	103	e 10	--
SP-UTNFDC-510	9/24/2002	--	8	7.8	--	250	--	198	7.9	6	--	--	--	--
SP-UTNFDC-520	9/24/2002	0.003	10	7	7.1	280	364	237	3.7	2	1.6	JH 205	63	--
SP-UTNFDC-520	5/19/2003	0.04	5.5	8.65	7.9	282	436	120	11.7	0	e% 0.66	243	e% 3	--
SP-UTNFDC-520	8/13/2003	0.0045	6	7.45	7.73	327	408	3	6.07	0	H 0.487	H 204	<5	--
SP-UTNFDC-540	8/13/2003	0.0011	--	--	7.92	--	498	--	--	--	H 2.47	H 257	13	--
SP-UTNFDC-540	10/28/2003	0.0004	11	8.3	8.34	250	471	--	6.9	4	He% 2.54	246	e% 18	--
SP-UTNFDC-540	5/17/2004	0.0405	6.56	6.37	8.41	416	463	214	7	U 103	H 0.606	177	<5	--

TABLE A-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
SP-UTNFDC-600	8/6/2002	0.001	23	7.9	8.4	310	404	85	5.5	5	12	261	e% 32	--
SP-UTNFDC-600	5/20/2003	0.01	5.2	8.81	8.1	268	382	--	10.6	0	qe% 0.83	221	e 6	--
SP-UTNFDC-600	8/14/2003	0.0022	15.4	7.92	8.06	347	434	-59	6.86	2	Hqe% 2.55	e% 232	11	--
SP-UTNFDC-600	10/29/2003	0.0003	7	7.5	8.19	346	573	68	7.4	--	0.755	308	5	--
SP-UTNFDC-600	5/18/2004	0.0144	8.55	6.51	8.18	367	410	90	7.1	U 86	H 4.95	235	11	--
SP-UTNFDC-600	8/25/2004	0.0125	10.7	7.78	8.38	438	494	170	6.55	7.34	H 0.385	H 244	H 21	--
SOUTH FORK DEER CREEK														
SW-SFDC-200	5/18/2003	3.5	6.7	8.62	8.1	194	268	64	11.6	13	e% 6.9	175	e% 21	--
SW-SFDC-200	8/13/2003	0.129	18.7	8.08	8.25	218	276	124	7.61	--	Hqe% 0.802	e% 137	<5	--
SW-SFDC-200	10/28/2003	0.064	7	8.1	8.2	198	341	30	7.9	--	He% 1.71	177	e% <5	--
SW-SFDC-300	5/22/2002	0.21	--	--	8.3	--	284	--	--	--	2.3	138	<4	--
SW-SFDC-300	5/18/2003	0.08	6	8.45	8.2	197	278	68	12.3	5	e% 0.65	168	e% 2	--
SW-SFDC-800	5/23/2002	0.1	6	8.4	8.2	120	158	--	9.9	0	0.4	77	<4	--
SW-SFDC-800	5/19/2003	0.5	5.9	7.99	8.1	89	132	110	10.8	2.2	e% 1.8	97	e% 4	--
SW-SFDC-800	5/17/2004	0.0004	6.15	6.18	8.08	181	200	140	5.86	U 155	H 0.82	100	<5	--
SW-UTSFDC-900	5/19/2003	0.35	5.6	7.86	8.1	78	124	101	10.9	2.8	e% 2.4	87	e% <1	--
SP-UTSFDC-500	5/22/2002	0.002	3	8.2	7.8	100	136	--	9.6	0	1.5	54	<4	--
SP-UTSFDC-600	10/29/2003	No Flow	5	7.8	7.91	310	439	--	2.8	--	0.523	220	<5	--
WELLS CANYON														
SW-WC-800	5/18/2003	0.11	8.8	9.35	8.6	257	359	65	12.7	2	e% 2.5	218	e% 18	--
SW-WC-800	8/12/2003	0.22	15.7	8.36	8.41	308	377	107	8.46	--	Hqe% 8.98	e% 188	16	--
SW-WC-800	10/28/2003	0.18	8	8.2	8.26	280	397	--	7.8	3	He% 2.47	211	e% 5	--
SW-WC-800	5/19/2004	0.194	14.95	6.99	8.49	358	e% 340	125	9.13	U 155	H 0.96	227	e 23	--
SW-WC-800	8/24/2004	0.142	11.3	8.73	8.39	361	364	155	8.6	3.35	H 0.411	H 180	H <5	--
SP-UTWC-300	5/23/2002	0.46	12	6.9	7.4	300	36	--	5.7	5	2.5	22	<6	--

TABLE A-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
SP-UTWC-300	5/18/2003	0.005	10.2	7	6.9	26	35	60	7.5	4	e% 7	J 70	e% 4	--
SP-WC-400	5/20/2002	1.82	9	7.9	8.3	210	287	--	9.2	1	4.9	162	12	--
SP-WC-400	8/8/2002	0.002	12	7.9	8.6	260	363	95	6.4	1	11	207	e% 30	--
SP-WC-400	5/18/2003	0.17	5	7.95	7.4	212	289	81	9.1	0	e% 1.6	184	e% 4	--
SP-WC-400	8/13/2003	0.088	15	7.93	8.02	298	368	113	6.6	--	Hqe% 15.8	e% 200	31	--
SP-WC-400	10/28/2003	0.015	7	7.9	8.11	223	377	25	7	--	He% 4.53	207	e% 20	--
SP-WC-400	5/17/2004	0.022	8.94	6.39	8.25	301	340	162	6.32	U 160	H 3.31	175	<5	--
SP-WC-400	8/25/2004	0.013	9.6	7.8	8.33	339	353	170	8.2	4.39	H 3.76	196	122	--
SP-WC-750	6/5/2003	--	--	--	7.7	--	375	--	--	--	<0.2	210	<5	--
SP-WC-750	7/29/2003	0.126	10	7.74	--	365	304	160	7.92	0.33	--	207	<5	--
SP-WC-750	8/14/2003	0.027	8	7.35	7.74	283	356	-29	6.37	6	Hqe% 0.181	e% 175	<5	--
DIAMOND CREEK														
SW-DMC-200	5/18/2003	0.52	4.8	8.08	7.8	84	113	55	19.6	52	e% 12	100	e% 11	--
SW-DMC-200	8/14/2003	0.009	8.9	7.9	8.2	227	287	136	9.71	--	Hqe% 0.264	e% 183	<5	--
STEWART CANYON														
SW-ST-500	8/15/2003	0.093	11.6	8.24	8.35	267	336	-23	5.94	3	0.257	162	5	--
SW-ST-500	5/18/2004	0.32	10.59	6.75	8.35	240	271	54	6.7	U 302	H 2.87	142	<5	--
SW-ST-500	8/26/2004	0.15	8.5	7.4	8.37	330	333	179	9.68	5.26	H 0.431	170	10	--
SW-ST-700	8/26/2004	2.7	12.8	8.37	8.41	287	288	170	16.4	1.24	H 0.424	190	<5	--
SP-ST-100	8/15/2003	0.999	7.3	7.41	7.87	278	363	-44	5.86	3	0.117	182	5	--
SP-ST-100	5/18/2004	3.81	7.18	6.35	7.88	330	371	143	6.47	U 159	H 0.351	223	<5	--
SP-ST-100	8/26/2004	4.2	6.9	7.88	8.27	347	349	200	8.64	0.24	H 0.203	170	<5	--
SP-ST-200	8/15/2003	0.033	6.8	7.35	7.86	282	358	-13	6.52	10	0.103	184	5	--
SP-ST-200	5/18/2004	0.051	6.45	6.32	8.09	337	379	127	6.6	U 165	H 0.426	208	<5	--
SP-ST-200	8/26/2004	0.05	7.6	8.37	8.3	347	351	206	13.28	0.77	H 0.193	183	<5	--

TABLE A-1
SUMMARY OF SURFACE WATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Flow (cfs)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Field Turbidity (NTU)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)	Oil Grease (mg/L)
IDAHO DEQ Standards**			**22**	**6.5 - 9.0**	**6.5 - 9.0**	**NE**	**NE**	**NE**	**6.0**	**50**	**50**	**NE**	**NE**	**NE**
LAMB CANYON														
SW-LC-500	8/15/2003	0.45	8.4	8.35	8.35	311	393	-8	6.98	4	2.68	221	10	--
CLEAR CREEK														
SW-CL-800	7/29/2003	0.279	14.3	8.25	--	411	320	150	10.45	0.69	--	232	<5	--
WHITE DUGWAY CREEK														
SW-WD-800	7/29/2003	0.182	25.2	8.8	--	1075	835	127	11.5	2.13	--	610	<5	--
WARM CREEK														
SW-WM-800	7/30/2003	0.26	23.5	8.2	--	546	455	91	11.21	2.93	--	320	<5	--

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL)
--	Field data or laboratory samples were not collected or analyzed
(mg/L)	Milligrams per liter
C	Degrees centigrade
cfs	Cubic feet per second
(umhos/cm)	Micromhos per centimeter
ORP	Oxygen reduction potential
(mV)	Millivolts
DO	Dissolved oxygen
(NTU)	Nephelometric Turbidity Unit
J	Estimated value (Northern Analytical)
e	Field duplicate results exceed acceptable limits - PQL based determination.
e%	Field duplicate results exceed acceptable limits - relative percent difference determinat
H	Sample analyzed out of holding time.
q	Associated values are estimates - field blank showed evidence of contamination.
NE	Not Established
U	Field observations indicate low turbidity (clear) water
**	The surface water standards are from IDAPA 58.01.02.250.
	Shading indicates results above Idaho DEQ Standards.

The SP-UTDC-700 sample collected on 8/14/03 was from a pond with increased turbidity during sample collection due to disturbance of bottom sediment.

Sample SW-CC-800 collected on 8/24/04 was received by laboratory improperly preserved for non-metals analysis.

Sample SP-MC-300 collected on 8/8/25/04 exhibited increased turbidity during sample collection due to disturbance of bottom sediment.

TABLE A-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
CROW CREEK																			
SW-CC-50 N	7/29/2003	--	222	--	236	--	N 67.2	7.3	0.149	79.7	15.3	--	--	--	--	--	1.03	11.8	19
SW-CC-50 N	5/19/2004	--	228	e 7.5	236	--	65.2	6.18	0.148	219	13.7	--	--	--	--	--	0.662	11	24.2
SW-CC-50 N	8/24/2004	--	231	--	240	--	64.4	e 7.83	0.169	222	14.8	--	--	--	--	--	1.07	11.2	22.4
SW-CC-100 N	8/15/2003	--	189	9.38	199	0.01	54.1	10.9	0.198	197	15	0.03	--	--	0.03	0.05	B 0.84	11	11.5
SW-CC-100 N	10/29/2003	--	199	<1	199	<0.01	60.2	13.2	0.16	211	14.8	<0.02	--	--	<0.01	e 0.02	e% 1.11	10.8	12.1
SW-CC-100 D	10/29/2003	--	198	1.26	200	<0.01	55.4	13.4	0.165	200	15	<0.02	--	--	<0.01	0.04	B 0.907	11	12.1
SW-CC-100 N	5/19/2004	--	200	e 7.58	208	--	55.6	14.4	0.199	201	15.1	--	--	--	--	--	0.542	13.2	15.3
SW-CC-100 N	8/24/2004	--	211	--	219	--	55.8	e 18.2	0.224	205	15.9	--	--	--	--	--	0.744	13.7	15.1
SW-CC-300 N	5/20/2003	<2	qe% 258	--	qe% 212	<0.05	59	47	0.11	e% 213	e% 16	<0.05	<0.05	<0.05	0.03	q 0.06	<1	32	e 16
SW-CC-300 N	7/29/2003	--	226	--	233	--	N 63.3	64.3	0.194	232	17.9	--	--	--	--	--	B 0.771	51.6	16.2
SW-CC-300 N	8/12/2003	--	180	17.38	197.5	0.01	q 53	67.4	0.25	q 200	q 16.4	<0.02	--	--	H <0.01	e% <0.01	B 0.817	q 49.4	17.4
SW-CC-300 N	5/19/2004	--	203	e 3.74	207	--	55.9	43.3	0.208	203	15.3	--	--	--	--	--	0.562	30.1	17.1
SW-CC-300 N	8/24/2004	--	225	--	237	--	58.2	e 73.6	0.229	213	16.5	--	--	--	--	--	0.91	52.7	18.8
SW-CC-800 N	5/20/2003	<2	qe% 210	9	qe% 188	<0.05	59	58	0.18	e% 217	e% 17	<0.05	<0.05	<0.05	0.02	q 0.04	<1	42	e 32
SW-CC-800 N	8/15/2003	--	146	19.2	168	0.01	44.5	56.3	0.255	185	17.8	0.02	--	--	0.01	0.01	1.21	42	39
SW-CC-800 N	5/19/2004	--	204	e 6.98	211	--	59	70.6	0.263	220	17.7	--	--	--	--	--	0.657	45.5	35.9
SW-CC-800 D	5/19/2004	--	208	4.52	212	--	58.9	71.3	0.265	220	17.7	--	--	--	--	--	0.698	45.6	34.5
SW-CC-800 N	8/24/2004	--	<1	--	<1	--	51.1	e 73.8	0.101	205	18.8	--	--	--	--	--	1.21	51.7	42
SP-UTCC-50 N	7/29/2003	--	193	--	193	--	N 38.7	2.89	0.119	143	11.2	--	--	--	--	--	1.05	30.8	20.9
SP-RIEDE N	7/30/2003	--	194	--	194	--	N 62.4	13.4	0.24	206	12.2	--	--	--	--	--	1.56	14.9	8.38
SP-BOOKS N	6/5/2003	<2	301	--	235	<0.05	58	30	0.24	211	16	<0.05	<0.05	<0.05	0.04	0.08	<1	19	<5
SP-BOOKS N	7/30/2003	--	191	--	191	--	N 49.8	31	0.342	191	16.3	--	--	--	--	--	B 0.692	23.7	8.55
SP-BOOKS N	8/14/2003	--	168	4.3	172	<0.01	q 49.4	32.9	0.32	q 190	q 16.2	<0.02	--	--	H <0.01	e% <0.01	0.786	q 23.9	7.93
SP-BOOKS N	5/19/2004	--	200	e <1	200	--	50.2	33	0.353	192	16.3	--	--	--	--	--	0.639	23	8.62
SP-BOOKS N	8/24/2004	--	205	--	205	--	47.8	e 34.6	0.334	186	16.2	--	--	--	--	--	0.662	22.2	9.02
SP-BOOKS D	8/24/2004	--	202	--	202	--	48.7	34.3	0.358	189	16.5	--	--	--	--	--	0.689	22.4	9

TABLE A-2
SUMMARY OF SURFACE WATER DATA
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PANELS F AND G
BASELINE STUDY

Site		Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SP-CC-500	N	7/30/2003	--	253	--	253	--	N 77.1	13.7	0.302	291	23.9	--	--	--	--	--	1.55	31.9	99
SP-QH-800	N	10/30/2003	--	226	<1	226	<0.01	q 62.5	5.43	0.167	237	19.6	<0.02	--	--	H 0.06	0.18	q 2.78	q 7.45	12.8
SOUTH FORK SAGE CREEK																				
SW-SFSC-200	N	5/20/2003	<2	qe% 48	--	qe% 39	<0.05	9	<2	<0.1	e% 31	e% 2	0.1	0.1	<0.05	0.04	q 0.05	<1	<1	e <5
SW-SFSC-200	N	8/12/2003	--	197	<1	197	0.03	51.7	0.916	0.112	192	15.2	0.11	--	--	H 0.01	0.02	B 0.607	2.91	7.96
SW-SFSC-500	N	5/20/2002	<2	128	--	105	<0.05	31	<4	0.07	110	8	0.09	0.09	<0.05	0.02	0.04	<1	2	8
SW-SFSC-500	N	8/12/2003	--	179	9.04	188	0.08	50.7	0.909	0.118	188	14.9	0.04	--	--	H 0.02	0.03	B 0.771	3.29	10.4
SW-SFSC-800	N	8/12/2003	--	208	<1	208	0.02	50.6	4.43	0.304	208	19.8	0.13	--	--	H <0.01	<0.01	B 0.852	4.7	13
SW-SFSC-800	N	5/18/2004	--	205	2.64	207	--	48	4.05	0.33	198	18.9	--	--	--	--	--	0.535	4.45	12.4
SP-UTSFSC-100	N	5/21/2002	<2	248	--	203	<0.05	62	<2	0.12	118	19	0.06	0.06	<0.05	0.03	0.04	<1	3	13
SP-UTSFSC-100	N	8/6/2002	<2	264	--	216	<0.05	69	e% <4	0.11	234	15	0.12	0.12	<0.05	0.05	0.1	<1	3	13
SP-UTSFSC-100	N	5/20/2003	<2	qe% 272	--	qe% 223	<0.05	68	<2	0.13	e% 240	e% 17	0.05	0.05	<0.05	0.04	q 0.05	<1	2	e 11
SP-UTSFSC-100	N	8/12/2003	--	236	<1	236	0.03	q 68.4	1.81	0.138	q 236	q 15.9	0.04	--	--	H 0.08	e% 0.18	2.08	q 2.97	10.2
SP-SFSC-100	N	10/28/2003	--	151	<1	151	0.02	41.4	0.916	0.102	152	11.7	0.16	--	--	H <0.01	e% 0.02	B 0.547	3.45	6.17
SP-UTSFSC-200	N	9/23/2002	<2	248	--	203	0.12	70	<4	0.13	257	20	<0.05	<0.05	<0.05	0.01	0.21	<1	5	18
SP-UTSFSC-200	N	5/20/2003	<2	qe% 344	--	qe% 282	<0.05	69	<2	0.12	e% 259	e% 21	<0.05	<0.05	<0.05	0.01	q 0.03	<1	3	e 13
SP-UTSFSC-200	D	5/20/2003	<2	229	--	188	<0.05	63	<2	0.1	211	13	<0.05	<0.05	<0.05	0.02	0.03	<1	3	24
SP-UTSFSC-200	N	8/12/2003	--	249	<1	249	0.02	q 67.5	0.717	0.149	q 250	q 19.9	<0.02	--	--	H <0.01	e% <0.01	B 0.839	q 3.7	13.7
SP-UTSFSC-200	N	10/29/2003	--	242	<1	242	<0.01	65.6	0.737	0.136	243	19.2	<0.02	--	--	H <0.01	e <0.01	Be% 0.87	3.53	13.8
SP-SFSC-750	N	7/28/2003	--	208	--	208	--	N 52.6	4.18	0.314	216	20.6	--	--	--	--	--	B 0.79	4.84	11.8
SP-SFSC-750	N	8/12/2003	--	202	<1	202	0.08	47.3	3.66	0.283	193	18.1	0.14	--	--	H 0.01	0.01	B 0.754	3.96	12.3
SP-SFSC-750	N	9/28/2004	--	220	<1	220	--	49.8	4.58	0.324	207	20	--	--	--	--	--	0.639	4.62	13.6
SP-HOOPES	N	7/28/2003	--	205	--	205	--	N 61.1	7.37	0.402	246	22.8	--	--	--	--	--	B 0.796	7.87	44.8
SP-UTSC-850	N	5/18/2004	--	234	<1	234	--	63.6	2.63	0.257	231	17.5	--	--	--	--	--	0.384	5.39	16.2
SP-UTSC-850	N	9/28/2004	--	203	<1	203	--	46.2	4.7	0.245	181	16	--	--	--	--	--	1.41	5.91	6.02
MANNING CREEK																				
SP-MC-300	N	5/21/2002	<2	261	--	214	0.06	65	<2	0.11	245	20	<0.05	<0.05	<0.05	<0.01	0.02	<1	3	11

TABLE A-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
PANELS F AND G
BASELINE STUDY

Site		Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SP-MC-300	N	5/20/2003	<2	qe% 287	--	qe% 235	<0.05	65	<2	<0.1	e% 228	e% 16	0.06	0.06	<0.05	0.01	q 0.02	<1	3	e 8
SP-MC-300	N	8/25/2004	--	244	--	244	--	89.6	e 1.17	0.147	331	26.1	--	--	--	--	--	8.08	3.16	10.7
DEER CREEK																				
SW-DC-200	N	5/18/2003	<2	186	--	153	e% <0.05	44	2	0.11	147	9	<0.05	<0.05	<0.05	e% 0.1	e% 0.1	<1	2	8
SW-DC-200	N	8/14/2003	--	194	<1	194	<0.1	q 57	0.438	0.153	q 196	q 12.9	<0.02	--	--	H 0.06	e% 0.1	0.636	q 2.78	10.7
SW-DC-200	N	5/20/2004	--	162	e <1	162	--	43.8	0.446	0.159	151	9.99	--	--	--	--	--	0.378	2.14	8.53
SW-DC-200	N	8/25/2004	--	200	--	200	--	53.6	e 0.606	0.179	187	12.8	--	--	--	--	--	0.581	2.49	11.1
SW-DC-300	N	5/22/2002	<2	193	--	158	<0.05	56	<2	0.13	189	12	<0.05	<0.05	<0.05	0.03	**B 0.03	<1	2	8
SW-DC-300	N	5/19/2003	<2	229	--	188	e% <0.05	52	1	<0.1	167	9	<0.05	<0.05	<0.05	e% 0.04	e% 0.07	<1	2	8
SW-DC-400	N	5/22/2002	<2	178	--	146	<0.05	52	<4	0.1	175	11	<0.05	<0.05	<0.05	e 0.06	0.07	<1	2	12
SW-DC-400	N	5/19/2003	<2	158	--	129	e% <0.05	50	1	<0.1	162	9	<0.05	<0.05	<0.05	e% 0.06	e% 0.08	<1	2	8
SW-DC-400	N	5/17/2004	--	164	4.6	169	--	47.7	0.461	0.13	154	8.4	--	--	--	--	--	B 0.26	2.09	7.66
SW-DC-500	N	5/23/2002	<2	198	--	162	<0.05	58	<2	0.1	202	14	<0.05	<0.05	<0.05	e 0.03	0.06	<1	3	10
SW-DC-500	D	5/23/2002	<2	198	--	162	<0.05	59	<2	0.1	205	14	<0.05	<0.05	<0.05	0.05	0.06	<1	3	11
SW-DC-500	N	8/7/2002	<2	239	--	196	0.15	61	e% 2	0.13	222	17	0.07	0.07	<0.05	0.03	0.07	<1	3	14
SW-DC-500	N	5/19/2003	<2	229	--	188	e% 0.18	53	1	<0.1	174	10	<0.05	<0.05	<0.05	e% 0.06	e% 0.07	<1	2	10
SW-DC-500	N	8/13/2003	--	199	12.4	212	0.02	58.1	1	0.149	--	16.6	<0.02	--	--	H 0.03	0.05	B 0.852	3.29	10.8
SW-DC-500	N	10/28/2003	--	201	7.4	208	<0.01	58.3	1.15	0.144	215	16.8	<0.02	--	--	<0.01	e% 0.02	B 0.82	3.38	13.4
SW-DC-500	N	5/17/2004	--	178	8	186	--	51.5	0.875	0.134	175	11.2	--	--	--	--	--	0.425	2.46	8.83
SW-DC-500	N	8/26/2004	--	221	--	231	--	56.9	e 0.916	0.168	212	16.9	--	--	--	--	--	0.72	3.01	11
SW-DC-800	N	5/19/2003	<2	229	--	188	e% <0.05	53	2	<0.1	190	14	<0.05	<0.05	<0.05	e% 0.04	e% 0.07	<1	2	9
SW-DC-800	N	7/29/2003	--	212	--	217	--	N 58.9	1.59	0.146	222	18.2	--	--	--	--	--	B 0.637	2.66	7.18
SW-DC-800	N	8/12/2003	--	194	16.6	211	0.02	q 54.6	1.59	0.141	q 208	q 17.3	<0.02	--	--	H 0.03	e% 0.03	B 0.708	q 2.54	6.83
SW-DC-800	N	10/30/2003	--	199	4.2	204	q 0.04	q 56	1.9	0.116	214	18	<0.02	--	--	H 0.02	0.02	B 0.762	q 2.54	6.56
SW-DC-800	N	5/19/2004	--	211	e 2.38	214	--	54	1.28	0.145	199	15.5	--	--	--	--	--	0.494	2.5	8.86
SW-DC-800	N	8/24/2004	--	212	--	224	--	53.7	e 1.67	0.177	206	17.6	--	--	--	--	--	0.636	2.38	7.58
SP-DC-100	N	10/29/2003	--	157	<1	157	<0.01	46	1.29	0.24	160	10.9	0.08	--	--	0.093	e 0.1	Be% 0.484	2.68	12.5

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PANELS F AND G
BASELINE STUDY

Site		Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SP-DC-350	N	8/8/2002	<2	171	--	140	<0.05	57	e% <2	0.16	171	7	0.19	0.19	<0.05	0.08	0.17	<1	2	15
SP-DC-350	N	5/19/2003	<2	143	--	118	e% <0.05	30	1	0.15	87	3	0.16	0.16	<0.05	e% 0.17	e% 0.17	<1	2	7
SP-DC-350	N	8/13/2003	--	153	<1	153	0.02	q 52.5	0.942	0.199	q 158	q 6.63	0.15	--	--	H 0.14	e% 0.14	0.467	q 2.21	13
SP-DC-350	N	5/17/2004	--	109	<1	109	--	34.3	0.714	0.172	102	4.02	--	--	--	--	--	B 0.249	1.73	7.96
SP-DC-350	N	8/25/2004	--	162	--	162	--	50.6	e 0.768	0.208	153	6.57	--	--	--	--	--	0.612	2.03	13.3
SP-UTDC-700	N	5/19/2003	<2	96	--	78	e% <0.05	26	1	0.1	73	2	<0.05	<0.05	<0.05	e% 0.09	e% 0.14	<1	2	9
SP-UTDC-700	N	8/14/2003	--	116	<1	116	<0.01	q 42.8	0.814	0.133	q 122	q 3.61	0.02	--	--	H 0.14	e% 0.57	0.728	q 2.21	4.97
SP-UTDC-700	N	10/28/2003	--	102	<1	102	0.47	40.5	1.77	<0.1	119	4.29	<0.02	--	--	0.049	e% 1.45	2.29	2.26	8.34
SP-UTDC-700	N	5/17/2004	--	206	<1	206	--	66.1	1.43	0.298	208	10.4	--	--	--	--	--	B 0.282	2.5	20.6
SP-UTDC-700	N	8/26/2004	--	252	--	252	--	125	e 1.75	0.347	381	16.8	--	--	--	--	--	2.27	3.22	24
SP-UTDC-800	N	9/25/2002	<2	242	--	198	<0.05	80	<4	0.15	253	13	<0.05	<0.05	<0.05	0.01	0.1	<1	3	24
SP-UTDC-800	N	5/19/2003	<2	143	--	118	e% <0.05	44	2	0.16	135	6	0.05	0.05	<0.05	e% 0.23	e% 0.18	<1	2	14
SP-UTDC-800	N	8/13/2003	--	241	<1	241	0.02	q 80.2	1.75	0.312	q 254	q 13.1	<0.02	--	--	H 0.05	e% 0.06	0.506	q 2.97	22.1
SP-UTDC-800	N	10/28/2003	--	236	<1	236	<0.01	84.3	2.04	0.301	266	13.6	<0.02	--	--	0.037	e% 1.81	1.01	3.13	23.5
SP-UTDC-800	N	5/17/2004	--	81.6	<1	81.6	--	29.3	0.732	0.133	83.4	2.5	--	--	--	--	--	0.622	1.65	6.46
NORTH FORK DEER CREEK																				
SW-NFDC-200	N	5/19/2003	<2	258	--	212	e% <0.05	56	2	0.13	210	17	<0.05	<0.05	<0.05	e% 0.07	e% 0.08	<1	2	11
SW-NFDC-200	D	5/19/2003	<2	244	14	223	0.54	59	3	0.1	209	15	<0.05	<0.05	<0.05	0.02	0.07	<1	3	7
SW-NFDC-500	N	5/22/2002	<2	226	--	185	<0.05	61	<2	0.1	239	21	<0.05	<0.05	<0.05	e 0.02	0.03	<1	3	12
SW-NFDC-500	N	8/7/2002	<2	231	--	189	<0.05	59	e% <2	0.1	213	16	0.07	0.07	<0.05	0.02	0.07	<1	3	9
SW-NFDC-500	N	5/19/2003	<2	244	--	200	e% <0.05	58	2	0.1	211	16	<0.05	<0.05	<0.05	e% 0.02	e% 0.04	<1	3	11
SW-NFDC-500	D	5/19/2003	<2	258	--	212	<0.05	53	1	0.12	190	14	<0.05	<0.05	<0.05	0.05	0.06	<1	2	10
SW-NFDC-500	N	8/13/2003	--	208	<1	208	0.05	55.3	0.959	0.131	203	15.6	0.07	--	--	H 0.02	0.03	B 0.705	3.14	6.6
SW-NFDC-500	N	10/28/2003	--	205	<1	205	<0.01	55.8	1.11	0.122	206	16.2	<0.02	--	--	0.013	e% 0.03	B 0.831	3.39	8.76
SW-NFDC-900	N	6/18/2002	<2	220	--	180	0.07	55	<2	0.16	211	18	<0.05	<0.05	<0.05	0.02	**B 0.04	<1	3	11
SW-NFDC-900	N	8/7/2002	<2	237	--	194	<0.05	60	e% <2	0.12	220	17	0.07	0.07	<0.05	0.02	0.11	<1	3	13
SW-NFDC-900	N	5/19/2003	<2	258	--	212	e% <0.05	58	1	0.11	215	17	<0.05	<0.05	<0.05	e% 0.02	e% 0.14	<1	3	13

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IDAHO DEQ Standards**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SW-NFDC-900 N	8/13/2003	--	198	12.4	210	0.02	58.4	0.95	0.163	214	16.6	<0.02	--	--	H 0.03	0.06	B 0.81	3.29	10.5
SW-NFDC-900 N	10/28/2003	--	211	<1	211	<0.01	59.8	1.17	0.135	221	17.3	<0.02	--	--	0.019	e% 0.03	B 0.838	3.54	13.2
SW-UTNFDC-510 N	9/24/2002	<2	259	--	212	<0.05	54	<4	0.17	225	22	0.06	0.06	<0.05	<0.01	0.01	<1	5	16
SW-UTNFDC-510 N	5/19/2003	<2	272	--	223	e% 0.07	59	2	<0.1	242	23	<0.05	<0.05	<0.05	e% <0.005	e% 0.02	<1	5	16
SW-UTNFDC-510 N	8/13/2003	--	240	<1	240	0.05	58.2	1.22	0.11	239	22.6	<0.02	--	--	H <0.01	<0.01	B 0.839	4.68	11.1
SW-UTNFDC-700 N	9/23/2002	<2	138	--	113	<0.05	50	<4	0.07	187	15	0.11	0.11	<0.05	0.01	<0.01	<1	3	6
SW-UTNFDC-700 N	5/19/2003	<2	220	--	180	e% <0.05	50	1	<0.1	195	17	0.17	0.17	<0.05	e% <0.005	e% 0.03	<1	3	12
SW-UTNFDC-700 N	8/13/2003	--	188	4.78	193	0.05	49.2	1.02	0.102	186	15.3	0.15	--	--	H <0.01	<0.01	B 0.527	2.98	5.54
SW-UTNFDC-800 N	9/23/2002	<2	220	--	180	<0.05	56	<4	0.09	193	13	<0.05	<0.05	<0.05	0.02	0.02	<1	3	6
SW-UTNFDC-900 N	9/23/2002	<2	187	--	153	<0.05	54	<4	0.1	168	8	<0.05	<0.05	<0.05	<0.01	0.01	<1	2	5
SW-UTNFDC-950 N	9/23/2002	<2	199	--	163	<0.05	60	<4	0.1	191	10	<0.05	<0.05	<0.05	<0.01	0.02	<1	3	5
SP-NFDC-50 N	10/29/2003	--	219	<1	219	<0.01	53.2	0.827	0.143	218	20.8	0.67	--	--	H <0.01	e <0.01	Be% 0.83	3.04	9.56
SP-NFDC-700 N	6/18/2002	<2	242	--	198	<0.05	63	<4	0.16	256	24	0.13	0.13	<0.05	0.06	**B 0.04	<1	3	27
SP-NFDC-700 N	8/7/2002	<2	242	--	198	<0.05	66	e% <2	0.18	238	18	0.21	0.21	<0.05	0.05	0.09	<1	4	25
SP-NFDC-700 N	5/19/2003	<2	287	--	235	e% <0.05	64	2	0.14	242	20	0.13	0.13	<0.05	e% 0.06	e% 0.06	<1	3	24
SP-NFDC-700 N	8/13/2003	--	223	<1	223	0.02	62.9	1.02	0.22	234	18.6	0.12	--	--	H 0.06	0.05	B 0.689	3.42	24.6
SP-UTNFDC-400 N	5/21/2002	<2	83	--	68	<0.05	25	<2	0.17	75	3	<0.05	<0.05	<0.05	0.26	0.53	<1	2	7
SP-UTNFDC-400 N	5/20/2003	<2	qe% 115	--	qe% 94	<0.05	28	<2	0.17	e% 86	e% 4	<0.05	<0.05	<0.05	0.28	q 0.28	<1	2	e 6
SP-UTNFDC-520 N	9/24/2002	<2	242	--	198	<0.05	52	<4	0.14	200	17	0.06	0.06	<0.05	0.01	0.01	<1	4	15
SP-UTNFDC-520 N	5/19/2003	<2	258	--	212	e% <0.05	60	1	<0.1	240	22	0.07	0.07	<0.05	e% 0.009	e% 0.02	<1	3	16
SP-UTNFDC-520 N	8/13/2003	--	220	<1	220	0.05	56.9	0.984	0.133	221	19.1	0.05	--	--	H <0.01	<0.01	B 0.821	3.51	13.7
SP-UTNFDC-540 N	8/13/2003	--	269	<1	269	0.03	74.7	0.677	0.301	279	22.4	<0.02	--	--	H 0.09	0.21	B 0.596	2.59	15.5
SP-UTNFDC-540 N	10/28/2003	--	257	<1	257	<0.01	68.5	1.12	0.204	269	23.7	<0.02	--	--	0.098	e% 0.23	B 0.743	2.44	8.84
SP-UTNFDC-540 N	5/17/2004	--	241	10.82	251	--	61.8	1.03	0.277	240	20.7	--	--	--	--	--	0.398	2.26	12.2
SP-UTNFDC-600 N	8/6/2002	<2	253	--	207	<0.05	74	e% <4	0.19	242	14	0.19	0.19	<0.05	0.03	0.15	<1	4	22
SP-UTNFDC-600 N	5/20/2003	<2	qe% 258	--	qe% 212	<0.05	64	2	0.14	e% 217	e% 14	<0.05	<0.05	<0.05	0.02	q 0.03	<1	3	e 24
SP-UTNFDC-600 N	8/14/2003	--	231	<1	231	<0.01	q 70.3	1.13	0.198	q 234	q 14.2	<0.02	--	--	H 0.03	e% 0.04	0.512	q 3.17	17.8

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Site		Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SP-UTNFDC-600	N	10/29/2003	--	279	<1	279	<0.01	76.5	1.4	0.356	293	24.7	<0.02	--	--	0.174	e 0.19	Be% 0.69	2.59	21.1
SP-UTNFDC-600	N	5/18/2004	--	202	<1	202	--	59.1	0.92	0.226	198	12.3	--	--	--	--	--	B 0.27	2.79	22.9
SP-UTNFDC-600	N	8/25/2004	--	239	--	250	--	71.6	e 1.11	0.203	242	15.3	--	--	--	--	--	0.785	3	16.5
SOUTH FORK DEER CREEK																				
SW-SFDC-200	N	5/18/2003	<2	215	--	176	e% <0.05	48	1	0.12	153	8	<0.05	<0.05	<0.05	e% 0.09	e% 0.13	<1	2	7
SW-SFDC-200	N	8/13/2003	--	149	<1	149	0.02	q 41.4	0.639	0.127	q 147	q 10.6	<0.02	--	--	H 0.04	e% 0.04	0.684	q 2.61	8.45
SW-SFDC-200	D	8/13/2003	--	145	<1	145	0.02	39.7	0.65	0.123	142	10.3	<0.02	--	--	H 0.03	0.04	0.671	2.55	8.38
SW-SFDC-200	N	10/28/2003	--	170	<1	170	<0.01	51.8	0.987	0.1	174	10.9	<0.02	--	--	<0.01	e% 0.05	B 0.587	2.64	10.1
SW-SFDC-300	N	5/22/2002	<2	171	--	140	<0.05	53	<2	0.09	174	10	0.11	0.11	<0.05	e 0.06	0.1	<1	2	9
SW-SFDC-300	N	5/18/2003	<2	186	--	153	e% <0.05	54	2	<0.1	164	7	<0.05	<0.05	<0.05	e% 0.07	e% 0.07	<1	1	6
SW-SFSC-800	N	9/28/2004	--	221	<1	221	--	49.3	4.35	0.367	205	19.9	--	--	--	--	--	0.617	4.58	13.4
SW-SFDC-800	N	5/23/2002	<2	90	--	74	<0.05	30	<2	0.11	87	3	<0.05	<0.05	<0.05	e 0.1	0.11	<1	1	7
SW-SFDC-800	N	5/19/2003	<2	96	--	78	e% <0.05	25	1	0.12	71	2	<0.05	<0.05	<0.05	e% 0.1	e% 0.11	<1	1	6
SW-SFDC-800	N	5/17/2004	--	98	<1	98	--	31.1	0.739	0.128	87.1	2.32	--	--	--	--	--	B 0.17	1.53	4.09
SW-UTSFDC-900	N	5/19/2003	<2	72	--	59	e% <0.05	23	1	<0.1	66	2	0.05	0.05	<0.05	e% 0.1	e% 0.11	<1	1	6
SP-UTSFDC-500	N	5/22/2002	<2	71	--	58	<0.05	28	<2	0.05	78	2	<0.05	<0.05	<0.05	e 0.04	0.05	<1	1	<5
SP-UTSFDC-600	N	10/29/2003	--	222	<1	222	<0.01	54.2	1.72	0.174	213	18.9	0.03	--	--	H <0.01	e <0.01	Be% 0.759	4.4	6.96
WELLS CANYON																				
SW-WC-800	N	5/18/2003	<2	239	9	212	e% <0.05	60	3	0.1	212	15	<0.05	<0.05	<0.05	e% 0.03	e% 0.07	<1	3	7
SW-WC-800	N	8/12/2003	--	201	8.78	210	0.02	q 57.7	2.86	0.165	q 204	q 14.5	0.08	--	--	H 0.04	e% 0.06	1.93	q 3.32	5.47
SW-WC-800	D	8/12/2003	--	199	9.28	209	0.01	57.5	2.67	0.163	203	14.4	0.08	--	--	H 0.04	0.08	2.01	3.31	5.28
SW-WC-800	N	10/28/2003	--	201	<1	201	0.02	57.9	2.54	0.15	203	14.2	0.03	--	--	0.018	e% 0.02	B 0.826	3.32	5.32
SW-WC-800	N	5/19/2004	--	198	e 9.62	208	--	53.8	2.04	0.165	191	13.7	--	--	--	--	--	0.532	3.03	4.89
SW-WC-800	D	5/19/2004	--	199	e 9.28	208	--	52.2	2.08	0.153	185	13.3	--	--	--	--	--	0.513	2.99	5.01
SW-WC-800	N	8/24/2004	--	206	--	214	--	54.1	e 2.02	0.17	194	14.4	--	--	--	--	--	0.586	2.94	5.05
SP-UTWC-300	N	5/23/2002	<2	12	--	10	<0.05	4	<2	0.07	14	1	<0.05	<0.05	<0.05	e 0.02	0.04	<1	1	5
SP-UTWC-300	N	5/18/2003	<2	38	--	31	e% <0.05	5	2	<0.1	17	1	<0.05	<0.05	<0.05	e% 0.02	e% 0.05	<1	1	6

TABLE A-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
PANELS F AND G
BASELINE STUDY

Site		Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SP-WC-400	N	5/20/2002	<2	165	--	135	<0.05	47	<2	0.21	154	9	<0.05	<0.05	<0.05	0.22	0.24	<1	3	14
SP-WC-400	N	8/8/2002	<2	200	--	164	<0.05	62	e% 2	0.21	200	11	0.12	0.12	<0.05	0.1	0.3	<1	3	20
SP-WC-400	D	8/8/2002	<2	215	--	176	<0.05	61	6	0.21	198	11	0.17	0.17	<0.05	0.1	0.26	<1	3	21
SP-WC-400	N	5/18/2003	<2	186	--	153	e% <0.05	49	3	0.2	164	10	0.06	0.06	<0.05	e% 0.17	e% 0.18	<1	2	14
SP-WC-400	N	8/13/2003	--	182	<1	182	0.02	q 59.2	1.48	0.263	q 195	q 11.4	0.09	--	--	H 0.19	e% 0.4	1.02	q 3.02	17.9
SP-WC-400	N	10/28/2003	--	178	<1	178	0.02	58.8	1.74	0.235	194	11.5	<0.02	--	--	0.142	e% 0.22	B 0.843	3.09	19
SP-WC-400	D	10/28/2003	--	179	<1	179	0.02	59.8	1.77	0.238	--	11.7	<0.02	--	--	H 0.149	0.29	B 0.951	3.13	19.1
SP-WC-400	N	5/17/2004	--	167	<1	167	--	48.1	0.992	0.22	160	9.57	--	--	--	--	--	0.316	2.42	13.7
SP-WC-400	N	8/25/2004	--	184	--	188	--	57.8	e 1.86	0.256	194	12	--	--	--	--	--	1.81	2.81	18.9
SP-WC-750	N	6/5/2003	<2	249	--	204	<0.05	59	4	0.13	197	12	0.26	0.26	<0.05	0.04	0.06	<1	3	<5
SP-WC-750	N	7/29/2003	--	211	--	211	--	N 59.3	2.3	0.168	212	15.5	--	--	--	--	--	B 0.63	3.34	5.24
SP-WC-750	N	8/14/2003	--	193	<1	193	<0.1	q 56	2.25	0.133	q 189	q 11.8	0.24	--	--	H 0.04	e% 0.04	0.731	q 3.24	4.24
DIAMOND CREEK																				
SW-DMC-200	N	5/18/2003	<2	86	--	71	e% 0.14	18	1	0.1	61	4	<0.05	<0.05	<0.05	e% 0.29	e% 0.25	<1	1	6
SW-DMC-200	N	8/14/2003	--	156	<1	156	<0.01	q 42.5	0.568	0.16	q 185	q 10.9	<0.02	--	--	H 0.08	e% 0.1	0.523	q 3.27	7.1
SW-DMC-200	D	8/14/2003	--	158	<1	158	<0.01	43.2	0.518	0.143	153	11	<0.02	--	--	H 0.08	0.1	0.508	3.32	7.02
STEWART CANYON																				
SW-ST-500	N	8/15/2003	--	173	5.7	179	0.01	56.1	0.893	0.181	182	10.1	0.02	--	--	0.14	0.16	B 0.603	2.28	10.5
SW-ST-500	N	5/18/2004	--	132	<1	132	--	38.2	0.662	0.199	123	6.7	--	--	--	--	--	0.326	1.94	11
SW-ST-500	N	8/26/2004	--	180	--	187	--	53.4	e 0.867	0.199	174	9.92	--	--	--	--	--	0.555	2.09	12.2
SW-ST-700	N	8/26/2004	--	163	--	171	--	39.1	e 0.995	0.153	154	13.6	--	--	--	--	--	0.434	1.66	4.58
SW-ST-700	D	8/26/2004	--	162	--	169	--	38.8	1.36	0.151	153	13.6	--	--	--	--	--	0.412	1.64	4.59
SP-ST-100	N	8/15/2003	--	202	1	202	0.01	52.7	1.22	0.2	190	14.2	0.17	--	--	0.01	0.02	B 0.614	1.77	4.85
SP-ST-100	N	5/18/2004	--	195	<1	195	--	48.7	1.15	0.159	176	13.1	--	--	--	--	--	0.396	1.58	4.57
SP-ST-100	N	8/26/2004	--	199	--	202	--	50.2	e 0.972	0.165	184	14.1	--	--	--	--	--	0.51	1.61	5.2
SP-ST-200	N	8/15/2003	--	189	1	189	0.01	53.8	1.05	0.153	185	12.3	0.14	--	--	0.07	0.09	B 0.63	2.41	7.29
SP-ST-200	N	5/18/2004	--	197	<1	197	--	50.6	1.37	0.193	175	11.8	--	--	--	--	--	0.421	2.27	7.65

TABLE A-2
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR MAJOR IONS AND NUTRIENTS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Acidity (mg/L)	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Nitrate (mg/L)	Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**		**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**	**NE**
SP-ST-200 N	8/26/2004	--	198	--	203	--	52.4	e 1.34	0.18	182	12.5	--	--	--	--	--	0.553	2.27	7.82
LAMB CANYON																			
SW-LC-500 N	8/15/2003	--	210	7.08	217	0.01	62.4	0.618	0.16	206	12.1	0.08	--	--	0.06	0.1	B 0.552	1.94	11.3
CLEAR CREEK																			
SW-CL-800 N	7/29/2003	--	229	--	230	--	N 59.9	5.45	0.132	228	19	--	--	--	--	--	B 0.656	5.5	7.81
WHITE DUGWAY CREEK																			
SW-WD-800 N	7/29/2003	--	84.2	--	102	--	N 43.9	195	0.127	178	16.6	--	--	--	--	--	1.01	157	122
WARM CREEK																			
SW-WM-800 N	7/30/2003	--	245	--	245	--	N 65.6	34.7	0.217	233	16.9	--	--	--	--	--	B 0.851	29.8	13.2
PRESERVATIVE BLANK																			
SW-OC-200 B	5/20/2003	3	3	0	2	<0.05	< 1	<2	<0.1	<7	<1	<0.05	<0.05	<0.05	<0.01	0.01	<1	<1	<5
SW-OC-200 B	8/14/2003	--	<1	<1	<1	<0.01	0.0491	<0.2	<0.1	0.178	0.0134	<0.02	--	--	H <0.01	<0.01	<0.025	0.0488	<0.3
SW-OC-200 B	10/30/2003	--	<1	<1	<1	0.02	B 0.014	<0.2	<0.1	--	<0.005	<0.02	--	--	H <0.01	<0.01	B 0.0487	B 0.0624	<0.3
SW-OC-200 B	5/19/2004	--	<1	e <1	<1	--	B 0.0222	<0.2	<0.1	B 0.102	<0.0112	--	--	--	--	--	<0.0258	B 0.0265	<0.3

Notes:

< Indicates analyte not detected above laboratory practical quantification limit (PQL)
(mg/L) Milligrams per liter
D Field duplicate sample
N Located in Site column indicates natural sample.
N Located in analyte columns indicates percent recovery not within control limits 75-125% (SVL).
-- Field data or laboratory samples were not collected or analyzed.

Bromide analysis was conducted on thirteen samples collected during the period of July 28 through July 30, 2003 as part of the Crow Creek Study. The stations sampled include: SP-BOOKS, SP-CC-50, SP-Hoopes, SP-Reide, SP-SFSC-750, SP-UTCC-50, SP-WC-750, SW-CC-300, SW-CC-50, SW-CL-800, SW-DC-800, SW-WD-800, and SW-WM-800. All samples collected were below the 0.1 mg/L reporting limit.

e Field duplicate results exceed acceptable limits - PQL based determination.
e% Fieild duplicate results exceed acceptable limits - relative percent difference determination.
H Sample analyzed out of holding time.
q Associated values are estimates - field blank showed evidence of contamination.
NE Not Established
B Not detected above quantitation limit but present above the method detection limit.
**B Analyte was detected in method blank. Results are not corrected for the method blank concentration.
** Based on IDAPA 58.01.02, there are no surface water quality standards for major ions and nutrients.

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
CROW CREEK														
SW-CC-50	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SW-CC-50	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-CC-50	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	B 0.0169
SW-CC-50	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	e% 0.202
SW-CC-50	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-CC-50	8/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.187
SW-CC-100	8/15/2003	Dissolved	N	<0.0097	BW 0.0014	B 0.00049	0.0355	<0.00006	<0.012	<0.0001	B 0.00039	B 0.00036	<0.0026	<0.0045
SW-CC-100	8/15/2003	Total	N	0.035	<0.0006	<0.0004	0.0359	<0.00006	<0.012	<0.0001	B 0.00041	<0.0003	<0.0026	* 0.0396
SW-CC-100	10/29/2003	Dissolved	N	<0.0097	Be 0.0023	e <0.0004	0.0339	<0.00006	<0.012	<0.00006	<0.0003	B 0.0005	<0.0026	<0.0045
SW-CC-100	10/29/2003	Dissolved	D	<0.0097	<0.0006	B 0.00052	0.0339	<0.00006	<0.012	<0.00006	<0.0003	B 0.00035	<0.0026	<0.0045
SW-CC-100	10/29/2003	Total	N	e% 0.821	<0.0006	Be 0.00072	e% 0.0475	<0.00006	<0.012	e 0.00023	Be% 0.0023	<0.0003	<0.0026	e% 0.632
SW-CC-100	10/29/2003	Total	D	0.117	<0.0006	B 0.00052	0.0352	<0.00006	<0.012	<0.00006	B 0.00079	<0.0003	<0.0026	0.0854
SW-CC-100	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-CC-100	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	e% 0.163
SW-CC-100	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-CC-100	8/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0979
SW-CC-300	5/20/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SW-CC-300	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-CC-300	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SW-CC-300	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-CC-300	8/12/2003	Dissolved	N	<0.0097	Be 0.0011	B 0.00083	0.0449	<0.00006	<0.012	<0.0001	<0.0003	B 0.0004	<0.0026	Be 0.011
SW-CC-300	8/12/2003	Total	N	Ne% 0.0457	<0.0006	B 0.00081	0.0471	<0.00006	<0.012	<0.0001	Be% 0.00037	<0.0003	<0.0026	e% 0.0653
SW-CC-300	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-CC-300	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	e% 0.153
SW-CC-300	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-CC-300	8/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0357
SW-CC-800	5/20/2003	Dissolved	N	<0.1	<0.003	0.001	<0.1	<0.001	0.1	<0.0001	0.002	<0.01	<0.01	<0.03
SW-CC-800	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-CC-800	8/15/2003	Dissolved	N	<0.0097	BW 0.00082	B 0.00089	0.0425	B 0.00006	B 0.0146	<0.0001	<0.0003	B 0.00056	<0.0026	<0.0045
SW-CC-800	8/15/2003	Total	N	N 0.0298	W <0.0006	<0.0004	0.053	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	* 0.0482
SW-CC-800	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-CC-800	5/19/2004	Dissolved	D	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-CC-800	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	e% 0.0958
SW-CC-800	5/19/2004	Total	D	--	--	--	--	--	--	<0.0001	--	--	--	0.119
SW-CC-800	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-CC-800	8/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0403
SP-UTCC-50	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTCC-50	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-RIEDE	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-RIEDE	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	6/5/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	6/5/2003	Total	N	* <0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	0.14
SP-BOOKS	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	8/14/2003	Dissolved	N	<0.0097	Be 0.0014	<0.0007	0.0262	<0.00006	<0.012	<0.0001	B 0.0005	<0.0003	<0.0026	Be 0.0084
SP-BOOKS	8/14/2003	Total	N	Ne% <0.0097	<0.0006	<0.0007	0.0271	<0.00006	<0.012	<0.0001	qe% 0.00056	<0.0003	<0.0026	e% 0.0357
SP-BOOKS	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-BOOKS	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	Be% 0.0176
SP-BOOKS	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-BOOKS	8/24/2004	Dissolved	D	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-BOOKS	8/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-BOOKS	8/24/2004	Total	D	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-CC-500	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-CC-500	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-QH-800	10/30/2003	Dissolved	N	<0.0097	<0.0003	N <0.0006	0.025	<0.00006	B 0.0155	<0.00006	<0.0003	<0.0003	<0.0026	<0.0045
SP-QH-800	10/30/2003	Total	N	*N 1.5	<0.0003	N <0.0006	0.0367	<0.00006	B 0.0229	q 0.00035	B 0.0024	<0.0003	<0.0026	* 1.18
SOUTH FORK SAGE CREEK														
SW-SFSC-200	5/20/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	0.04
SW-SFSC-200	5/20/2003	Total	N	* <0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	0.1
SW-SFSC-200	8/12/2003	Dissolved	N	<0.0086	B 0.0015	<0.0004	0.0241	<0.00007	B 0.0287	<0.0001	B 0.0011	B 0.00044	0.0042	B 0.0062
SW-SFSC-200	8/12/2003	Total	N	* <0.0097	<0.0006	<0.0004	0.0223	B 0.00007	<0.012	<0.0001	B 0.00055	<0.0003	<0.0026	<0.0045
SW-SFSC-500	5/20/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	<0.05
SW-SFSC-500	5/20/2002	Total	N	0.2	<0.001	0.001	<0.1	<0.001	<0.05	0.0003	<0.01	--	<0.01	0.15
SW-SFSC-500	8/12/2003	Dissolved	N	B 0.0097	BW 0.00068	<0.0004	0.0283	<0.00007	B 0.0138	<0.0001	B 0.00099	<0.0004	B 0.002	<0.0035
SW-SFSC-500	8/12/2003	Total	N	* 0.0244	<0.0006	<0.0004	0.0277	<0.00006	B 0.0137	<0.0001	B 0.00048	<0.0003	<0.0026	0.022
SW-SFSC-800	8/12/2003	Dissolved	N	<0.0086	BW 0.0011	W <0.0004	0.046	<0.00007	<0.0065	<0.0001	B 0.0017	<0.0004	<0.0011	<0.0035
SW-SFSC-800	8/12/2003	Total	N	* <0.0097	<0.0006	<0.0004	0.043	B 0.00011	B 0.0162	<0.0001	B 0.00096	<0.0003	<0.0026	B 0.0124
SW-SFSC-800	5/18/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-SFSC-800	5/18/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0213
SP-SFSC-100	10/28/2003	Dissolved	N	*< 0.0086	Be% 0.00076	<0.0004	0.0193	<0.00007	<0.0065	<0.00006	Be 0.00068	<0.0004	<0.0011	<0.0035
SP-SFSC-100	10/28/2003	Total	N	0.0501	<0.0006	<0.0004	0.0194	<0.00007	<0.0065	<0.00006	B 0.00097	<0.0004	<0.0011	0.0245

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-UTSFSC-100	5/21/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SP-UTSFSC-100	5/21/2002	Total	N	* <0.1	<0.001	0.001	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	<0.05
SP-UTSFSC-100	8/6/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.01	--	<0.01	<0.01
SP-UTSFSC-100	8/6/2002	Total	N	e 0.1	<0.001	<0.001	<0.1	<0.001	<0.1	e% 0.0001	<0.01	--	<0.01	e% <0.01
SP-UTSFSC-100	5/20/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.003	<0.01	<0.01	<0.03
SP-UTSFSC-100	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFSC-100	8/12/2003	Dissolved	N	B 0.0143	Be 0.0016	<0.0007	0.0217	<0.00006	B 0.0149	<0.0001	<0.0003	B 0.00031	<0.0026	Be 0.0124
SP-UTSFSC-100	8/12/2003	Total	N	Ne% 0.885	W <0.0006	<0.0007	0.0309	B 0.00021	B 0.0205	q 0.00011	Be% 0.0017	B 0.00063	<0.0026	e% 0.771
SP-UTSFSC-200	9/23/2002	Dissolved	N	<0.1	<0.003	<0.003	0.03	<0.001	<0.1	0.0001	0.002	--	<0.001	0.33
SP-UTSFSC-200	9/23/2002	Total	N	0.5	<0.003	<0.003	0.03	<0.001	<0.1	<0.0001	0.002	--	<0.001	0.8
SP-UTSFSC-200	5/20/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SP-UTSFSC-200	5/20/2003	Dissolved	D	<0.1	<0.003	0.002	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SP-UTSFSC-200	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFSC-200	5/20/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFSC-200	8/12/2003	Dissolved	N	0.0447	Be 0.0014	<0.0007	0.0254	B 0.00017	B 0.016	<0.0001	<0.0003	<0.0003	<0.0026	e 0.0229
SP-UTSFSC-200	8/12/2003	Total	N	Ne% 0.127	<0.0006	<0.0007	0.0267	<0.00006	B 0.0198	<0.0001	Be% 0.00074	<0.0003	<0.0026	e% 0.132
SP-UTSFSC-200	10/29/2003	Dissolved	N	<0.0097	Be 0.0026	e <0.0004	0.0245	<0.00006	B 0.0153	<0.00006	<0.0003	B 0.00043	<0.0026	<0.0045
SP-UTSFSC-200	10/29/2003	Total	N	e% 0.0863	<0.0006	e <0.0004	e% 0.0248	<0.00006	B 0.0176	e <0.00006	Be% 0.00055	<0.0003	<0.0026	e% 0.0653
SP-SFSC-750	7/28/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-SFSC-750	7/28/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-SFSC-750	8/12/2003	Dissolved	N	B 0.0098	B 0.00064	<0.0004	0.0457	<0.00007	0.102	<0.0001	B 0.0022	B 0.00042	0.0036	0.0285
SP-SFSC-750	8/12/2003	Total	N	* <0.0097	<0.0006	<0.0004	0.0397	B 0.0001	B 0.0153	<0.0001	B 0.00096	<0.0003	<0.0026	<0.0045
SP-SFSC-750	9/28/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-SFSC-750	9/28/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	B 0.0175

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-SFSC-750	10/13/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-SFSC-750	10/13/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0247
SP-HOOPES	7/28/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-HOOPES	7/28/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTSC-850	5/18/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	B 0.013
SP-UTSC-850	5/18/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.326
SP-UTSC-850	9/28/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0268
SP-UTSC-850	9/28/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.228
MANNING CREEK														
SP-MC-300	5/21/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SP-MC-300	5/21/2002	Total	N	0.2	<0.001	0.003	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	0.18
SP-MC-300	5/20/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.003	<0.01	<0.01	<0.03
SP-MC-300	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-MC-300	8/25/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-MC-300	8/25/2004	Total	N	--	--	--	--	--	--	0.0024	--	--	--	26.9
DEER CREEK														
SW-DC-200	5/18/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SW-DC-200	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-DC-200	8/14/2003	Dissolved	N	<0.0097	Be 0.0015	<0.0007	0.0244	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	e <0.0045
SW-DC-200	8/14/2003	Total	N	Ne% <0.0097	<0.0006	<0.0007	0.0245	q 0.00006	<0.012	<0.0001	qe% 0.00044	<0.0003	<0.0026	e% 0.0185
SW-DC-200	5/20/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-DC-200	5/20/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	e% 0.0249
SW-DC-200	8/25/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-DC-200	8/25/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.114

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-DC-300	5/22/2002	Dissolved	N	<0.1	0.002	0.002	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	<0.05
SW-DC-300	5/22/2002	Total	N	0.2	<0.001	0.001	<0.1	<0.001	<0.05	0.0001	<0.01	--	<0.01	0.22
SW-DC-300	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-DC-300	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-DC-400	5/22/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SW-DC-400	5/22/2002	Total	N	0.2	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.2
SW-DC-400	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-DC-400	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-DC-400	5/17/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-DC-400	5/17/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	B 0.0132
SW-DC-500	5/23/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SW-DC-500	5/23/2002	Dissolved	D	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SW-DC-500	5/23/2002	Total	N	0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.14
SW-DC-500	5/23/2002	Total	D	* <0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.11
SW-DC-500	8/7/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.01	--	<0.01	0.06
SW-DC-500	8/7/2002	Total	N	e <0.1	<0.001	<0.001	<0.1	<0.001	<0.1	e% 0.0002	<0.01	--	<0.01	e% 0.05
SW-DC-500	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-DC-500	5/19/2003	Total	N	0.1	<0.003	0.002	<0.1	<0.001	<0.1	0.0003	(1) 0.001	<0.01	<0.01	0.21
SW-DC-500	8/13/2003	Dissolved	N	<0.0086	B 0.001	<0.0004	0.0339	<0.00007	B 0.0128	<0.0001	B 0.001	B 0.00048	<0.0011	<0.0035
SW-DC-500	8/13/2003	Total	N	* 0.171	<0.0006	<0.0004	0.0355	B 0.00013	B 0.0189	0.00011	B 0.00084	<0.0003	<0.0026	0.263
SW-DC-500	10/28/2003	Dissolved	N	*< 0.0086	BWe% 0.0021	W <0.0004	0.0305	<0.00007	B 0.0118	<0.00006	Be 0.00042	B 0.00043	<0.0011	<0.0035
SW-DC-500	10/28/2003	Total	N	0.0585	<0.0006	<0.0004	0.0302	<0.00007	<0.0065	0.0001	B 0.00055	<0.0004	<0.0011	0.0524
SW-DC-500	5/17/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-DC-500	5/17/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.19

TABLE A-3
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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-DC-500	8/26/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-DC-500	8/26/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.261
SW-DC-800	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SW-DC-800	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-DC-800	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SW-DC-800	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-DC-800	8/12/2003	Dissolved	N	B 0.0121	Be 0.002	<0.0007	0.0295	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	e 0.0251
SW-DC-800	8/12/2003	Total	N	e% 0.0244	<0.0006	<0.0007	0.0308	B 0.00007	<0.012	<0.0001	Be% 0.00059	<0.0003	<0.0026	e% 0.0898
SW-DC-800	10/30/2003	Dissolved	N	<0.0097	<0.0003	N <0.0006	0.0285	B 0.00009	B 0.0145	<0.00006	<0.0003	<0.0003	<0.0026	<0.0045
SW-DC-800	10/30/2003	Total	N	*BN 0.0176	W <0.0003	N <0.0006	0.0288	<0.00006	B 0.013	<0.00006	B 0.00046	<0.0003	<0.0026	* 0.114
SW-DC-800	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-DC-800	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	e% 0.103
SW-DC-800	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	B 0.0144
SW-DC-800	8/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.111
SP-DC-100	10/29/2003	Dissolved	N	<0.0097	We 0.0071	Be 0.00069	0.0037	<0.00006	<0.012	0.0001	B 0.0017	B 0.00067	<0.0026	<0.0045
SP-DC-100	10/29/2003	Total	N	e% <0.0097	B 0.0016	Be 0.00069	e% 0.0033	<0.00006	<0.012	e 0.0002	Be% 0.0019	<0.0003	<0.0026	Be% 0.0107
SP-DC-350	8/8/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	0.0004	<0.01	--	<0.01	<0.01
SP-DC-350	8/8/2002	Total	N	e <0.1	<0.001	<0.001	<0.1	<0.001	<0.1	e% 0.0003	<0.01	--	<0.01	e% 0.03
SP-DC-350	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SP-DC-350	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-DC-350	8/13/2003	Dissolved	N	<0.0097	e 0.0061	<0.0007	0.0114	<0.00006	<0.012	0.0002	B 0.0015	<0.0003	<0.0026	e <0.0045
SP-DC-350	8/13/2003	Total	N	Ne% <0.0097	<0.0006	<0.0007	0.0115	<0.00006	<0.012	q 0.00023	qe% 0.0023	<0.0003	<0.0026	e% <0.0045
SP-DC-350	5/17/2004	Dissolved	N	--	--	--	--	--	--	W*<0.0001	--	--	--	<0.0124
SP-DC-350	5/17/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0708

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-DC-350	8/25/2004	Dissolved	N	--	--	--	--	--	--	0.00017	--	--	--	<0.0124
SP-DC-350	8/25/2004	Total	N	--	--	--	--	--	--	0.00046	--	--	--	0.62
SP-UTDC-700	5/19/2003	Dissolved	N	<0.1	<0.003	0.005	<0.1	<0.001	<0.1	0.0003	0.002	<0.01	<0.01	<0.03
SP-UTDC-700	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTDC-700	8/14/2003	Dissolved	N	0.0237	Be 0.0016	B 0.0012	0.0077	<0.00006	<0.012	<0.0001	B 0.0025	<0.0003	<0.0026	e <0.0045
SP-UTDC-700	8/14/2003	Total	N	1.95	<0.0006	0.0014	0.0195	q 0.00011	<0.012	q 0.0063	qe% 0.0309	<0.0003	<0.0026	e% 1
SP-UTDC-700	10/28/2003	Dissolved	N	*B 0.017	e% 0.0033	<0.0004	0.0132	<0.00007	<0.0065	0.0001	Be 0.00061	B 0.00068	<0.0011	<0.0035
SP-UTDC-700	10/28/2003	Total	N	6.74	W <0.0006	BW 0.0028	0.0572	B 0.00023	<0.0065	0.0016	0.0785	B 0.00085	0.0061	4.03
SP-UTDC-700	5/17/2004	Dissolved	N	--	--	--	--	--	--	*0.00024	--	--	--	<0.0124
SP-UTDC-700	5/17/2004	Total	N	--	--	--	--	--	--	0.00046	--	--	--	0.219
SP-UTDC-700	8/26/2004	Dissolved	N	--	--	--	--	--	--	0.00022	--	--	--	<0.0124
SP-UTDC-700	8/26/2004	Total	N	--	--	--	--	--	--	0.0113	--	--	--	7.54
SP-UTDC-800	9/25/2002	Dissolved	N	<0.1	<0.003	<0.003	<0.02	<0.001	<0.1	0.0003	0.003	--	<0.001	0.45
SP-UTDC-800	9/25/2002	Total	N	0.1	<0.003	<0.003	<0.02	<0.001	<0.1	0.0005	0.008	--	<0.001	0.67
SP-UTDC-800	5/19/2003	Dissolved	N	<0.1	<0.003	0.007	<0.1	<0.001	<0.1	<0.0001	0.004	<0.01	<0.01	<0.03
SP-UTDC-800	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTDC-800	8/13/2003	Dissolved	N	<0.0097	Be 0.0016	B 0.00083	0.0034	<0.00006	<0.012	0.00021	<0.0003	B 0.00043	<0.0026	Be 0.012
SP-UTDC-800	8/13/2003	Total	N	N 0.0315	W <0.0006	0.001	0.0035	<0.00006	<0.012	q 0.00031	qe% 0.0018	0.00041	<0.0026	e% 0.0843
SP-UTDC-800	10/28/2003	Dissolved	N	*< 0.0086	We% <0.0006	W <0.0004	0.0042	<0.00007	<0.0065	0.00033	Be 0.00059	B 0.00064	<0.0011	<0.0035
SP-UTDC-800	10/28/2003	Total	N	1.36	W <0.0006	BW 0.003	0.0105	<0.00007	B 0.009	0.001	0.057	<0.0004	B 0.0014	1.82
SP-UTDC-800	5/17/2004	Dissolved	N	--	--	--	--	--	--	*0.00023	--	--	--	B 0.0142
SP-UTDC-800	5/17/2004	Total	N	--	--	--	--	--	--	0.0072	--	--	--	1.29
NORTH FORK DEER CREEK														
SW-NFDC-200	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	0.1	<0.0001	<0.001	<0.01	<0.01	<0.03

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Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-NFDC-200	5/19/2003	Dissolved	D	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.002	<0.01	<0.01	<0.03
SW-NFDC-200	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-200	5/19/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-500	5/22/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SW-NFDC-500	5/22/2002	Total	N	0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.13
SW-NFDC-500	8/7/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	0.0002	<0.01	--	<0.01	0.03
SW-NFDC-500	8/7/2002	Total	N	e 0.1	<0.001	<0.001	<0.1	<0.001	<0.1	e% <0.0001	<0.01	--	<0.01	e% 0.12
SW-NFDC-500	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.002	<0.01	<0.01	<0.03
SW-NFDC-500	5/19/2003	Dissolved	D	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-NFDC-500	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-500	5/19/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-500	8/13/2003	Dissolved	N	<0.0086	B 0.00068	<0.0004	0.0339	<0.00007	<0.0065	<0.0001	B 0.00085	B 0.0006	<0.0011	<0.0035
SW-NFDC-500	8/13/2003	Total	N	* 0.0594	<0.0006	<0.0004	0.0339	<0.00006	<0.012	<0.0001	B 0.00045	<0.0003	<0.0026	0.158
SW-NFDC-500	10/28/2003	Dissolved	N	*B 0.0099	e% <0.0006	W <0.0004	0.0321	<0.00007	<0.0065	<0.00006	Be 0.00021	B 0.00054	<0.0011	<0.0035
SW-NFDC-500	10/28/2003	Total	N	0.119	<0.0006	<0.0004	0.0332	<0.00007	B 0.0084	B 0.00007	B 0.00061	<0.0004	<0.0011	0.147
SW-NFDC-900	6/18/2002	Dissolved	N	<0.1	<0.001	0.002	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	<0.05
SW-NFDC-900	6/18/2002	Total	N	0.2	<0.001	0.002	<0.1	<0.001	<0.05	0.0003	<0.01	--	<0.01	0.24
SW-NFDC-900	8/7/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.01	--	<0.01	0.02
SW-NFDC-900	8/7/2002	Total	N	e 0.02	<0.001	<0.001	<0.1	<0.001	<0.1	e% 0.0002	<0.01	--	<0.01	e% 0.2
SW-NFDC-900	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-NFDC-900	5/19/2003	Total	N	0.4	<0.003	0.002	<0.1	<0.001	<0.1	0.0001	(1) 0.001	<0.01	<0.01	0.57
SW-NFDC-900	8/13/2003	Dissolved	N	<0.0086	B 0.0021	<0.0004	0.0326	<0.00007	<0.0065	<0.0001	B 0.00089	<0.0004	<0.0011	<0.0035
SW-NFDC-900	8/13/2003	Total	N	* 0.095	<0.0006	<0.0004	0.034	<0.00006	<0.012	<0.0001	B 0.00049	<0.0003	<0.0026	0.179
SW-NFDC-900	10/28/2003	Dissolved	N	*< 0.0086	e% <0.0006	W <0.0004	0.0308	<0.00007	<0.0065	<0.00006	Be 0.00046	B 0.00049	<0.0011	<0.0035

TABLE A-3
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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				NE	4.3	0.05	NE	NE	NE	0.001h	0.01+	NE	0.011h	NE
SW-NFDC-900	10/28/2003	Total	N	0.109	<0.0006	<0.0004	0.0321	<0.00007	<0.0065	B 0.00008	B 0.00071	<0.0004	<0.0011	0.111
SW-UTNFDC-510	9/24/2002	Dissolved	N	<0.1	<0.003	<0.003	0.02	<0.001	<0.1	<0.0001	0.002	--	<0.001	0.32
SW-UTNFDC-510	9/24/2002	Total	N	0.2	<0.003	<0.003	0.02	<0.001	<0.1	0.0001	0.002	--	<0.001	0.47
SW-UTNFDC-510	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SW-UTNFDC-510	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-UTNFDC-510	8/13/2003	Dissolved	N	<0.0086	B 0.0016	<0.0004	0.0264	<0.00007	B 0.0188	<0.0001	B 0.0011	B 0.00054	<0.0011	B 0.0037
SW-UTNFDC-510	8/13/2003	Total	N	* 0.0994	<0.0006	<0.0004	0.0273	<0.00006	B 0.0247	<0.0001	B 0.00072	<0.0003	<0.0026	0.171
SW-UTNFDC-700	9/23/2002	Dissolved	N	<0.1	<0.003	<0.003	0.03	<0.001	<0.1	0.0001	<0.001	--	<0.001	0.29
SW-UTNFDC-700	9/23/2002	Total	N	* <0.1	<0.003	<0.003	0.04	<0.001	<0.1	<0.0001	0.001	--	<0.001	0.32
SW-UTNFDC-700	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-UTNFDC-700	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-UTNFDC-700	8/13/2003	Dissolved	N	<0.0086	B 0.0011	<0.0004	0.0282	<0.00007	<0.0065	<0.0001	B 0.00097	B 0.00049	<0.0011	<0.0035
SW-UTNFDC-700	8/13/2003	Total	N	N <0.0097	W <0.0006	<0.0004	0.0265	<0.00006	<0.012	<0.0001	B 0.00042	<0.0003	<0.0026	B 0.0143
SW-UTNFDC-800	9/23/2002	Dissolved	N	<0.1	<0.003	<0.003	0.04	<0.001	<0.1	<0.0001	0.002	--	<0.001	0.32
SW-UTNFDC-800	9/23/2002	Total	N	0.1	<0.003	<0.003	0.04	<0.001	<0.1	<0.0001	0.002	--	<0.001	0.37
SW-UTNFDC-900	9/23/2002	Dissolved	N	<0.1	<0.003	<0.003	0.03	<0.001	<0.1	<0.0001	<0.001	--	<0.001	0.3
SW-UTNFDC-900	9/23/2002	Total	N	* <0.1	<0.003	<0.003	0.04	<0.001	<0.1	<0.0001	0.001	--	<0.001	0.33
SW-UTNFDC-950	9/23/2002	Dissolved	N	<0.1	<0.003	<0.003	0.04	<0.001	<0.1	0.0001	0.002	--	<0.001	0.33
SW-UTNFDC-950	9/23/2002	Total	N	0.3	<0.003	<0.003	0.05	<0.001	<0.1	0.0001	0.002	--	<0.001	0.55
SP-NFDC-50	10/29/2003	Dissolved	N	<0.0097	We 0.0032	e <0.0004	0.0297	<0.00006	<0.012	<0.00006	B 0.00039	B 0.00036	<0.0026	<0.0045
SP-NFDC-50	10/29/2003	Total	N	e% 0.0319	<0.0006	e <0.0004	e% 0.0296	<0.00006	<0.012	e <0.00006	Be% 0.00057	<0.0003	<0.0026	e% 0.0281
SP-NFDC-700	6/18/2002	Dissolved	N	<0.1	0.004	0.002	<0.1	<0.001	<0.05	0.0001	<0.01	--	<0.01	<0.05
SP-NFDC-700	6/18/2002	Total	N	* <0.1	<0.001	0.001	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	<0.05
SP-NFDC-700	8/7/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	0.0003	<0.01	--	<0.01	<0.01

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BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-NFDC-700	8/7/2002	Total	N	e 0.4	<0.001	0.001	<0.1	<0.001	<0.1	e% 0.0024	<0.01	--	<0.01	e% 2.82
SP-NFDC-700	5/19/2003	Dissolved	N	<0.1	<0.003	0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SP-NFDC-700	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-NFDC-700	8/13/2003	Dissolved	N	<0.0086	B 0.0027	<0.0004	0.0193	<0.00007	B 0.0108	<0.0001	B 0.0016	<0.0004	<0.0011	<0.0035
SP-NFDC-700	8/13/2003	Total	N	* <0.0097	<0.0006	<0.0004	0.018	<0.00006	B 0.0152	<0.0001	B 0.00095	<0.0003	<0.0026	B 0.0082
SP-UTNFDC-400	5/21/2002	Dissolved	N	0.1	<0.001	0.001	<0.1	<0.001	<0.05	0.0006	<0.01	--	<0.01	0.08
SP-UTNFDC-400	5/21/2002	Total	N	2.7	<0.001	0.003	<0.1	0.005	<0.05	0.0046	0.01	--	<0.01	1.96
SP-UTNFDC-400	5/20/2003	Dissolved	N	<0.1	<0.003	0.002	<0.1	<0.001	<0.1	0.0007	0.001	<0.01	<0.01	<0.03
SP-UTNFDC-400	5/20/2003	Total	N	0.2	<0.003	0.002	<0.1	<0.001	<0.1	0.0011	0.003	<0.01	<0.01	0.25
SP-UTNFDC-520	9/24/2002	Dissolved	N	<0.1	<0.003	<0.003	0.03	<0.001	<0.1	<0.0001	0.002	--	<0.001	0.35
SP-UTNFDC-520	9/24/2002	Total	N	* <0.1	<0.003	<0.003	0.03	<0.001	<0.1	<0.0001	0.002	--	<0.001	0.33
SP-UTNFDC-520	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.001	<0.01	<0.01	<0.03
SP-UTNFDC-520	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTNFDC-520	8/13/2003	Dissolved	N	<0.0086	B 0.002	<0.0004	0.0285	<0.00007	B 0.0102	<0.0001	B 0.0012	<0.0004	<0.0011	<0.0035
SP-UTNFDC-520	8/13/2003	Total	N	*B 0.0192	<0.0006	<0.0004	0.0277	<0.00006	B 0.0142	<0.0001	B 0.00047	<0.0003	<0.0026	0.0273
SP-UTNFDC-540	8/13/2003	Dissolved	N	<0.0086	B 0.0021	B 0.00049	0.0188	B 0.00029	<0.0065	0.00096	B 0.0018	B 0.00077	<0.0011	<0.0035
SP-UTNFDC-540	8/13/2003	Total	N	* 0.0236	<0.0006	B 0.0014	0.0189	<0.00006	<0.012	0.004	B 0.0015	<0.0003	<0.0026	0.179
SP-UTNFDC-540	10/28/2003	Dissolved	N	*< 0.0086	BWe% 0.0021	BW 0.0004	0.0193	<0.00007	B 0.0129	0.0016	Be 0.00094	B 0.00054	<0.0011	<0.0035
SP-UTNFDC-540	10/28/2003	Total	N	0.0862	<0.0006	B 0.0011	0.0205	<0.00007	<0.0065	0.0025	B 0.0044	<0.0004	<0.0011	0.146
SP-UTNFDC-540	5/17/2004	Dissolved	N	--	--	--	--	--	--	*0.0019	--	--	--	<0.0124
SP-UTNFDC-540	5/17/2004	Total	N	--	--	--	--	--	--	0.0021	--	--	--	0.0269
SP-UTNFDC-600	8/6/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.01	--	<0.01	0.02
SP-UTNFDC-600	8/6/2002	Total	N	e 0.2	<0.001	<0.001	<0.1	<0.001	<0.1	e% 0.0007	<0.01	--	<0.01	e% 0.55
SP-UTNFDC-600	5/20/2003	Dissolved	N	<0.1	<0.003	0.002	<0.1	<0.001	<0.1	<0.0001	0.002	<0.01	<0.01	<0.03

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IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-UTNFDC-600	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTNFDC-600	8/14/2003	Dissolved	N	<0.0097	Be 0.0028	<0.0007	0.0096	<0.00006	<0.012	<0.0001	<0.0003	B 0.00034	<0.0026	e <0.0045
SP-UTNFDC-600	8/14/2003	Total	N	N 0.16	W <0.0006	<0.0007	0.0108	q 0.00013	0.0162	q 0.00014	qe% 0.0017	0.00037	<0.0026	e% 0.309
SP-UTNFDC-600	10/29/2003	Dissolved	N	<0.0097	BWe 0.0027	Be 0.00075	0.0103	<0.00006	<0.012	<0.00006	B 0.0018	B 0.00039	<0.0026	<0.0045
SP-UTNFDC-600	10/29/2003	Total	N	e% 0.025	<0.0006	Be 0.0011	e% 0.01	<0.00006	<0.012	e 0.00022	Be% 0.0022	<0.0003	<0.0026	e% 0.0366
SP-UTNFDC-600	5/18/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SP-UTNFDC-600	5/18/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.412
SP-UTNFDC-600	8/25/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	B 0.0177
SP-UTNFDC-600	8/25/2004	Total	N	--	--	--	--	--	--	0.00026	--	--	--	0.702
SOUTH FORK DEER CREEK														
SW-SFDC-200	5/18/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-SFDC-200	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-SFDC-200	8/13/2003	Dissolved	N	<0.0097	Be 0.0018	<0.0007	0.0251	<0.00006	B 0.0158	<0.0001	<0.0003	<0.0003	<0.0026	e 0.0217
SW-SFDC-200	8/13/2003	Dissolved	D	B 0.0138	<0.0006	<0.0007	0.024	<0.00006	<0.012	<0.0001	<0.0003	B 0.00032	<0.0026	0.0275
SW-SFDC-200	8/13/2003	Total	N	N 0.127	<0.0006	<0.0007	0.0257	<0.00006	<0.012	<0.0001	qe% 0.00045	<0.0003	<0.0026	e% 0.21
SW-SFDC-200	8/13/2003	Total	D	N 0.0901	<0.0006	<0.0007	0.0252	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	0.186
SW-SFDC-200	10/28/2003	Dissolved	N	* 0.0204	BWe% 0.0029	<0.0004	0.0265	<0.00007	<0.0065	<0.00006	e <0.0002	B 0.00066	<0.0011	0.0342
SW-SFDC-200	10/28/2003	Total	N	0.174	<0.0006	<0.0004	0.0285	<0.00007	<0.0065	<0.00006	B 0.00066	<0.0004	<0.0011	0.31
SW-SFDC-300	5/22/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SW-SFDC-300	5/22/2002	Total	N	* <0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.08
SW-SFDC-300	5/18/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	0.002	<0.01	<0.01	<0.03
SW-SFDC-300	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-SFDC-800	5/23/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SW-SFDC-800	5/23/2002	Total	N	* <0.1	0.002	0.001	<0.1	<0.001	<0.05	0.0002	<0.01	--	<0.01	<0.05

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-SFDC-800	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-SFDC-800	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-SFDC-800	5/17/2004	Dissolved	N	--	--	--	--	--	--	*0.00022	--	--	--	<0.0124
SW-SFDC-800	5/17/2004	Total	N	--	--	--	--	--	--	0.0002	--	--	--	<0.0124
SW-SFSC-800	9/28/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-SFSC-800	9/28/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0272
SW-UTSFDC-900	5/19/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-UTSFDC-900	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFDC-500	5/22/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.06
SP-UTSFDC-500	5/22/2002	Total	N	0.1	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.12
SP-UTSFDC-600	10/29/2003	Dissolved	N	<0.0097	BWe 0.0022	e <0.0004	0.0338	<0.00006	<0.012	<0.00006	<0.0003	B 0.00057	<0.0026	<0.0045
SP-UTSFDC-600	10/29/2003	Total	N	e% 0.037	<0.0006	e <0.0004	e% 0.0338	<0.00006	<0.012	e <0.00006	Be% 0.0003	<0.0003	<0.0026	e% 0.0275
WELLS CANYON														
SW-WC-800	5/18/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-WC-800	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-WC-800	8/12/2003	Dissolved	N	<0.0097	Be 0.0029	<0.0007	0.0341	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	Be 0.0053
SW-WC-800	8/12/2003	Dissolved	D	B 0.0117	B 0.0018	<0.0007	0.0344	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	B 0.006
SW-WC-800	8/12/2003	Total	N	Ne% 0.146	<0.0006	<0.0007	0.0373	<0.00006	<0.012	q 0.00018	Be% 0.00086	<0.0003	<0.0026	e% 0.135
SW-WC-800	8/12/2003	Total	D	N 0.37	<0.0006	<0.0007	0.0377	<0.00006	<0.012	0.0002	B 0.0016	<0.0003	<0.0026	0.266
SW-WC-800	10/28/2003	Dissolved	N	*< 0.0086	Be% 0.0028	<0.0004	0.0334	<0.00007	<0.0065	<0.00006	Be 0.00066	B 0.00056	<0.0011	<0.0035
SW-WC-800	10/28/2003	Total	N	0.154	<0.0006	B 0.00045	0.0353	<0.00007	<0.0065	M 0.00012	B 0.0014	<0.0004	<0.0011	0.0908
SW-WC-800	5/19/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-WC-800	5/19/2004	Dissolved	D	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-WC-800	5/19/2004	Total	N	--	--	--	--	--	--	0.00021	--	--	--	e% 0.383

TABLE A-3
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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-WC-800	5/19/2004	Total	D	--	--	--	--	--	--	0.00023	--	--	--	0.408
SW-WC-800	8/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-WC-800	8/24/2004	Total	N	--	--	--	--	--	--	0.00013	--	--	--	0.263
SP-UTWC-300	5/23/2002	Dissolved	N	0.3	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.15
SP-UTWC-300	5/23/2002	Total	N	0.4	<0.001	<0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	0.29
SP-UTWC-300	5/18/2003	Dissolved	N	0.2	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	0.08
SP-UTWC-300	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-WC-400	5/20/2002	Dissolved	N	<0.1	<0.001	0.001	<0.1	<0.001	<0.05	<0.0001	<0.01	--	<0.01	<0.05
SP-WC-400	5/20/2002	Total	N	0.4	0.002	0.003	<0.1	<0.001	<0.05	0.0007	<0.01	--	<0.01	0.29
SP-WC-400	8/8/2002	Dissolved	N	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	0.0002	<0.01	--	<0.01	0.03
SP-WC-400	8/8/2002	Dissolved	D	<0.1	<0.001	<0.001	<0.1	<0.001	<0.1	0.0001	<0.01	--	<0.01	0.03
SP-WC-400	8/8/2002	Total	N	e 0.1	<0.001	<0.001	<0.1	<0.001	<0.1	e% 0.0011	<0.01	--	<0.01	e% 0.72
SP-WC-400	8/8/2002	Total	D	0.3	<0.001	0.001	<0.1	<0.001	<0.1	0.0006	<0.01	--	<0.01	0.35
SP-WC-400	5/18/2003	Dissolved	N	<0.1	<0.003	0.002	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SP-WC-400	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-WC-400	8/13/2003	Dissolved	N	<0.0097	Be 0.0021	<0.0007	0.0177	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	Be 0.0055
SP-WC-400	8/13/2003	Total	N	N 0.888	W <0.0006	0.0011	0.0241	q 0.00008	<0.012	q 0.00081	qe% 0.0064	0.00041	<0.0026	e% 0.616
SP-WC-400	10/28/2003	Dissolved	N	*B 0.015	e% 0.0038	<0.0004	0.0185	<0.00007	<0.0065	<0.00006	Be 0.00075	<0.0004	<0.0011	<0.0035
SP-WC-400	10/28/2003	Dissolved	D	<0.0086	B 0.00071	<0.0004	0.0187	<0.00007	<0.0065	<0.00006	B 0.00098	<0.0004	<0.0011	<0.0035
SP-WC-400	10/28/2003	Total	N	0.77	<0.0006	B 0.00045	0.0247	<0.00007	<0.0065	0.00083	B 0.0057	<0.0004	<0.0011	0.581
SP-WC-400	10/28/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--
SP-WC-400	5/17/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SP-WC-400	5/17/2004	Total	N	--	--	--	--	--	--	0.00022	--	--	--	0.147
SP-WC-400	8/25/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124

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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SP-WC-400	8/25/2004	Total	N	--	--	--	--	--	--	0.0037	--	--	--	3.1
SP-WC-750	6/5/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-WC-750	6/5/2003	Total	N	* <0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SP-WC-750	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SP-WC-750	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SP-WC-750	8/14/2003	Dissolved	N	<0.0097	Be 0.0013	<0.0007	0.0244	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	e <0.0045
SP-WC-750	8/14/2003	Total	N	Ne% <0.0097	W <0.0006	<0.0007	0.0243	<0.00006	<0.012	<0.0001	qe% 0.00094	<0.0003	<0.0026	e% <0.0045
DIAMOND CREEK														
SW-DMC-200	5/18/2003	Dissolved	N	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	<0.01	<0.03
SW-DMC-200	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
SW-DMC-200	8/14/2003	Dissolved	N	<0.0097	e <0.0006	<0.0007	0.0148	<0.00006	<0.012	<0.0001	<0.0003	B 0.00041	<0.0026	e <0.0045
SW-DMC-200	8/14/2003	Dissolved	D	<0.0097	B 0.00088	<0.0007	0.0146	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	<0.0026	<0.0045
SW-DMC-200	8/14/2003	Total	N	N 0.0314	<0.0006	<0.0007	0.015	<0.00006	<0.012	<0.0001	qe% 0.00042	<0.0003	<0.0026	e% 0.023
SW-DMC-200	8/14/2003	Total	D	N 0.0238	<0.0006	<0.0007	0.015	<0.00006	<0.012	<0.0001	0.00034	<0.0003	<0.0026	0.0228
STEWART CANYON														
SW-ST-500	8/15/2003	Dissolved	N	<0.0097	W <0.0006	<0.0004	0.0088	<0.00006	<0.012	<0.0001	B 0.0012	<0.0003	<0.0026	<0.0045
SW-ST-500	8/15/2003	Total	N	0.04	W <0.0006	<0.0004	0.0093	<0.00006	<0.012	0.00041	B 0.0014	<0.0003	<0.0026	* 0.0868
SW-ST-500	5/18/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-ST-500	5/18/2004	Total	N	--	--	--	--	--	--	0.00021	--	--	--	0.106
SW-ST-500	8/26/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-ST-500	8/26/2004	Total	N	--	--	--	--	--	--	0.00048	--	--	--	0.222
SW-ST-700	8/26/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-ST-700	8/26/2004	Dissolved	D	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SW-ST-700	8/26/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	B 0.0163

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BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-ST-700	8/26/2004	Total	D	--	--	--	--	--	--	<0.0001	--	--	--	0.0204
SP-ST-100	8/15/2003	Dissolved	N	<0.0097	BW 0.00073	<0.0004	0.022	<0.00006	<0.012	<0.0001	B 0.00094	B 0.00065	<0.0026	<0.0045
SP-ST-100	8/15/2003	Total	N	* <0.0097	<0.0006	<0.0004	0.0224	<0.00006	<0.012	<0.0001	B 0.00072	<0.0003	<0.0026	*< 0.0045
SP-ST-100	5/18/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SP-ST-100	5/18/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-ST-100	8/26/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-ST-100	8/26/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-ST-200	8/15/2003	Dissolved	N	<0.0097	W <0.0006	<0.0004	0.0222	<0.00006	<0.012	<0.0001	B 0.001	B 0.00049	<0.0026	<0.0045
SP-ST-200	8/15/2003	Total	N	* <0.0097	W <0.0006	<0.0004	0.022	<0.00006	<0.012	<0.0001	B 0.0009	<0.0003	<0.0026	*B 0.0089
SP-ST-200	5/18/2004	Dissolved	N	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SP-ST-200	5/18/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	0.0273
SP-ST-200	8/26/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	--	<0.0124
SP-ST-200	8/26/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	--	B 0.0193
LAMB CANYON														
SW-LC-500	8/15/2003	Dissolved	N	<0.0097	BW 0.00082	<0.0004	0.0152	B 0.00011	B 0.0122	<0.0001	B 0.0016	B 0.00035	<0.0026	<0.0045
SW-LC-500	8/15/2003	Total	N	0.0679	W <0.0006	<0.0004	0.0159	<0.00006	<0.012	0.00042	B 0.0017	<0.0003	B 0.0029	* 0.111
CLEAR CREEK														
SW-CL-800	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SW-CL-800	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
WHITE DUGWAY CREEK														
SW-WD-800	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--
SW-WD-800	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
WARM CREEK														
SW-WM-800	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--

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BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Cobalt (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**NE**	**4.3**	**0.05**	**NE**	**NE**	**NE**	**0.001h**	**0.01+**	**NE**	**0.011h**	**NE**
SW-WM-800	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--
PRESERVATIVE BLANK														
SW-OC-200	5/20/2003	Dissolved	B	<0.1	<0.003	<0.001	<0.1	<0.001	<0.1	<0.0001	<0.001	<0.01	0.02	<0.03
SW-OC-200	5/20/2003	Total	B	--	--	--	--	--	--	--	--	--	--	--
SW-OC-200	8/14/2003	Dissolved	B	<0.0097	<0.0006	<0.0007	<0.0005	<0.00006	<0.012	<0.0001	<0.0003	<0.0003	0.0192	<0.0045
SW-OC-200	8/14/2003	Total	B	N <0.0097	<0.0006	<0.0007	<0.0005	0.00007	<0.012	M 0.00011	0.0003	<0.0003	0.0211	<0.0045
SW-OC-200	10/30/2003	Dissolved	B	--	--	--	--	--	--	--	--	--	--	--
SW-OC-200	10/30/2003	Total	B	* <0.0097	<0.0003	WN <0.0006	<0.0005	<0.00006	<0.012	0.00011	B 0.00051	<0.0003	0.0188	*< 0.0045
SW-OC-200	5/19/2004	Dissolved	B	--	--	--	--	--	--	*<0.0001	--	--	--	<0.0124
SW-OC-200	5/19/2004	Total	B	--	--	--	--	--	--	<0.0001	--	--	--	e% <0.0124

Notes:

- B Not detected above quantitation limit but present above method detection limit (SVL).
- D Field duplicate sample
- J Estimated value (Northern Analytical).
- N Located in the QC column indicates natural sample.
- N Located in analyte column indicates percent recovery not within control limits 75-125% (
- NE Not Established
- M Duplicate precision goal not met (SVL).
- W Post-digestion spike recovery out of control limits 85-115% (SVL).
- < Indicates analyte not detected above laboratory practical quantification limit (PQL).
- (mg/L) Milligrams per liter
- * Dulicate analysis not within control limits (SVL).
- (1) Verified by a second analysis (Northern Analytical).
- -- Field data or laboratory samples were not collected or analyzed.
- H Sample analyzed out of holding time.
- e Field duplicate results exceed acceptable limits - PQL based determination.
- e% Field duplicate results exceed acceptable limits - relative percent difference determination.
- q Associated values are estimates - field blank showed evidence of contamination.
- ** The surface water standards value is the lowest concentration for cold water biota for Criteria Maximum Concentration (CMC), Criteria Continuous Concentration (CCC), or human consumption of organisms. Standards from IDAPA 58.01.02.210 + 250. For Idaho, water quality standards are based on the dissolved fraction for metals in surface water (except total fraction for selenium and mercury as CCC). Standard values followed by an "h" indicate the aquatic life criteria are expressed as a function of total hardness and water effect ratio (WER). Hardness dependent standards are calculated for each watershed based on the average observed hardness. Standards shown are based on hardness of 100 mg/L.
- Shading indicates results above Idaho DEQ Standards, regardless of physical state (Total or Dissolved).
- + Chromium standard of 0.01 mg/l is for Chromium VI; the chromium III standard is 0.18 mg/l for CCC and is hardness dependent.

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
CROW CREEK															
SW-CC-50	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CC-50	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CC-50	5/19/2004	Dissolved	N	<0.0007	0.0394	<0.0002	--	<0.0013	B 0.00051	--	--	--	--	--	B 0.0014
SW-CC-50	5/19/2004	Total	N	B 0.001	0.0478	<0.0002	--	<0.0013	Be% 0.00051	--	--	--	--	--	B 0.003
SW-CC-50	8/24/2004	Dissolved	N	B 0.00063	0.0269	<0.0001	--	0.013	N< 0.0003	--	--	--	--	--	Be 0.00097
SW-CC-50	8/24/2004	Total	N	<0.0004	0.033	<0.0001	--	<0.0013	Be 0.0003	--	--	--	--	--	B 0.0016
SW-CC-100	8/15/2003	Dissolved	N	W <0.0003	0.0071	<0.0001	0.011	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.0019	<0.0018
SW-CC-100	8/15/2003	Total	N	<0.0003	0.0102	<0.0001	0.0086	<0.001	BN 0.00028	--	--	<0.0001	<0.0003	B 0.002	<0.0018
SW-CC-100	10/29/2003	Dissolved	N	<0.0004	0.0077	<0.0001	0.0087	B 0.0023	B 0.0005	--	--	<0.0001	<0.0003	B 0.0018	0.0018
SW-CC-100	10/29/2003	Dissolved	D	<0.0004	0.0064	<0.0001	B 0.0079	B 0.0025	B 0.00068	--	--	<0.0001	<0.0003	B 0.0016	0.0018
SW-CC-100	10/29/2003	Total	N	B 0.00069	e% 0.0774	<0.0001	0.0096	<0.001	Be 0.00097	<0.0002	Be 0.00097	<0.0001	<0.0003	Be% 0.0039	e% 0.0095
SW-CC-100	10/29/2003	Total	D	<0.0004	0.0096	<0.0001	0.0102	<0.001	B 0.00075	<0.0002	B 0.00075	<0.0001	W <0.0003	B 0.0018	<0.0018
SW-CC-100	5/19/2004	Dissolved	N	<0.0007	0.0052	<0.0002	--	<0.0013	B 0.00092	--	--	--	--	--	<0.0002
SW-CC-100	5/19/2004	Total	N	B 0.001	0.0185	<0.0002	--	<0.0013	Be% 0.00097	--	--	--	--	--	B 0.002
SW-CC-100	8/24/2004	Dissolved	N	<0.0004	0.0057	<0.0001	--	0.0166	BN 0.00078	--	--	--	--	--	Be 0.0013
SW-CC-100	8/24/2004	Total	N	<0.0004	0.0155	<0.0001	--	<0.0013	Be 0.00097	--	--	--	--	--	B 0.0012
SW-CC-300	5/20/2003	Dissolved	N	<0.002	e <0.01	<0.0001	<0.005	<0.01	e 0.001	<0.001	e 0.001	<0.001	<0.002	<0.005	e <0.01
SW-CC-300	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CC-300	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CC-300	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CC-300	8/12/2003	Dissolved	N	e <0.0003	e 0.0074	<0.0001	0.0101	B 0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.0019	<0.0018
SW-CC-300	8/12/2003	Total	N	Be% 0.00083	0.0175	<0.0001	q 0.0114	<0.001	--	--	--	N 0.0001	<0.0005	B 0.0021	<0.0018
SW-CC-300	5/19/2004	Dissolved	N	<0.0007	0.0131	<0.0002	--	<0.0013	B 0.00067	--	--	--	--	--	B 0.0034

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-CC-300	5/19/2004	Total	N	B 0.001	0.021	<0.0002	--	<0.0013	Be% 0.00048	--	--	--	--	--	B 0.0022
SW-CC-300	8/24/2004	Dissolved	N	W <0.0004	0.0072	<0.0001	--	B 0.0097	BN 0.00037	--	--	--	--	--	e <0.0002
SW-CC-300	8/24/2004	Total	N	<0.0004	0.0117	<0.0001	--	<0.0013	Be 0.00063	--	--	--	--	--	<0.0002
SW-CC-800	5/20/2003	Dissolved	N	<0.002	e 0.01	<0.0001	<0.005	<0.01	e 0.002	<0.001	e 0.002	<0.001	<0.002	<0.005	e <0.01
SW-CC-800	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CC-800	8/15/2003	Dissolved	N	<0.0003	0.0032	<0.0001	0.013	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.002	<0.0018
SW-CC-800	8/15/2003	Total	N	<0.0003	0.0215	<0.0001	0.0097	<0.001	N <0.0002	--	--	N <0.0001	<0.0003	B 0.0021	<0.0018
SW-CC-800	5/19/2004	Dissolved	N	<0.0007	0.022	<0.0002	--	<0.0013	B 0.00078	--	--	--	--	--	B 0.0025
SW-CC-800	5/19/2004	Dissolved	D	<0.0007	0.0213	<0.0002	--	<0.0013	B 0.00079	--	--	--	--	--	B 0.0018
SW-CC-800	5/19/2004	Total	N	B 0.00082	0.0299	<0.0002	--	<0.0013	Be% 0.00081	--	--	--	--	--	B 0.001
SW-CC-800	5/19/2004	Total	D	B 0.00082	0.0297	<0.0002	--	<0.0013	B 0.00031	--	--	--	--	--	B 0.00096
SW-CC-800	8/24/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.0107	BN 0.00076	--	--	--	--	--	e <0.0002
SW-CC-800	8/24/2004	Total	N	<0.0004	0.0054	<0.0001	--	<0.0013	e 0.0017	--	--	--	--	--	<0.0002
SP-UTCC-50	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTCC-50	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-RIEDE	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-RIEDE	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	6/5/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	6/5/2003	Total	N	<0.002	0.02	<0.0002	<0.005	<0.01	--	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SP-BOOKS	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-BOOKS	8/14/2003	Dissolved	N	Be 0.0007	e 0.0236	<0.0001	0.0113	<0.001	<0.0002	--	--	W <0.0001	<0.0005	B 0.0011	B 0.0021
SP-BOOKS	8/14/2003	Total	N	qe% 0.00062	0.0211	<0.0001	q 0.0113	<0.001	--	--	--	N <0.0001	<0.0005	0.00096	<0.0018
SP-BOOKS	5/19/2004	Dissolved	N	<0.0007	0.0035	<0.0002	--	<0.0013	B 0.00062	--	--	--	--	--	B 0.002

TABLE A-3
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ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-BOOKS	5/19/2004	Total	N	B 0.001	0.0024	<0.0002	--	<0.0013	e%B 0.00058	--	--	--	--	--	B 0.0012
SP-BOOKS	8/24/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.0112	BN 0.00082	--	--	--	--	--	Be 0.001
SP-BOOKS	8/24/2004	Dissolved	D	B 0.00043	B 0.0011	<0.0001	--	0.011	BN 0.00051	--	--	--	--	--	<0.0002
SP-BOOKS	8/24/2004	Total	N	<0.0004	<0.001	<0.0001	--	<0.0013	Be 0.00093	--	--	--	--	--	<0.0002
SP-BOOKS	8/24/2004	Total	D	<0.0004	<0.001	<0.0001	--	<0.0013	B 0.00072	--	--	--	--	--	<0.0002
SP-CC-500	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-CC-500	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-QH-800	10/30/2003	Dissolved	N	<0.0004	0.0563	<0.0001	0.0108	<0.001	B 0.00077	--	--	<0.0001	<0.0003	B 0.0014	<0.0018
SP-QH-800	10/30/2003	Total	N	B 0.0018	q 0.128	<0.0001	q 0.0125	<0.001	B 0.00099	<0.0002	B 0.00099	<0.0001	<0.0003	B 0.0038	q 0.01
SOUTH FORK SAGE CREEK															
SW-SFSC-200	5/20/2003	Dissolved	N	<0.002	e <0.01	<0.0001	<0.005	<0.01	e <0.001	<0.001	e <0.001	<0.001	<0.002	<0.005	e <0.01
SW-SFSC-200	5/20/2003	Total	N	<0.002	<0.01	0.0002	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-SFSC-200	8/12/2003	Dissolved	N	<0.0003	B 0.0018	N <0.0001	B 0.0053	<0.0011	<0.0002	--	--	W <0.0001	B 0.00034	B 0.00042	<0.0017
SW-SFSC-200	8/12/2003	Total	N	B 0.00065	B 0.0018	<0.0001	0.0104	<0.001	<0.0002	<0.0002	<0.0002	W <0.0001	B 0.00035	B 0.00025	<0.0018
SW-SFSC-500	5/20/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-SFSC-500	5/20/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-SFSC-500	8/12/2003	Dissolved	N	<0.0003	B 0.0011	N <0.0001	B 0.0049	<0.0011	<0.0002	--	--	W <0.0001	B 0.00034	B 0.00057	<0.0017
SW-SFSC-500	8/12/2003	Total	N	B 0.00073	0.004	<0.0001	0.0106	<0.001	<0.0002	--	--	W <0.0001	<0.0003	B 0.00036	<0.0018
SW-SFSC-800	8/12/2003	Dissolved	N	<0.0003	0.0027	N <0.00025	B 0.006	<0.0011	B 0.00024	--	--	W <0.0001	<0.0003	B 0.0015	<0.0017
SW-SFSC-800	8/12/2003	Total	N	B 0.00073	0.0064	<0.0001	0.0133	<0.001	B 0.00053	<0.0002	B 0.00053	W <0.0001	<0.0003	B 0.0015	<0.0018
SW-SFSC-800	5/18/2004	Dissolved	N	<0.001	B 0.0012	<0.0002	--	B 0.004	0.0021	--	--	--	--	--	B 0.0008
SW-SFSC-800	5/18/2004	Total	N	W <0.001	0.0034	<0.0002	--	<0.0013	0.0021	--	--	--	--	--	B 0.0017
SP-SFSC-100	10/28/2003	Dissolved	N	<0.0004	B 0.0018	<0.0001	B 0.0069	<0.0011	<0.0002	--	--	<0.0001	<0.0003	B 0.00043	<0.0017
SP-SFSC-100	10/28/2003	Total	N	B 0.00057	0.0023	<0.0001	B 0.0074	<0.0011	<0.0002	<0.0002	<0.0002	<0.0001	<0.0003	B 0.00051	<0.0017

TABLE A-3
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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-UTSFSC-100	5/21/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SP-UTSFSC-100	5/21/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SP-UTSFSC-100	8/6/2002	Dissolved	N	0.004	<0.02	JH <0.0005	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	e <0.02
SP-UTSFSC-100	8/6/2002	Total	N	<0.001	e <0.02	JH <0.0005	--	<0.02	0.001	<0.001	e% <0.001	<0.001	<0.002	<0.005	0.03
SP-UTSFSC-100	5/20/2003	Dissolved	N	<0.002	e <0.01	<0.0001	<0.005	<0.01	e <0.001	<0.001	e <0.001	<0.001	<0.002	<0.005	e <0.01
SP-UTSFSC-100	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFSC-100	8/12/2003	Dissolved	N	Be 0.00031	e 0.0121	<0.0001	0.0103	B 0.0015	<0.0002	--	--	<0.0001	<0.0005	B 0.00043	<0.0018
SP-UTSFSC-100	8/12/2003	Total	N	qe% 0.0021	0.122	<0.0001	q 0.0112	<0.001	B 0.00026	<0.0002	B 0.00026	N <0.0001	<0.0005	B 0.0017	q 0.0069
SP-UTSFSC-200	9/23/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SP-UTSFSC-200	9/23/2002	Total	N	<0.003	0.039	<0.0002	--	<0.02	0.002	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SP-UTSFSC-200	5/20/2003	Dissolved	N	<0.002	e 0.04	<0.0001	<0.005	<0.01	e <0.001	<0.001	e <0.001	<0.001	<0.002	<0.005	e <0.01
SP-UTSFSC-200	5/20/2003	Dissolved	D	<0.002	<0.01	<0.0001	<0.005	<0.01	0.005	<0.001	0.005	<0.001	<0.002	<0.005	0.03
SP-UTSFSC-200	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFSC-200	5/20/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFSC-200	8/12/2003	Dissolved	N	e <0.0003	e 0.0058	<0.0001	0.0113	<0.001	<0.0002	--	--	<0.0001	<0.0005	<0.0002	<0.0018
SP-UTSFSC-200	8/12/2003	Total	N	Be% 0.0012	0.0174	<0.0001	q 0.013	<0.001	<0.0002	<0.0002	<0.0002	N <0.0001	<0.0005	B 0.00027	<0.0018
SP-UTSFSC-200	10/29/2003	Dissolved	N	<0.0004	0.0062	<0.0001	0.0114	B 0.0016	<0.0002	--	--	<0.0001	<0.0002	<0.0002	0.0018
SP-UTSFSC-200	10/29/2003	Total	N	<0.0004	e% 0.0114	<0.0001	0.0101	<0.001	e <0.0002	<0.0002	e <0.0002	<0.0001	<0.0003	e% <0.0002	e% <0.0018
SP-SFSC-750	7/28/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-SFSC-750	7/28/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-SFSC-750	8/12/2003	Dissolved	N	<0.0003	<0.0003	N <0.0005	B 0.007	<0.0011	<0.0002	--	--	W <0.0001	<0.0003	B 0.0017	<0.0017
SP-SFSC-750	8/12/2003	Total	N	B 0.00058	B 0.0011	<0.0001	0.013	<0.001	0.001	<0.0002	0.001	W <0.0001	<0.0003	B 0.0015	<0.0018
SP-SFSC-750	9/28/2004	Dissolved	N	W <0.0004	B 0.0011	<0.0002	--	B 0.0066	--	0.0017	--	--	--	--	B 0.00031
SP-SFSC-750	9/28/2004	Total	N	<0.0004	0.0034	<0.0002	--	<0.0013	0.0018	--	--	--	--	--	<0.0002

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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-SFSC-750	10/13/2004	Dissolved	N	B 0.0011	B 0.0019	<0.0002	--	<0.0013	B 0.0008	--	--	--	--	--	S 0.0076
SP-SFSC-750	10/13/2004	Total	N	B 0.00069	0.0024	<0.0002	--	<0.0013	0.001	--	--	--	--	--	B 0.0023
SP-HOOPES	7/28/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-HOOPES	7/28/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTSC-850	5/18/2004	Dissolved	N	<0.001	0.119	<0.0002	--	B 0.0076	0.008	--	--	--	--	--	B 0.0021
SP-UTSC-850	5/18/2004	Total	N	W <0.001	0.14	--	--	<0.0013	0.0084	--	--	--	--	--	B 0.0037
SP-UTSC-850	9/28/2004	Dissolved	N	<0.0004	0.0298	<0.0002	--	B 0.0068	--	B0.00053	--	--	--	--	B 0.00036
SP-UTSC-850	9/28/2004	Total	N	W <0.0004	0.036	<0.0002	--	<0.0013	B 0.00073	--	--	--	--	--	B 0.0017
MANNING CREEK															
SP-MC-300	5/21/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SP-MC-300	5/21/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SP-MC-300	5/20/2003	Dissolved	N	<0.002	e <0.01	<0.0001	<0.005	<0.01	e <0.001	<0.001	e <0.001	<0.001	<0.002	<0.005	e <0.01
SP-MC-300	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-MC-300	8/25/2004	Dissolved	N	<0.0004	0.221	<0.0001	--	0.0104	N< 0.0003	--	--	--	--	--	e <0.0002
SP-MC-300	8/25/2004	Total	N	0.0265	2.22	B 0.00013	--	0.0244	e 0.0016	--	--	--	--	--	0.189
DEER CREEK															
SW-DC-200	5/18/2003	Dissolved	N	<0.002	0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-DC-200	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DC-200	8/14/2003	Dissolved	N	Be 0.0007	e 0.01	<0.0001	0.0096	<0.001	<0.0002	--	--	W <0.0001	<0.0005	B 0.00055	<0.0018
SW-DC-200	8/14/2003	Total	N	qe% 0.00083	0.0121	<0.0001	q 0.0107	<0.001	--	--	--	N <0.0001	<0.0005	0.00059	<0.0018
SW-DC-200	5/20/2004	Dissolved	N	<0.0007	B 0.0012	<0.0002	--	<0.0013	0.0015	--	--	--	--	--	B 0.00097
SW-DC-200	5/20/2004	Total	N	B 0.00082	0.0033	<0.0002	--	<0.0013	Be% 0.0016	--	--	--	--	--	B 0.001
SW-DC-200	8/25/2004	Dissolved	N	<0.0004	0.0142	B 0.00018	--	0.0126	N 0.0012	--	--	--	--	--	Be 0.00031
SW-DC-200	8/25/2004	Total	N	<0.0004	0.0284	<0.0001	--	<0.0013	e 0.0016	--	--	--	--	--	B 0.0013

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-DC-300	5/22/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-DC-300	5/22/2002	Total	N	<0.001	0.03	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	0.04
SW-DC-300	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-DC-300	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DC-400	5/22/2002	Dissolved	N	0.002	<0.02	e <0.0002	--	<0.02	0.001	<0.001	<0.001	<0.001	<0.002	<0.005	0.64
SW-DC-400	5/22/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	0.002	<0.001	0.001	<0.001	<0.002	<0.005	<0.02
SW-DC-400	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.01
SW-DC-400	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DC-400	5/17/2004	Dissolved	N	W <0.001	B 0.0011	<0.0002	--	B 0.0054	0.0011	--	--	--	--	--	B 0.0034
SW-DC-400	5/17/2004	Total	N	W <0.001	B 0.0015	<0.0002	--	<0.0013	0.0011	--	--	--	--	--	B 0.003
SW-DC-500	5/23/2002	Dissolved	N	<0.001	<0.02	e 0.0005	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-DC-500	5/23/2002	Dissolved	D	<0.001	<0.02	<0.0002	--	<0.02	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.02
SW-DC-500	5/23/2002	Total	N	0.001	<0.02	0.001	--	<0.02	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.02
SW-DC-500	5/23/2002	Total	D	<0.001	<0.02	<0.0002	--	<0.02	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.02
SW-DC-500	8/7/2002	Dissolved	N	0.004	<0.02	JH <0.0005	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	e 0.05
SW-DC-500	8/7/2002	Total	N	0.001	e 0.02	JH <0.0005	--	<0.02	0.002	<0.001	e% 0.001	<0.001	<0.002	<0.005	0.1
SW-DC-500	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.01
SW-DC-500	5/19/2003	Total	N	0.003	0.02	0.0002	<0.005	<0.01	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.01
SW-DC-500	8/13/2003	Dissolved	N	W <0.0003	0.0155	N <0.0001	B 0.0068	<0.0011	<0.0002	--	--	<0.0001	B 0.00034	B 0.0014	<0.0017
SW-DC-500	8/13/2003	Total	N	B 0.0014	0.0822	<0.0001	0.0124	<0.001	B 0.0007	<0.0002	B 0.0007	<0.0001	<0.0003	B 0.0017	B 0.0031
SW-DC-500	10/28/2003	Dissolved	N	<0.0004	0.0048	<0.0001	0.0095	<0.0011	0.00093	--	--	<0.0001	W <0.0003	B 0.0014	B 0.0034
SW-DC-500	10/28/2003	Total	N	B 0.00046	0.0118	<0.0001	0.0095	<0.0011	B 0.0011	<0.0002	0.0011	<0.0001	<0.0003	B 0.0012	<0.0017
SW-DC-500	5/17/2004	Dissolved	N	<0.001	0.0036	<0.0002	--	B 0.0053	0.0012	--	--	--	--	--	B 0.0021
SW-DC-500	5/17/2004	Total	N	<0.001	0.0351	--	--	<0.0013	0.0012	--	--	--	--	--	B 0.005

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-DC-500	8/26/2004	Dissolved	N	<0.0004	0.0086	<0.0001	--	0.0131	BN 0.00055	--	--	--	--	--	Be 0.0003
SW-DC-500	8/26/2004	Total	N	<0.0004	0.0546	<0.0001	--	<0.0013	Be 0.00072	--	--	--	--	--	B 0.0026
SW-DC-800	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.01
SW-DC-800	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DC-800	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DC-800	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DC-800	8/12/2003	Dissolved	N	e <0.0003	e 0.0098	<0.0001	0.0113	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.0024	<0.0018
SW-DC-800	8/12/2003	Total	N	Be% 0.001	0.0184	<0.0001	q 0.0126	<0.001	0.0012	0.00032	B 0.00093	<0.0001	<0.0005	B 0.0026	<0.0018
SW-DC-800	10/30/2003	Dissolved	N	B 0.00053	0.0144	<0.0001	0.0129	<0.001	0.0018	--	--	<0.0001	<0.0003	B 0.0013	<0.0018
SW-DC-800	10/30/2003	Total	N	B 0.00043	q 0.0173	<0.0001	q 0.0128	<0.001	q 0.0018	--	--	<0.0001	<0.0003	B 0.0016	<0.0018
SW-DC-800	5/19/2004	Dissolved	N	W <0.0007	0.0126	<0.0002	--	<0.0013	0.0018	--	--	--	--	--	B 0.0017
SW-DC-800	5/19/2004	Total	N	<0.0007	0.0186	<0.0002	--	<0.0013	Be% 0.0017	--	--	--	--	--	B 0.0013
SW-DC-800	8/24/2004	Dissolved	N	B 0.00045	0.0098	<0.0001	--	0.0129	N 0.0012	--	--	--	--	--	e <0.0002
SW-DC-800	8/24/2004	Total	N	<0.0004	0.0181	<0.0001	--	<0.0013	e 0.0015	--	--	--	--	--	B 0.00041
SP-DC-100	10/29/2003	Dissolved	N	<0.0004	0.0053	<0.0001	0.0134	0.0103	0.003	--	--	<0.0001	<0.0003	B 0.0042	0.0501
SP-DC-100	10/29/2003	Total	N	<0.0004	Be% 0.0016	<0.0001	0.0139	<0.001	e 0.0034	--	--	<0.0001	W <0.0003	Be% 0.0046	e% 0.0487
SP-DC-350	8/8/2002	Dissolved	N	<0.001	<0.02	JH <0.0005	--	<0.02	0.006	<0.001	0.003	<0.001	<0.002	<0.005	e 0.08
SP-DC-350	8/8/2002	Total	N	<0.001	e <0.02	JH <0.0005	--	<0.02	0.006	<0.001	e% 0.004	<0.001	<0.002	<0.005	0.1
SP-DC-350	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.01
SP-DC-350	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-DC-350	8/13/2003	Dissolved	N	e <0.0003	e 0.0037	<0.0001	0.0095	B 0.0052	B 0.00029	--	--	<0.0001	<0.0005	B 0.0031	q 0.028
SP-DC-350	8/13/2003	Total	N	qe% 0.00042	0.0013	<0.0001	q 0.011	<0.001	0.0035	<0.0002	0.0035	N <0.0001	<0.0005	0.0033	q 0.0256
SP-DC-350	5/17/2004	Dissolved	N	<0.001	<0.001	<0.0002	--	B 0.0075	0.0028	--	--	--	--	--	0.0108
SP-DC-350	5/17/2004	Total	N	W <0.001	0.0022	<0.0002	--	<0.0013	0.0029	--	--	--	--	--	0.193

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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-DC-350	8/25/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.0165	N 0.0028	--	--	--	--	--	e 0.0269
SP-DC-350	8/25/2004	Total	N	<0.0004	0.0401	<0.0001	--	0.0103	e 0.0045	--	--	--	--	--	0.0652
SP-UTDC-700	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.01	<0.001	0.01	<0.001	<0.002	0.016	0.01
SP-UTDC-700	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTDC-700	8/14/2003	Dissolved	N	e <0.0003	e 0.0101	<0.0001	B 0.0062	B 0.0043	B 0.00039	--	--	<0.0001	<0.0005	0.0134	<0.0018
SP-UTDC-700	8/14/2003	Total	N	qe% 0.0011	0.0376	<0.0001	q 0.0071	0.0133	--	--	--	<0.0001	<0.0005	0.0197	q 0.0797
SP-UTDC-700	10/28/2003	Dissolved	N	<0.0004	0.188	<0.0001	0.0097	B 0.0013	0.0037	--	--	W <0.0001	W <0.0003	0.0093	0.0079
SP-UTDC-700	10/28/2003	Total	N	0.0036	0.294	<0.0001	0.0105	0.0266	0.0068	--	--	B 0.00057	B 0.00034	0.032	0.225
SP-UTDC-700	5/17/2004	Dissolved	N	<0.001	B 0.0013	<0.0002	--	0.0199	0.0073	--	--	--	--	--	0.0606
SP-UTDC-700	5/17/2004	Total	N	<0.001	0.0192	<0.0002	--	0.0145	0.0075	--	--	--	--	--	0.0763
SP-UTDC-700	8/26/2004	Dissolved	N	W <0.0004	0.0067	<0.0001	--	0.0323	N 0.003	--	--	--	--	--	0.0815
SP-UTDC-700	8/26/2004	Total	N	0.0032	0.66	0.00027	--	0.29	e 0.0078	--	--	--	--	--	1.15
SP-UTDC-800	9/25/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	0.002	0.002	<0.001	<0.0005	<0.002	<0.05	0.06
SP-UTDC-800	9/25/2002	Total	N	<0.003	0.019	<0.0002	--	0.03	0.003	0.002	<0.001	<0.0005	<0.002	<0.05	0.09
SP-UTDC-800	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	0.006	<0.01	0.015	<0.001	0.015	<0.001	<0.002	0.005	0.04
SP-UTDC-800	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTDC-800	8/13/2003	Dissolved	N	e <0.0003	e 0.003	<0.0001	0.0267	q 0.0179	B 0.00048	--	--	<0.0001	<0.0005	B 0.002	q 0.0786
SP-UTDC-800	8/13/2003	Total	N	qe% 0.00058	0.0083	<0.0001	q 0.0277	0.0098	0.0029	<0.0002	0.0029	N <0.0001	<0.0005	0.0026	q 0.0838
SP-UTDC-800	10/28/2003	Dissolved	N	<0.0004	B 0.00036	<0.0001	0.0284	0.0174	0.0023	--	--	W <0.0001	W <0.0003	B 0.0024	0.0981
SP-UTDC-800	10/28/2003	Total	N	B 0.001	0.0139	<0.0001	0.0297	0.0244	0.0032	<0.0002	0.0032	B 0.00027	<0.0003	0.0177	0.163
SP-UTDC-800	5/17/2004	Dissolved	N	W <0.001	0.0322	<0.0002	--	B 0.0085	0.0065	--	--	--	--	--	0.0077
SP-UTDC-800	5/17/2004	Total	N	<0.001	0.0563	<0.0002	--	0.0128	0.0069	--	--	--	--	--	0.0862
NORTH FORK DEER CREEK															
SW-NFDC-200	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.01

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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-NFDC-200	5/19/2003	Dissolved	D	<0.002	<0.01	<0.0001	<0.005	<0.01	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.01
SW-NFDC-200	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-200	5/19/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-500	5/22/2002	Dissolved	N	<0.001	<0.02	e 0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	0.03
SW-NFDC-500	5/22/2002	Total	N	<0.001	<0.02	0.0005	--	<0.02	0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.02
SW-NFDC-500	8/7/2002	Dissolved	N	<0.001	0.04	JH <0.0005	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	e 0.07
SW-NFDC-500	8/7/2002	Total	N	<0.001	e 0.09	JH <0.0005	--	<0.02	0.002	<0.001	e% 0.001	<0.001	<0.002	<0.005	0.05
SW-NFDC-500	5/19/2003	Dissolved	N	<0.002	0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-NFDC-500	5/19/2003	Dissolved	D	<0.002	<0.01	<0.0001	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.01
SW-NFDC-500	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-500	5/19/2003	Total	D	--	--	--	--	--	--	--	--	--	--	--	--
SW-NFDC-500	8/13/2003	Dissolved	N	W <0.0003	0.0441	N <0.0001	B 0.0053	<0.0011	<0.0002	--	--	<0.0001	B 0.00047	B 0.00056	<0.0017
SW-NFDC-500	8/13/2003	Total	N	B 0.00058	0.117	<0.0001	0.0111	<0.001	<0.0002	--	--	<0.0001	<0.0003	B 0.00047	<0.0018
SW-NFDC-500	10/28/2003	Dissolved	N	<0.0004	0.0591	<0.0001	0.0081	<0.0011	<0.0002	--	--	<0.0001	W <0.0003	B 0.00059	<0.0017
SW-NFDC-500	10/28/2003	Total	N	B 0.00046	0.0984	<0.0001	0.0086	<0.0011	<0.0002	--	--	<0.0001	<0.0003	B 0.00068	<0.0017
SW-NFDC-900	6/18/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-NFDC-900	6/18/2002	Total	N	<0.001	0.04	<0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-NFDC-900	8/7/2002	Dissolved	N	<0.001	<0.02	JH <0.0005	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	e <0.02
SW-NFDC-900	8/7/2002	Total	N	0.001	e 0.05	JH <0.0005	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SW-NFDC-900	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.01
SW-NFDC-900	5/19/2003	Total	N	<0.002	0.08	0.0005	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.01
SW-NFDC-900	8/13/2003	Dissolved	N	W <0.0003	0.0024	N <0.00025	B 0.006	<0.0011	<0.0002	--	--	W <0.0001	<0.0003	B 0.0011	<0.0017
SW-NFDC-900	8/13/2003	Total	N	B 0.00065	0.0656	<0.0001	0.0122	<0.001	B 0.00046	<0.0002	B 0.00046	<0.0001	<0.0003	B 0.0014	<0.0018
SW-NFDC-900	10/28/2003	Dissolved	N	<0.0004	0.0044	<0.0001	0.0087	<0.0011	B 0.00096	--	--	W <0.0001	<0.0003	B 0.00097	<0.0017

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-NFDC-900	10/28/2003	Total	N	B 0.00057	0.0205	<0.0001	0.0094	<0.0011	B 0.00098	B 0.00032	B 0.00066	<0.0001	W <0.0003	B 0.0014	<0.0017
SW-UTNFDC-510	9/24/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-510	9/24/2002	Total	N	<0.003	0.044	<0.0002	--	<0.02	0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-510	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-UTNFDC-510	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-UTNFDC-510	8/13/2003	Dissolved	N	<0.0003	0.0208	N <0.0001	B 0.0048	<0.0011	<0.0002	--	--	<0.0001	<0.0003	<0.0003	<0.0017
SW-UTNFDC-510	8/13/2003	Total	N	B 0.00094	0.074	<0.0001	0.0131	<0.001	<0.0002	--	--	<0.0001	<0.0003	B 0.00035	<0.0018
SW-UTNFDC-700	9/23/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-700	9/23/2002	Total	N	<0.003	0.011	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-700	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-UTNFDC-700	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-UTNFDC-700	8/13/2003	Dissolved	N	W <0.0003	B 0.0019	N <0.0001	B 0.0049	<0.0011	<0.0002	--	--	<0.0001	<0.0003	B 0.00045	<0.0017
SW-UTNFDC-700	8/13/2003	Total	N	B 0.00073	0.0071	<0.0001	0.0107	<0.001	<0.0002	--	--	N <0.0001	B 0.00031	B 0.00045	<0.0018
SW-UTNFDC-800	9/23/2002	Dissolved	N	0.028	0.018	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	1.22
SW-UTNFDC-800	9/23/2002	Total	N	<0.003	0.009	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-900	9/23/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-900	9/23/2002	Total	N	<0.003	0.022	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-950	9/23/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SW-UTNFDC-950	9/23/2002	Total	N	<0.003	0.023	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SP-NFDC-50	10/29/2003	Dissolved	N	<0.0004	B 0.0018	<0.0001	0.0094	<0.001	B 0.00041	--	--	<0.0001	<0.0003	B 0.00024	0.011
SP-NFDC-50	10/29/2003	Total	N	<0.0004	e% 0.0029	<0.0001	0.0095	<0.001	Be 0.00057	--	--	<0.0001	<0.0003	e% <0.0002	e% 0.0097
SP-NFDC-700	6/18/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	0.002	<0.001	0.003	<0.001	<0.002	<0.005	<0.02
SP-NFDC-700	6/18/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	0.003	<0.001	0.003	<0.001	<0.002	<0.005	<0.02
SP-NFDC-700	8/7/2002	Dissolved	N	<0.001	<0.02	JH <0.0005	--	<0.02	0.004	<0.001	0.004	<0.001	<0.002	<0.005	e 0.03

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-NFDC-700	8/7/2002	Total	N	0.001	e 0.56	JH <0.0005	--	0.02	0.005	<0.001	e% 0.003	<0.001	<0.002	0.01	0.16
SP-NFDC-700	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.003	<0.001	0.003	<0.001	<0.002	<0.005	<0.01
SP-NFDC-700	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-NFDC-700	8/13/2003	Dissolved	N	<0.0003	B 0.00065	N <0.0001	0.0083	<0.0011	B 0.00024	--	--	<0.0001	B 0.00047	B 0.0028	0.0074
SP-NFDC-700	8/13/2003	Total	N	B 0.0008	0.0023	<0.0001	0.0146	<0.001	0.0018	<0.0002	0.0018	<0.0001	<0.0003	B 0.0028	0.0054
SP-UTNFDC-400	5/21/2002	Dissolved	N	<0.001	0.02	<0.0002	--	<0.02	0.003	<0.001	0.002	<0.001	<0.002	<0.005	0.07
SP-UTNFDC-400	5/21/2002	Total	N	0.002	0.07	<0.0002	--	<0.02	0.003	<0.001	0.003	<0.001	<0.002	0.021	0.12
SP-UTNFDC-400	5/20/2003	Dissolved	N	<0.002	e <0.01	<0.0001	<0.005	<0.01	e 0.003	<0.001	e 0.003	<0.001	<0.002	0.014	e 0.02
SP-UTNFDC-400	5/20/2003	Total	N	0.004	<0.01	0.0002	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	0.015	0.05
SP-UTNFDC-520	9/24/2002	Dissolved	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	0.08
SP-UTNFDC-520	9/24/2002	Total	N	<0.003	<0.005	<0.0002	--	<0.02	<0.001	<0.001	<0.001	<0.0005	<0.002	<0.05	<0.01
SP-UTNFDC-520	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SP-UTNFDC-520	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTNFDC-520	8/13/2003	Dissolved	N	<0.0003	<0.0003	N <0.0001	B 0.0054	<0.0011	<0.0002	--	--	<0.0001	<0.0003	B 0.00036	<0.0017
SP-UTNFDC-520	8/13/2003	Total	N	B 0.0008	0.0058	<0.0001	0.0124	<0.001	<0.0002	<0.0002	<0.0002	<0.0001	<0.0003	B 0.00021	<0.0018
SP-UTNFDC-540	8/13/2003	Dissolved	N	W <0.0003	0.0078	N <0.0001	0.0139	0.0132	B 0.00082	--	--	<0.0001	<0.0003	0.0196	0.0994
SP-UTNFDC-540	8/13/2003	Total	N	<0.0003	0.0254	<0.0001	0.0206	B 0.0085	0.0036	B 0.00026	0.0033	<0.0001	<0.0003	0.0221	0.114
SP-UTNFDC-540	10/28/2003	Dissolved	N	<0.0004	B 0.00083	<0.0001	0.0144	B 0.0099	0.0054	--	--	<0.0001	B <0.0003	0.018	0.0615
SP-UTNFDC-540	10/28/2003	Total	N	B 0.00057	0.0076	<0.0001	0.015	B 0.0064	0.0054	<0.0002	0.0054	<0.0001	<0.0003	0.0206	0.0811
SP-UTNFDC-540	5/17/2004	Dissolved	N	<0.001	<0.001	<0.0002	--	0.0139	0.0105	--	--	--	--	--	0.0653
SP-UTNFDC-540	5/17/2004	Total	N	<0.001	0.0022	--	--	B 0.0036	0.0104	--	--	--	--	--	0.0695
SP-UTNFDC-600	8/6/2002	Dissolved	N	0.002	<0.02	JH <0.0005	--	<0.02	0.004	<0.001	0.003	<0.001	<0.002	<0.005	e 0.04
SP-UTNFDC-600	8/6/2002	Total	N	<0.001	e 0.03	JH <0.0005	--	<0.02	0.005	<0.001	e% 0.005	<0.001	<0.002	<0.005	0.05
SP-UTNFDC-600	5/20/2003	Dissolved	N	<0.002	e <0.01	<0.0001	<0.005	<0.01	e 0.005	<0.001	e 0.005	<0.001	<0.002	<0.005	e <0.01

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-UTNFDC-600	5/20/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTNFDC-600	8/14/2003	Dissolved	N	We <0.0003	e 0.0055	<0.0001	0.0102	B 0.003	--	--	--	<0.0001	<0.0005	<0.0002	B 0.0026
SP-UTNFDC-600	8/14/2003	Total	N	qe% 0.00076	0.0218	<0.0001	q 0.0116	<0.001	--	--	--	N <0.0001	<0.0005	0.00038	q 0.0118
SP-UTNFDC-600	10/29/2003	Dissolved	N	<0.0004	0.0077	<0.0001	0.0213	0.0101	0.0122	--	--	<0.0001	<0.0003	0.0076	0.0251
SP-UTNFDC-600	10/29/2003	Total	N	<0.0004	e% 0.012	<0.0001	0.0219	B 0.0016	e <0.0002	--	--	<0.0001	<0.0003	e% 0.0075	e% 0.0273
SP-UTNFDC-600	5/18/2004	Dissolved	N	<0.001	0.0045	<0.0002	--	B 0.0068	0.0033	--	--	--	--	--	B 0.0038
SP-UTNFDC-600	5/18/2004	Total	N	<0.001	0.0147	<0.0002	--	<0.0013	0.0036	--	--	--	--	--	0.0122
SP-UTNFDC-600	8/25/2004	Dissolved	N	<0.0004	0.0113	<0.0001	--	0.0143	N 0.0014	--	--	--	--	--	Be 0.002
SP-UTNFDC-600	8/25/2004	Total	N	<0.0004	0.0477	<0.0001	--	B 0.0072	e 0.0035	--	--	--	--	--	0.0276
SOUTH FORK DEER CREEK															
SW-SFDC-200	5/18/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.01
SW-SFDC-200	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-SFDC-200	8/13/2003	Dissolved	N	e <0.0003	e 0.0159	<0.0001	0.0099	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.00074	<0.0018
SW-SFDC-200	8/13/2003	Dissolved	D	<0.0003	0.0152	<0.0001	0.0082	B 0.0016	<0.0002	--	--	<0.0001	<0.0005	B 0.00077	<0.0018
SW-SFDC-200	8/13/2003	Total	N	qe% 0.0005	0.0426	<0.0001	q 0.0095	<0.001	--	--	--	N <0.0001	<0.0005	0.00072	<0.0018
SW-SFDC-200	8/13/2003	Total	D	0.0013	0.0437	<0.0001	0.0094	<0.001	--	--	--	N <0.0001	<0.0005	0.0008	<0.0018
SW-SFDC-200	10/28/2003	Dissolved	N	<0.0004	0.0246	<0.0001	0.008	<0.0011	B 0.00028	--	--	<0.0001	W <0.0003	B 0.00047	<0.0017
SW-SFDC-200	10/28/2003	Total	N	<0.0004	0.073	<0.0001	0.0084	<0.0011	<0.0002	--	--	<0.0001	<0.0003	B 0.00076	<0.0017
SW-SFDC-300	5/22/2002	Dissolved	N	<0.001	<0.02	e <0.0002	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	0.11
SW-SFDC-300	5/22/2002	Total	N	<0.001	0.03	<0.0002	--	<0.02	0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.02
SW-SFDC-300	5/18/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-SFDC-300	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-SFDC-800	5/23/2002	Dissolved	N	<0.001	<0.02	e <0.0002	--	<0.02	0.002	<0.001	<0.001	<0.001	<0.002	<0.005	<0.02
SW-SFDC-800	5/23/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	0.002	<0.001	0.002	<0.001	<0.002	<0.005	<0.02

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PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-SFDC-800	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.001	<0.001	0.001	<0.001	<0.002	<0.005	<0.01
SW-SFDC-800	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-SFDC-800	5/17/2004	Dissolved	N	<0.001	<0.001	<0.0002	--	B 0.0056	0.002	--	--	--	--	--	0.0072
SW-SFDC-800	5/17/2004	Total	N	W <0.001	B 0.0012	<0.0002	--	<0.0013	0.002	--	--	--	--	--	0.0081
SW-SFSC-800	9/28/2004	Dissolved	N	W <0.0004	<0.001	<0.0002	--	B 0.0069	--	0.0017	--	--	--	--	B 0.00024
SW-SFSC-800	9/28/2004	Total	N	W <0.0004	0.003	<0.0002	--	<0.0013	0.0019	--	--	--	--	--	<0.0002
SW-UTSFDC-900	5/19/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-UTSFDC-900	5/19/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-UTSFDC-500	5/22/2002	Dissolved	N	<0.001	<0.02	e 0.0003	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	0.21
SP-UTSFDC-500	5/22/2002	Total	N	<0.001	<0.02	0.0004	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	0.03
SP-UTSFDC-600	10/29/2003	Dissolved	N	<0.0004	0.0061	<0.0001	0.0083	B 0.0014	<0.0002	--	--	<0.0001	<0.0003	<0.0002	0.0018
SP-UTSFDC-600	10/29/2003	Total	N	<0.0004	e% 0.006	<0.0001	0.0094	<0.001	e <0.0002	--	--	<0.0001	<0.0003	e% <0.0002	e% <0.0018
WELLS CANYON															
SW-WC-800	5/18/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-WC-800	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-WC-800	8/12/2003	Dissolved	N	e <0.0003	e 0.0035	<0.0001	0.0094	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.0024	<0.0018
SW-WC-800	8/12/2003	Dissolved	D	<0.0003	0.0037	<0.00025	0.0095	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.0025	B 0.0024
SW-WC-800	8/12/2003	Total	N	Be% 0.00042	0.0128	<0.0001	q 0.0107	<0.001	--	--	--	N <0.0001	<0.0005	B 0.003	B 0.0049
SW-WC-800	8/12/2003	Total	D	B 0.0012	0.0133	<0.0001	0.0109	<0.001	--	--	--	N <0.0001	<0.0005	B 0.0033	0.006
SW-WC-800	10/28/2003	Dissolved	N	<0.0004	B 0.0015	<0.0001	0.0082	<0.0011	B 0.00052	--	--	<0.0001	W <0.0003	B 0.0015	B 0.0048
SW-WC-800	10/28/2003	Total	N	<0.0004	0.0034	<0.0001	0.0091	<0.0011	B 0.00049	--	--	<0.0001	<0.0003	B 0.0021	B 0.0036
SW-WC-800	5/19/2004	Dissolved	N	<0.0007	B 0.0014	<0.0002	--	<0.0013	B 0.00086	--	--	--	--	--	B 0.0012
SW-WC-800	5/19/2004	Dissolved	D	<0.0007	<0.001	<0.0002	--	<0.0013	B 0.00078	--	--	--	--	--	B 0.00035
SW-WC-800	5/19/2004	Total	N	B 0.0012	0.0197	<0.0002	--	<0.0013	e%B 0.00082	--	--	--	--	--	0.0105

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-WC-800	5/19/2004	Total	D	B 0.00082	0.0199	<0.0002	--	<0.0013	B 0.00087	--	--	--	--	--	0.0104
SW-WC-800	8/24/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.011	BN 0.00049	--	--	--	--	--	B 0.00022
SW-WC-800	8/24/2004	Total	N	<0.0004	0.0107	<0.0001	--	<0.0013	Be 0.00062	--	--	--	--	--	0.0053
SP-UTWC-300	5/23/2002	Dissolved	N	<0.001	<0.02	e 0.0003	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	0.1
SP-UTWC-300	5/23/2002	Total	N	<0.001	<0.02	0.0004	--	<0.02	<0.001	--	--	<0.001	<0.002	<0.005	<0.02
SP-UTWC-300	5/18/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SP-UTWC-300	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-WC-400	5/20/2002	Dissolved	N	<0.001	<0.02	<0.0002	--	<0.02	0.004	<0.001	0.004	<0.001	<0.002	<0.005	0.07
SP-WC-400	5/20/2002	Total	N	<0.001	<0.02	<0.0002	--	<0.02	0.005	<0.001	0.004	<0.001	<0.002	<0.005	0.02
SP-WC-400	8/8/2002	Dissolved	N	<0.001	<0.02	JH <0.0005	--	<0.02	0.006	<0.001	0.004	<0.001	<0.002	<0.005	e 0.02
SP-WC-400	8/8/2002	Dissolved	D	0.001	<0.02	JH <0.0005	--	<0.02	0.006	<0.001	0.003	<0.001	<0.002	<0.005	0.06
SP-WC-400	8/8/2002	Total	N	<0.001	e 0.07	JH <0.0005	--	<0.02	0.006	<0.001	e% 0.006	<0.001	<0.002	<0.005	0.07
SP-WC-400	8/8/2002	Total	D	<0.001	0.04	JH <0.0005	--	<0.02	0.006	<0.001	0.004	<0.001	<0.002	<0.005	0.05
SP-WC-400	5/18/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	0.005	<0.001	0.005	<0.001	<0.002	<0.005	0.02
SP-WC-400	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-WC-400	8/13/2003	Dissolved	N	e <0.0003	e 0.0104	<0.0001	0.0107	B 0.0031	B 0.00062	--	--	<0.0001	<0.0005	B 0.0035	q 0.0055
SP-WC-400	8/13/2003	Total	N	qe% 0.0013	0.066	<0.0001	q 0.0124	0.0016	0.0039	0.00038	0.0035	N <0.0001	<0.0005	0.0065	q 0.0473
SP-WC-400	10/28/2003	Dissolved	N	<0.0004	0.0078	<0.0001	0.0109	B 0.0018	0.0039	--	--	<0.0001	W <0.0003	B 0.0027	0.0141
SP-WC-400	10/28/2003	Dissolved	D	<0.0004	0.0066	<0.0001	0.0109	B 0.0018	0.0038	--	--	<0.0001	<0.0003	B 0.0027	0.0117
SP-WC-400	10/28/2003	Total	N	B 0.00069	0.057	<0.0001	0.0118	B 0.0013	0.0043	B 0.00029	0.004	<0.0001	<0.0003	0.0055	0.0464
SP-WC-400	10/28/2003	Total	D	--	--	--	--	--	0.0043	--	--	--	--	--	--
SP-WC-400	5/17/2004	Dissolved	N	W <0.001	0.0037	<0.0002	--	B 0.0063	0.0041	--	--	--	--	--	0.0125
SP-WC-400	5/17/2004	Total	N	W <0.001	0.011	<0.0002	--	<0.0013	0.0041	--	--	--	--	--	0.0187
SP-WC-400	8/25/2004	Dissolved	N	B 0.00048	0.037	<0.0001	--	0.0183	N 0.0039	--	--	--	--	--	Be 0.0047

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SP-WC-400	8/25/2004	Total	N	B 0.0025	0.199	B 0.0001	--	0.0323	e 0.0059	--	--	--	--	--	0.191
SP-WC-750	6/5/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-WC-750	6/5/2003	Total	N	<0.002	<0.01	<0.0002	<0.005	<0.01	--	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SP-WC-750	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-WC-750	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SP-WC-750	8/14/2003	Dissolved	N	We <0.0003	B 0.0014	<0.0001	0.0086	B 0.0012	<0.0002	--	--	<0.0001	<0.0005	B 0.0017	<0.0018
SP-WC-750	8/14/2003	Total	N	e% <0.0003	0.00084	<0.0001	q 0.0096	<0.001	0.00051	<0.0002	0.00051	N <0.0001	<0.0005	0.0016	<0.0018
DIAMOND CREEK															
SW-DMC-200	5/18/2003	Dissolved	N	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-DMC-200	5/18/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-DMC-200	8/14/2003	Dissolved	N	Be 0.00039	e 0.0036	<0.0001	0.0082	B 0.0013	<0.0002	--	--	W <0.0001	<0.0005	B 0.00033	<0.0018
SW-DMC-200	8/14/2003	Dissolved	D	B 0.0007	0.0045	<0.0001	B 0.0076	B 0.0016	<0.0002	--	--	W <0.0001	<0.0005	B 0.00032	<0.0018
SW-DMC-200	8/14/2003	Total	N	qe% 0.00083	0.0071	<0.0001	q 0.0094	<0.001	--	--	--	N <0.0001	<0.0005	0.00038	<0.0018
SW-DMC-200	8/14/2003	Total	D	0.0012	0.0068	<0.0001	0.0092	<0.001	--	--	--	N <0.0001	<0.0005	0.00028	<0.0018
STEWART CANYON															
SW-ST-500	8/15/2003	Dissolved	N	W <0.0003	0.0035	<0.0001	0.0106	<0.001	B 0.00066	--	--	<0.0001	<0.0005	B 0.0019	B 0.0036
SW-ST-500	8/15/2003	Total	N	BW 0.00044	0.0152	<0.0001	0.0082	<0.001	N 0.0012	--	--	<0.0001	B 0.00088	B 0.0021	0.0145
SW-ST-500	5/18/2004	Dissolved	N	<0.001	B 0.0013	<0.0002	--	B 0.0069	0.0028	--	--	--	--	--	B 0.0042
SW-ST-500	5/18/2004	Total	N	W <0.001	0.0081	<0.0002	--	<0.0013	0.0076	--	--	--	--	--	0.0163
SW-ST-500	8/26/2004	Dissolved	N	<0.0004	0.002	<0.0001	--	0.0152	N 0.0024	--	--	--	--	--	Be 0.0039
SW-ST-500	8/26/2004	Total	N	<0.0004	0.017	<0.0001	--	B 0.0036	e 0.003	--	--	--	--	--	0.0268
SW-ST-700	8/26/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.0129	BN 0.00059	--	--	--	--	--	e <0.0002
SW-ST-700	8/26/2004	Dissolved	D	<0.0004	<0.001	<0.0001	--	0.013	BN 0.00072	--	--	--	--	--	<0.0002
SW-ST-700	8/26/2004	Total	N	<0.0004	B 0.0012	<0.0001	--	<0.0013	Be 0.00088	--	--	--	--	--	<0.0002

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-ST-700	8/26/2004	Total	D	<0.0004	B 0.001	<0.0001	--	<0.0013	B 0.00047	--	--	--	--	--	B 0.00025
SP-ST-100	8/15/2003	Dissolved	N	W <0.0003	B 0.0012	<0.0001	0.0119	<0.001	<0.0002	--	--	<0.0001	<0.0005	B 0.0025	<0.0018
SP-ST-100	8/15/2003	Total	N	W <0.0003	B 0.0012	<0.0001	0.0089	<0.001	BN 0.00061	<0.0002	B 0.00061	<0.0001	<0.0003	B 0.0025	<0.0018
SP-ST-100	5/18/2004	Dissolved	N	W <0.001	<0.001	<0.0002	--	B 0.0043	0.0028	--	--	--	--	--	B 0.00093
SP-ST-100	5/18/2004	Total	N	W <0.001	<0.001	<0.0002	--	<0.0013	0.0017	--	--	--	--	--	B 0.0016
SP-ST-100	8/26/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.0136	N 0.0011	--	--	--	--	--	Be 0.00082
SP-ST-100	8/26/2004	Total	N	<0.0004	<0.001	<0.0001	--	<0.0013	Be 0.00092	--	--	--	--	--	B 0.00064
SP-ST-200	8/15/2003	Dissolved	N	W <0.0003	B 0.0013	<0.0001	0.0108	<0.001	B 0.00023	--	--	<0.0001	<0.0005	0.0021	<0.0018
SP-ST-200	8/15/2003	Total	N	<0.0003	B 0.0013	<0.0001	B 0.008	<0.001	BN 0.00064	<0.0002	B 0.00064	<0.0001	B 0.00088	B 0.0019	<0.0018
SP-ST-200	5/18/2004	Dissolved	N	<0.001	<0.001	<0.0002	--	B 0.0051	0.0022	--	--	--	--	--	B 0.00064
SP-ST-200	5/18/2004	Total	N	W <0.001	B 0.0016	<0.0002	--	<0.0013	0.0024	--	--	--	--	--	B 0.0013
SP-ST-200	8/26/2004	Dissolved	N	<0.0004	<0.001	<0.0001	--	0.0128	N 0.001	--	--	--	--	--	Be 0.00024
SP-ST-200	8/26/2004	Total	N	<0.0004	<0.001	<0.0001	--	<0.0013	e 0.0016	--	--	--	--	--	B 0.00028
LAMB CANYON															
SW-LC-500	8/15/2003	Dissolved	N	W <0.0003	B 0.0018	<0.0001	0.0105	<0.001	B 0.00061	--	--	<0.0001	<0.0005	B 0.0019	B 0.0026
SW-LC-500	8/15/2003	Total	N	W <0.0003	0.0201	<0.0001	0.0082	<0.001	BN 0.00038	--	--	<0.0001	<0.0003	B 0.0022	0.0134
CLEAR CREEK															
SW-CL-800	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-CL-800	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
WHITE DUGWAY CREEK															
SW-WD-800	7/29/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--
SW-WD-800	7/29/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
WARM CREEK															
SW-WM-800	7/30/2003	Dissolved	N	--	--	--	--	--	--	--	--	--	--	--	--

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**
SW-WM-800	7/30/2003	Total	N	--	--	--	--	--	--	--	--	--	--	--	--
PRESERVATIVE BLANK															
SW-OC-200	5/20/2003	Dissolved	B	<0.002	<0.01	<0.0001	<0.005	<0.01	<0.001	<0.001	<0.001	<0.001	<0.002	<0.005	<0.01
SW-OC-200	5/20/2003	Total	B	--	--	--	--	--	--	--	--	--	--	--	--
SW-OC-200	8/14/2003	Dissolved	B	B 0.00093	<0.0007	<0.0001	<0.0005	B 0.003	<0.0002	--	--	W <0.0001	<0.0005	<0.0002	0.0118
SW-OC-200	8/14/2003	Total	B	0.001	<0.0007	<0.0001	0.00056	<0.001	--	--	--	N <0.0001	<0.0005	<0.0002	0.0106
SW-OC-200	10/30/2003	Dissolved	B	--	--	--	--	--	--	--	--	--	--	--	--
SW-OC-200	10/30/2003	Total	B	B 0.0012	B 0.0013	<0.0001	B 0.00071	<0.001	B 0.00028	--	--	<0.0001	<0.0003	<0.0002	0.0125
SW-OC-200	5/19/2004	Dissolved	B	<0.0007	<0.001	<0.0002	--	<0.0013	<0.0003	--	--	--	--	--	<0.0002
SW-OC-200	5/19/2004	Total	B	<0.0007	<0.001	<0.0002	--	<0.0013	e%< 0.0003	--	--	--	--	--	B 0.0022

TABLE A-3
SUMMARY OF SURFACE WATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Molybdenum (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.0025h**	**NE**	**1.2e-5**	**NE**	**0.16h**	**0.005**	**NE**	**NE**	**0.0034h**	**0.0063**	**NE**	**0.105h**

Notes:

- B Not detected above quantitation limit but present above method detection limit (SVL).
- D Field duplicate sample
- J Estimated value (Northern Analytical).
- N Located in the QC column indicates natural sample.
- N Located in analyte column indicates percent recovery not within control limits 75-125% (SVL).
- NE Not Established
- M Duplicate precision goal not met (SVL).
- W Post-digestion spike recovery out of control limits 85-115% (SVL).
- < Indicates analyte not detected above laboratory practical quantification limit (PQL).
- (mg/L) Milligrams per liter
- * Dulicate analysis not within control limits (SVL).
- (1) Verified by a second analysis (Northern Analytical).
- -- Field data or laboratory samples were not collected or analyzed.
- H Sample analyzed out of holding time.
- e Field duplicate results exceed acceptable limits - PQL based determination.
- e% Field duplicate results exceed acceptable limits - relative percent difference determination.
- q Associated values are estimates - field blank showed evidence of contamination.
- ** The surface water standards value is the lowest concentration for cold water biota for Criteria Maximum Concentration (CMC), Criteria Continuous Concentration (CCC), or human consumption of organisms. Standards from IDAPA 58.01.02.210 + 250. For Idaho, water quality standards are based on the dissolved fraction for metals in surface water (except total fraction for selenium and mercury as CCC). Standard values followed by an "h" indicate the aquatic life criteria are expressed as a function of total hardness and water effect ratio (WER). Hardness dependent standards are calculated for each watershed based on the average observed hardness. Standards shown are based on a hardness of 100 mg/L.
- Shading indicates results above Idaho DEQ Standards, regardless of physical state (Total or Dissolved).
- + Chromium standard of 0.01 mg/l is for Chromium VI; the chromium III standard is 0.18 mg/l for CCC and is hardness dependent.

Summary of Sediment Data

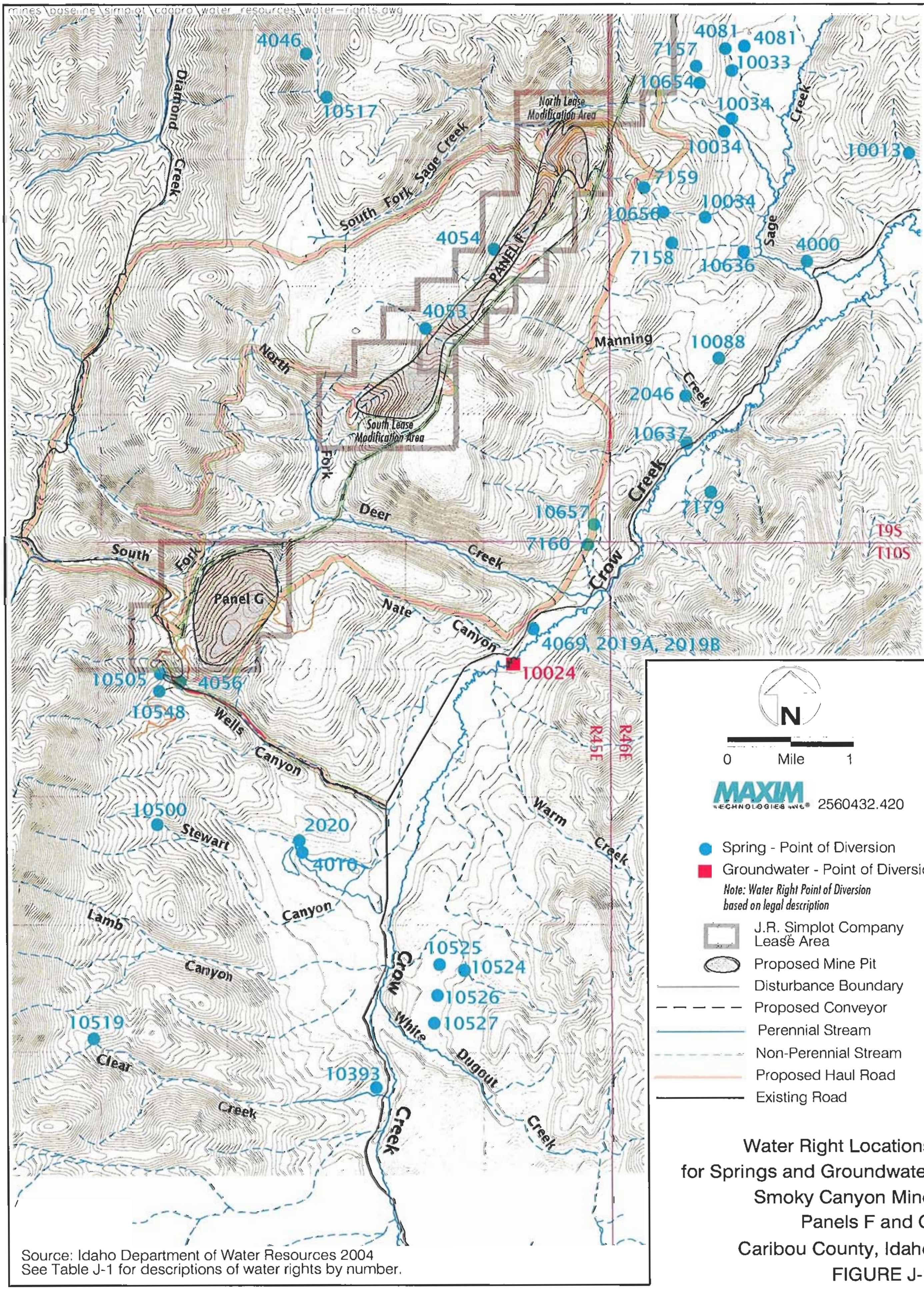
TABLE I-1
SUMMARY OF SEDIMENT DATA
ANALYSIS FOR TOTAL METALS
PANELS F AND G
BASELINE STUDY

Site		Date	Aluminum (mg/kg)	Antimony (mg/kg)	Arsenic (mg/kg)	Barium (mg/kg)	Beryllium (mg/kg)	Boron (mg/kg)	Cadmium (mg/kg)	Chromium (mg/kg)	Copper (mg/kg)	Iron (mg/kg)	Lead (mg/kg)	Manganese (mg/kg)	Mercury (mg/kg)	Nickel (mg/kg)	Selenium All (mg/kg)	Selenium IV (mg/kg)	Selenium VI (mg/kg)	Silver (mg/kg)	Thallium (mg/kg)	Vanadium (mg/kg)	Zinc (mg/kg)
DEER CREEK																							
SW-DC-400	N	8/13/2003	11000	N <0.44	4.4	107	0.61	13.1	4.7	51.7	17	16000	8.4	1020	B 0.02	51.1	N 0.79	0.55	0.24	0.65	<0.39	48	278
SW-DC-500	N	8/12/2003	12800	N 0.57	5.4	106	0.7	18.9	6	78.6	19.9	17700	10.3	1090	B 0.02	45.3	N 1.3	0.8	0.54	0.59	<0.39	61.6	246
NORTH FORK DEER CREEK																							
SW-NFDC-500	N	8/13/2003	15000	N 0.64	7.1	250	0.78	11.9	2.4	31.8	21.5	27700	15.5	5020	B 0.02	47.5	N 0.5	0.25	0.25	0.66	<0.39	39.6	187
SW-NFDC-900	N	8/13/2003	14300	N 0.51	5.4	138	0.84	22.2	6.7	102	24	21400	10	1850	B 0.03	63.5	N 1.1	0.81	0.3	B 0.49	<0.39	90.2	313
SOUTH FORK DEER CREEK																							
SW-SFDC-800	N	8/13/2003	11300	N <0.44	5.2	149	0.6	8.1	8.6	37.7	13.3	15300	10.6	1730	B 0.02	52.6	N 0.76	0.43	0.33	B 0.49	<0.39	40.3	386

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL).
(mg/L)	Milligrams per kilogram
N	Located in Site column indicates natural sample.
N	Located in analyte column indicates percent recovery not within control limits 75-125% (SVL).
D	Field duplicate sample.
B	Not detected above quantification limit but present above method detection limit (SVL).

Summary of Water Rights Points of Diversion



Water Right Locations
for Springs and Groundwater
Smoky Canyon Mine
Panels F and G
Caribou County, Idaho
FIGURE J-1

Table J-1

Summary of Water Rights Points Of Diversion

Panels F and G Project

Baseline Study

Township, Range, Sec., Qrtr.				Water Right No.	Source	Diversion Rate (cfs)	Use	Owner
10S	45E	1	SESWSW	10024	Groundwater	0.04	Domestic	Riede
10S	45E	23	NWNW	10068	Crow Creek	0.02	Stock	USFS
10S	45E	5	NWSW	10081	Deer Creek South Frk	0.02	Stock	USFS
10S	45E	6	SWNE	10081	Deer Creek South Frk	0.02	Stock	USFS
10S	45E	26	SWNW	10393	Spring	0.02	Administrative	USFS
10S	45E	16	SWNW	10500	Spring	0.02	Stock	USFS
10S	45E	12	SWNE	10504	Books Creek	0.02	Stock	USFS
10S	45E	7	NESW	10504	Books Creek	0.02	Stock	USFS
10S	45E	9	NENW	10505	Spring	0.02	Stock	USFS
10S	45E	16	SESW	10516	Unnamed Stream	0.02	Stock	USFS
10S	45E	22	SWNW	10516	Unnamed Stream	0.02	Stock	USFS
10S	45E	20	SESE	10519	Spring	0.02	Stock	USFS
10S	45E	23	NENE	10522	Unnamed Stream	0.02	Stock	USFS
10S	45E	23	SENE	10523	Unnamed Stream	0.02	Stock	USFS
10S	45E	23	NENW	10523	Unnamed Stream	0.02	Stock	USFS
10S	45E	23	SENE	10524	Spring	0.02	Stock	USFS
10S	45E	23	SWNE	10525	Spring	0.02	Stock	USFS
10S	45E	23	NWSE	10526	Spring	0.02	Stock	USFS
10S	45E	23	NWSE	10527	Spring	0.02	Stock	USFS
10S	45E	23	NWSW	10529	White Dugway Creek	0.02	Stock	USFS
10S	45E	30	NWSE	10529	White Dugway Creek	0.02	Stock	USFS
10S	45E	9	NWNE	10548	Spring	0.02	Stock	USFS
10S	45E	12	NWSE	2019A	Books Spring	1.46	Domestic-irrigation	Books
10S	45E	12	SWSW	2019A	Warm Creek	0.94	Domestic-irrigation	Books
10S	45E	12	SWSW	2019B	Warm Creek	0.94	Domestic-irrigation	Books
10S	45E	12	NWSE	2019B	Books Spring	1.46	Domestic-irrigation	Books
10S	45E	15	SWNE	2020	Alleman Spring	1.5	Domestic-irrigation	Alleman
10S	45E	26	SWNW	2020	Crow Creek	1.5	Domestic-irrigation	Alleman
10S	45E	26	SENW	4007	Crow Creek	3	Irrigation-stock	Stewart
10S	45E	22	SENW	4008	Unnamed Stream	2	Irrigation-stock	Stewart
10S	45E	15	SESW	4009	Unnamed Stream	2	Irrigation-stock	Stewart
10S	45E	15	SWNE	4010	Alleman Spring	3	Irrigation-stock	Stewart
10S	45E	11	SWSE	4041	Crow Creek	1.6	Irrigation	Alleman
10S	45E	23	NENE	4042	Unnamed Stream	1.12	Irrigation-stock	Alleman
10S	45E	3	NENE	4049	Nate Canyon	0.02	Stock	USFS
10S	45E	9	NWNE	4056	Spring	0.02	Stock	USFS
10S	45E	1	NESW	4062	Books Creek	2.8	Irrigation-stock	Nate
10S	45E	11	NENE	4063	Waste Water	1.14	Irrigation-stock	Nate
10S	45E	11	SWSE	4064	Crow Creek	2.8	Irrigation	Nate
10S	45E	12	SWNW	4064	Warm Creek	2.8	Irrigation	Nate
10S	45E	12	NWNW	4064	Books Creek	2.8	Irrigation	Nate
10S	45E	14	NENW	4067	--	3	Irrigation-stock	Nate
10S	45E	14	NWSW	4067	--	3	Irrigation-stock	Nate
10S	45E	11	NWSE	4068	Crow Creek	5	Irrigation-stock	Nate

Table J-1

Summary of Water Rights Points Of Diversion

Panels F and G Project

Baseline Study

Township, Range, Sec., Qrtr.				Water Right No.	Source	Diversion Rate (cfs)	Use	Owner
10S	45E	11	SWSE	4068	Crow Creek	5	Irrigation-stock	Nate
10S	45E	1	NESW	4069	Books Spring	1	Irrigation-stock	Nate
10S	45E	1	SWSW	7176	Crow Creek	0.03	Irrigation	Riede
10S	46E	15	SESE	10071	Rock Creek	0.02	Stock	USFS
9S	45E	15	SWNE	10076	Sage Creek	0.02	Stock	USFS
9S	45E	7	NENW	10076	Sage Creek	0.02	Stock	USFS
9S	45E	34	SWSW	10081	Deer Creek South Frk	0.02	Stock	USFS
9S	45E	20	SWNW	10082	Deer Creek	0.02	Stock	USFS
9S	45E	29	NESE	10082	Deer Creek	0.02	Stock	USFS
9S	45E	15	NESE	10517	Hill Spring	0.02	Stock	USFS
9S	45E	36	SESE	10657	Spring	0.02	Stock	USFS
9S	45E	16	SWNE	11482	Diamond Creek	0.02	Stock	USFS
9S	45E	31	SWNW	11482	Diamond Creek	0.02	Stock	USFS
9S	45E	16	SWNE	11490	Diamond Creek	0.02	Stock	USFS
9S	45E	20	NWNE	11490	Deer Creek	0.02	Stock	USFS
9S	45E	15	NWNE	4046	Spring	0.02	Stock	USFS
9S	45E	26	SWNE	4053	Little Basin Spring	0.02	Stock	USFS
9S	45E	24	SWNE	4054	Panther Spring	0.02	Stock	USFS
9S	45E	25	NESE	4055	Manning Creek	0.02	Stock	USFS
9S	45E	36	SESE	7160	Spring	0.02	Stock	USFS
9S	46E	21	NESENW	10013	Spring	0.06	Domestic-stock	Box Ranch
9S	46E	18	SENENE	10033	Spring	0.02	Domestic	Hoopes
9S	46E	18	SENENE	10034	Spring	0.02	Stock	Hoopes
9S	46E	18	SENESE	10034	Spring	0.02	Stock	Hoopes
9S	46E	19	SWSENE	10034	Spring	0.02	Stock	Hoopes
9S	46E	28	NWSE	10071	Rock Creek	0.02	Stock	USFS
9S	46E	31	SWNE	10073	Crow Creek	0.02	Stock	USFS
9S	46E	18	NESE	10086	Sage Creek	0.02	Stock	USFS
9S	46E	18	NWSE	10086	Sage Creek	0.02	Stock	USFS
9S	46E	30	NESE	10088	Sage Spring	0.02	Stock	USFS
9S	46E	30	SESW	10515	Unnamed Stream	0.02	Stock	USFS
9S	46E	19	SESE	10636	Spring	0.02	Stock	USFS
9S	46E	31	NENW	10637	Spring	0.02	Stock	USFS
9S	46E	19	SWSW	10638	Unnamed Stream	0.02	Stock	USFS
9S	46E	18	NWNE	10654	Spring	0.02	Stock	USFS
9S	46E	19	SESE	10655	Unnamed Stream	0.02	Stock	USFS
9S	46E	19	SENW	10656	Spring	0.02	Stock	USFS
9S	46E	19	NWSE	11750	Unnamed Stream	0.02	Stock	USFS
9S	46E	30	SWSE	2046	Spring	0.02	Domestic-stock	Tolman-Farrell
9S	46E	20	NWSE	4000	Fox Spring	0.02	Domestic	Kennington
9S	46E	28	NENW	4016	Rock Creek	5	Irrigation-recreation	Hartman Ranch
9S	46E	20	SESW	4017	Sage Creek	1.4	Irrigation	Box Ranch
9S	46E	29	SWNE	4018	Crow Creek	0.9	Irrigation	Kennington
9S	46E	20	NESW	4019	Sage Creek	1.2	Irrigation	Kennington

Table J-1

Summary of Water Rights Points Of Diversion

Panels F and G Project

Baseline Study

Township, Range, Sec., Qrtr.	Water Right No.	Source	Diversion Rate (cfs)	Use	Owner
9S 46E 20 NESW	4020	Sage Creek	1.6	Irrigation	Kennington
9S 46E 29 SWNE	4021	Crow Creek	1.5	Irrigation	Kennington
9S 46E 29 SWNE	4022	Crow Creek	1.1	Irrigation	Kennington
9S 46E 17 NWNW	4081	Spring	5.06	Irrigation-stock	Petersen
9S 46E 18 NENE	4081	Spring	5.06	Irrigation-stock	Petersen
9S 46E 19 SESE	7137	Unnamed Stream	0.02	Stock	USFS
9S 46E 31 NENW	7138	Unnamed Stream	0.02	Stock	USFS
9S 46E 19 SWSW	7139	Unnamed Stream	0.02	Stock	USFS
9S 46E 18 NWNE	7157	Spring	0.02	Stock	USFS
9S 46E 19 NWSE	7158	Spring	0.02	Stock	USFS
9S 46E 19 NENW	7159	Spring	0.02	Stock	USFS
9S 46E 32 SENE	7166	Unnamed Stream	0.02	Stock	USFS
9S 46E 31 NENWSE	7178	Many Spring Creek	5	Fish	Whitney
9S 46E 31 NWNESE	7179	Spring	0.04	Domestic	Whitney

Notes:
Sec. Section
Qrtr. Quarter section
cfs Cubic feet per second

Source: Idaho Department of Water Resources, 2003.

Summary of Groundwater Data

TABLE B-1
SUMMARY OF GROUNDWATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Depth to Water*** (ft)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Lab Turbidity (NTU)	Total Dissolved Solids (mg/L)	Total Suspended Solids (mg/L)
IDAHO DEQ Standards**			**NE**	**6.5 - 8.5**	**6.5 - 8.5s**	**NE**	**NE**	**NE**	**NE**	**NE**	**500s**	**NE**
PANEL F (MANNING CREEK LEASE AREA)												
MC-MW-1	10/19/2003	145.1	--	--	--	--	--	--	--	--	--	--
MC-MW-1	10/30/2003	148.11	6.3	7.85	8.01	239	365	102.5	7.04	H 101	236	60
MC-MW-1	5/19/2004	145.94	--	--	8.09	--	330	--	--	0.742	192	<5
MC-MW-1	6/24/2004	145.79	7.49	7.46	8.02	327	344	116	9.54	H 0.137	228	<5
MC-MW-1	8/25/2004	--	--	--	--	--	--	--	--	--	--	--
MC-MW-2	10/14/2003	57.49	5	7.3	7.31	75	76	8	9	H 985	139	1350
MC-MW-2	10/29/2003	59.99	--	--	--	--	--	--	--	--	--	--
MC-MW-2	5/18/2004	42.24	--	--	--	--	--	--	--	--	--	--
MC-MW-2	6/30/2004	43.77	6.47	6.06	7.02	60	67	73	8.95	eH10.81	65.349	e<5
MC-MW-2	8/25/2004	49.25	--	--	--	--	--	--	--	--	--	--
MC-MW-3	10/14/2003	Dry	--	--	--	--	--	--	--	--	--	--
MC-MW-3	10/29/2003	Dry	--	--	--	--	--	--	--	--	--	--
MC-MW-3	5/18/2004	23.7	--	--	--	--	--	--	--	--	--	--
MC-MW-3	8/25/2004	Dry	--	--	--	--	--	--	--	--	--	--
MC-MW-4	10/14/2003	44.56	12	7.7	7.83	439	409	-31	8.5	H 1080	231	155
MC-MW-4	10/29/2003	45.54	--	--	--	--	--	--	--	--	--	--
MC-MW-4	5/18/2004	29.42	--	--	--	--	--	--	--	--	--	--
MC-MW-4	6/24/2004	31.78	8.1	7.42	7.93	460	494	-91.8	*0.29	H 3.48	260	<5
MC-MW-4	8/25/2004	36.8	--	--	--	--	--	--	--	--	--	--
MC-MW-5	10/14/2003	85.84	3	7.2	7.38	173	191	15	3.9	H 52.8	118	40
MC-MW-5	10/29/2003	88.44	--	--	--	--	--	--	--	--	--	--
MC-MW-5	5/18/2004	54.66	--	--	--	--	--	--	--	--	--	--
MC-MW-5	6/24/2004	47.91	9.46	5.43	6.96	163	73	152	8.89	H 6	37	<5
MC-MW-5	8/25/2004	74.9	--	--	--	--	--	--	--	--	--	--
MC-MW-5	10/5/2004	--	--	--	7.27	--	240	--	--	--	151	5
PANEL G (DEER CREEK LEASE AREA)												
DC-MW-1	10/9/2003	6.84	12	6.2	7.16	259	199	54	3.6	H 6456	H 168	H 4760
DC-MW-1	10/29/2003	7.49	--	--	--	--	--	--	--	--	--	--
DC-MW-1	5/19/2004	1.74	--	--	--	--	--	--	--	--	--	--
DC-MW-1	6/23/2004	3.34	6.4	5.79	7.31	167	137	183.2	3.55	H 654	100	1066
DC-MW-1	8/25/2004	6.2	--	--	--	--	--	--	--	--	--	--

TABLE B-1
SUMMARY OF GROUNDWATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Depth to Water*** (ft)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)
IDAHO DEQ Standards**			**NE**	**6.5 - 8.5**	**6.5 - 8.5s**	**NE**	**NE**	**NE**	**NE**	**NE**	**500s**	**NE**
DC-MW-2	10/12/2003	63.14	6	7.6	7.83	485	498	8	4.7	H 494	417	633
DC-MW-2	10/29/2003	62.63	--	--	--	--	--	--	--	--	--	--
DC-MW-2	5/19/2004	57.74	--	--	--	--	--	--	--	--	--	--
DC-MW-2	6/30/2004	57.25	7.56	8.1	8.21	420	467	18.5	*0.41	eH3.88	236	e51
DC-MW-2	8/25/2004	60.91	--	--	--	--	--	--	--	--	--	--
DC-MW-3	10/11/2003	94.74	6	8.5	8.18	480	495	38	1.8	H 9.56	253	27
DC-MW-3	10/29/2003	94.92	--	--	--	--	--	--	--	--	--	--
DC-MW-3	5/19/2004	95.83	--	--	--	--	--	--	--	--	--	--
DC-MW-3	6/30/2004	93.45	6.4	10.19	10.24	388	390	-67.3	1.69	eH8.42	181	e86
DC-MW-3	8/25/2004	94.4	--	--	--	--	--	--	--	--	--	--
DC-MW-4	10/12/2003	103.96	8	7.9	7.96	313	322	4	3	H 86.1	168	106
DC-MW-4	10/29/2003	104.99	--	--	--	--	--	--	--	--	--	--
DC-MW-4	5/19/2004	105.9	--	--	--	--	--	--	--	--	--	--
DC-MW-4	6/30/2004	105.5	6.91	8.36	8.3	291	299	-84	*0.5	eH0.942	158	e10
DC-MW-4	8/25/2004	104.45	--	--	--	--	--	--	--	--	--	--
DC-MW-5	10/10/2003	302.95	8	7.3	7.97	397	400	-100	7.2	H 9.81	248	<5
DC-MW-5	10/29/2003	>300	--	--	--	--	--	--	--	--	--	--
DC-MW-5	5/19/2004	300.8	--	--	--	--	--	--	--	--	--	--
DC-MW-5	6/25/2004	295.1	5.76	7.4	7.94	386	413	59.6	3.46	H 4.47	218	<5
DC-MW-5	8/25/2004	297.45	--	--	--	--	--	--	--	--	--	--
DC-MW-5	10/15/2004	--	--	--	7.86	--	406	--	--	--	355	5
DC-MW-6	10/9/2003	2.96	10	7.3	7.5	427	453	360	3.7	H 2050	H 284	H 2256
DC-MW-6	10/29/2003	4.25	--	--	--	--	--	--	--	--	--	--
DC-MW-6	5/19/2004	3.99	--	--	--	--	--	--	--	--	--	--
DC-MW-6	6/23/2004	3.23	10.59	6.84	7.56	326	328	101	9.1	H 162.5	232	243
DC-MW-6	8/25/2004	5.55	--	--	--	--	--	--	--	--	--	--

TABLE B-1
SUMMARY OF GROUNDWATER DATA
FIELD MEASUREMENTS AND PHYSICAL PARAMETERS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Depth to Water*** (ft)	Temp. (C)	Field pH	Lab pH	Field Conductivity (umhos/cm)	Lab Conductivity (umhos/cm)	Field ORP (mV)	Field DO (mg/L)	Lab Turbidity (NTU)	Total Dis-solved Solids (mg/L)	Total Sus-pended Solids (mg/L)
IDAHO DEQ Standards**			**NE**	**6.5 - 8.5**	**6.5 - 8.5s**	**NE**	**NE**	**NE**	**NE**	**NE**	**500s**	**NE**

Notes:

- *** Depth to water below measuring point.
- ft Feet
- (mg/L) Milligrams per liter
- C Degrees centigrade
- (umhos/cm) Micromhos per centimeter
- ORP Oxygen reduction potential
- (mV) Millivolts
- DO Dissolved oxygen
- (NTU) Nephelometric Turbidity Unit
- < Indicates analyte not detected above laboratory practical quantification limit (PQL).
- -- Field data or laboratory samples were not collected or analyzed.
- e Field duplicate results exceed acceptable limits - PQL based determination.
- H Sample analyzed out of holding time.
- NE Not Established
- * Dissolved oxygen measurment may have been affected by nitrogen used to power bladder pump.
- ** Standards from IDAPA 58.01.11.200. For Idaho, water quality standards are based on the total fraction for groundwater. Standard values followed by an "s" indicate a secondary standard.
- Shading indicates results above Idaho DEQ Standards.

Well MC-MW-3 and MC-MW-4 formerly known as MC-MW-11 and MC-MW-6, respectively.

TABLE B-2
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR MAJOR ION AND NUTRIENTS
PANLES F AND G
BASELINE STUDY

Site		Sample Date	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**250s**	**4.0**	**NE**	**NE**	**10**	**NE**	**NE**	**NE**	**NE**	**250s**
PANEL F (MANNING CREEK LEASE AREA)																	
MC-MW-1	N	10/30/2003	184	< 1	184	0.02	49.6	1.06	< 0.1	190	15.9	< 0.02	H 0.05	0.26	2.38	2.97	8.47
MC-MW-1	N	5/19/2004	189	< 1	189	--	46.7	0.65	0.11	172	13.4	--	--	--	0.536	3.03	8.11
MC-MW-1	N	6/24/2004	192	< 1	192	--	49.6	0.94	0.12	186	15.2	--	--	--	0.603	3.15	7.81
MC-MW-2	N	10/14/2003	35.6	< 1	35.6	0.02	27.9	0.87	0.12	--	6.68	0.57	H 0.43	5.609	11.5	1.95	2.55
MC-MW-2	N	6/30/2004	28.9	e< 1	28.9	--	9.33	0.92	0.16	29.4	1.48	--	--	--	0.452	1.29	1.99
MC-MW-4	N	10/14/2003	206	< 1	206	0.11	59.2	2.12	0.16	242	22.9	0.31	H <0.01	0.775	4.95	5.99	25.9
MC-MW-4	N	6/24/2004	273	< 1	273	--	63.6	1.41	0.15	264	25.6	--	--	--	2.35	4.17	22.3
MC-MW-5	N	10/14/2003	80.5	< 1	80.5	< 0.01	44.4	0.69	0.2	137	6.43	0.22	H 0.417	2.815	2.66	2.09	16.8
MC-MW-5	N	6/24/2004	< 30	< 1	30	--	10.1	0.56	0.2	31.6	1.53	--	--	--	0.404	1.45	4.46
MC-MW-5	N	10/5/2004	--	--	--	--	--	0.56	0.2	--	--	--	--	--	--	--	68
PANEL G (DEER CREEK LEASE AREA)																	
DC-MW-1	N	10/9/2003	60.1	< 1	60.1	0.22	49.3	1.34	0.18	204	19.8	25.16	H 0.033	41.546	13.2	3.07	6.84
DC-MW-1	N	6/23/2004	64.3	< 1	64.3	--	26.4	1.09	0.14	113	11.3	--	--	--	6.79	2.6	7.56
DC-MW-2	N	10/12/2003	242	< 1	242	0.02	139	1.95	0.42	460	27.4	0.16	H 0.068	14.171	10.3	5.91	26.6
DC-MW-2	N	6/30/2004	248	e< 1	248	--	89.3	1.87	0.60	299	18.5	--	--	--	2.63	7.63	29.3
DC-MW-3	N	10/11/2003	208	< 1	208	0.11	49.8	2.38	0.24	239	27.9	< 0.02	H <0.01	0.02	3.2	18.3	53.9
DC-MW-3	N	6/30/2004	42	e 1.4	186	--	30	1.81	0.22	153	18.9	--	--	--	7.48	56.8	22.2
DC-MW-3	D	6/30/2004	42.5	146	188	--	32.6	1.86	0.22	163	19.9	--	--	--	7.66	58.8	22.3
DC-MW-4	N	10/12/2003	163	< 1	163	0.02	68.2	2.91	0.11	202	7.74	< 0.02	H <0.01	1.229	1.53	3.49	7.5
DC-MW-4	D	10/12/2003	165	< 1	165	0.02	68.8	2.94	0.11	205	7.95	< 0.02	<0.01	1.25	1.53	3.53	7.54
DC-MW-4	N	6/30/2004	156	e 1.9	158	--	50.6	2.81	0.14	157	7.47	--	--	--	11	6	6.13
DC-MW-5	N	10/10/2003	208	< 1	208	< 0.01	60.4	1.72	0.34	220	16.9	0.15	H <0.01	0.022	B 0.68	2.85	14.2
DC-MW-5	N	6/25/2004	227	< 1	227	--	62.7	1.54	0.42	228	17.5	--	--	--	0.559	2.75	12.5
DC-MW-5	N	10/15/2004	--	--	--	--	--	1.63	0.4	--	--	--	--	--	--	--	12.2
DC-MW-6	N	10/9/2003	164	< 1	164	0.11	157	1.6	0.24	599	50.5	0.5	H 0.067	41.546	40.7	4.83	58.5
DC-MW-6	N	6/23/2004	168	< 1	168	--	70.8	0.84	0.29	254	18.9	--	--	--	9.52	3.32	16.2
PRESERVATIVE BLANK																	
FIELDBLANK	FB	6/24/2004	11.1	< 1	11.1	--	0.009	< 0.2	< 0.1	0.06	0.008	--	--	--	<0.0148	< 0.009	< 0.3

TABLE B-2
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR MAJOR ION AND NUTRIENTS
PANLES F AND G
BASELINE STUDY

Site		Sample Date	Alkalinity Bicarbonate (mg/L)	Alkalinity Carbonate (mg/L)	Alkalinity Total (mg/L)	Ammonia Undistilled (mg/L)	Calcium (mg/L)	Chloride (mg/L)	Fluoride Undistilled (mg/L)	Hardness (mg/L)	Magnesium (mg/L)	Nitrate and Nitrite (mg/L)	Phosphorous Ortho (mg/L)	Phosphorous Total (mg/L)	Potassium (mg/L)	Sodium (mg/L)	Sulfate (mg/L)
IDAHO DEQ Standards**			**NE**	**NE**	**NE**	**NE**	**NE**	**250s**	**4.0**	**NE**	**NE**	**10**	**NE**	**NE**	**NE**	**NE**	**250s**
EQUIPBLANK	B	6/30/2004	--	--	< 1	--	0.55	< 1	< 0.5	1.61	0.06	--	--	--	<0.015	0.02	< 1.5

Notes:

<	Indicates analyte not detected above laboratory practical quantification limit (PQL).
(mg/L)	Milligrams per liter
B	Not detected above quantitation limit but present above method detection limit (SVL).
D	Field duplicate sample
e	Field duplicate results exceed acceptable limits - PQL based determination.
H	Sample analyzed out of holding time.
N	Natural sample
NE	Not Established
**	Standards from IDAPA 58.01.11.200. For Idaho, water quality standards are based on the total fraction for groundwater. Standard values followed by an "s" indicate a secondary standard.
	Shading indicates results above Idaho DEQ Standards.

Well MC-MW-3 and MC-MW-4 formerly known as MC-MW-11 and MC-MW-6, respectively.

--	Field data or laboratory samples were not collected or analyzed.

TABLE B-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**0.2s**	**0.006**	**0.05**	**2.0**	**0.004**	**NE**	**0.005**	**0.1**	**1.3**	**0.3s**
PANEL F (MANNING CREEK LEASE AREA)													
MC-MW-1	10/30/2003	Dissolved	N	B 0.0125	<0.0006	<0.0006	0.033	<0.00006	B 0.0122	<0.00006	<0.0003	<0.0026	<0.0045
MC-MW-1	10/30/2003	Total	N	5.35	<0.0006	BWN 0.0013	0.051	B 0.00015	B 0.0177	0.00014	0.0103	0.0044	4.25
MC-MW-1	5/19/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	<0.0124
MC-MW-1	5/19/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	0.0277
MC-MW-1	6/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	<0.0108
MC-MW-1	6/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	<0.0108
MC-MW-2	10/14/2003	Dissolved	N	<0.0086	B 0.0017	B 0.00069	B 0.0159	<0.00007	0.0072	<0.0001	<0.0002	<0.0011	B 0.0081
MC-MW-2	10/14/2003	Total	N	39.3	W <0.0006	0.0305	0.25	0.0026	0.102	N 0.0091	0.476	0.0897	67.9
MC-MW-2	6/30/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	<0.011
MC-MW-2	6/30/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	0.344
MC-MW-4	10/14/2003	Dissolved	N	<0.0086	B 0.0019	W <0.0006	0.0745	<0.00007	B 0.0305	<0.0001	B 0.00041	<0.0011	B 0.0075
MC-MW-4	10/14/2003	Total	N	4.98	<0.0006	B 0.002	0.129	B 0.00032	B 0.0246	N 0.00075	0.0271	0.0116	6.93
MC-MW-4	6/24/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	0.177
MC-MW-4	6/24/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	0.298
MC-MW-5	10/14/2003	Dissolved	N	<0.0086	BW 0.0039	0.003	0.0041	<0.00007	<0.0065	0.0014	B 0.0013	<0.0011	B 0.0095
MC-MW-5	10/14/2003	Total	N	6.42	W 0.0023	0.012	0.0281	B 0.00045	B 0.0197	N 0.0072	0.257	0.0318	13.3
MC-MW-5	6/24/2004	Dissolved	N	--	--	--	--	--	--	0.0019	--	--	<0.0108
MC-MW-5	6/24/2004	Total	N	--	--	--	--	--	--	0.0019	--	--	0.171
MC-MW-5	10/5/2004	Dissolved	N	--	--	--	--	--	--	0.0114	--	--	<0.011
MC-MW-5	10/5/2004	Total	N	--	--	--	--	--	--	0.0121	--	--	0.205
PANEL G (DEER CREEK LEASE AREA)													
DC-MW-1	10/9/2003	Dissolved	N	B 0.0112	BW 0.0013	<0.0006	0.0413	<0.00006	<0.012	0.0011	<0.0003	<0.0026	<0.0045
DC-MW-1	10/9/2003	Total	N	80.4	BWN 0.0012	N 0.0185	0.55	E 0.0031	0.0509	0.0118	0.368	0.085	69
DC-MW-1	6/23/2004	Dissolved	N	--	--	--	--	--	--	0.00098	--	--	0.0252
DC-MW-1	6/23/2004	Total	N	--	--	--	--	--	--	0.0058	--	--	27.1
DC-MW-2	10/12/2003	Dissolved	N	B 0.0152	B 0.0012	B 0.0017	0.0198	<0.00006	<0.012	0.002	B 0.0015	<0.0026	<0.0045
DC-MW-2	10/12/2003	Total	N	59.8	BWN 0.0019	WN 0.0318	0.188	E 0.0021	0.0665	0.0188	0.501	0.0571	38
DC-MW-2	6/30/2004	Dissolved	N	--	--	--	--	--	--	0.00044	--	--	<0.011
DC-MW-2	6/30/2004	Total	N	--	--	--	--	--	--	0.00065	--	--	0.107
DC-MW-3	10/11/2003	Dissolved	N	B 0.0109	BW 0.0027	0.0075	0.0725	<0.00006	B 0.0159	<0.0001	<0.0003	<0.0026	<0.0045
DC-MW-3	10/11/2003	Total	N	0.799	BN 0.00065	N 0.0093	0.0895	e <0.00006	B 0.0172	<0.0001	B 0.0033	<0.0026	0.472
DC-MW-3	6/30/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	<0.011

TABLE B-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Aluminum (mg/L)	Antimony (mg/L)	Arsenic (mg/L)	Barium (mg/L)	Beryllium (mg/L)	Boron (mg/L)	Cadmium (mg/L)	Chromium (mg/L)	Copper (mg/L)	Iron (mg/L)
IDAHO DEQ Standard**				**0.2s**	**0.006**	**0.05**	**2.0**	**0.004**	**NE**	**0.005**	**0.1**	**1.3**	**0.3s**
DC-MW-3	6/30/2004	Dissolved	D	--	--	--	--	--	--	<0.0001	--	--	<0.011
DC-MW-3	6/30/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	0.0823
DC-MW-3	6/30/2004	Total	D	--	--	--	--	--	--	<0.0001	--	--	0.0829
DC-MW-4	10/12/2003	Dissolved	N	B 0.015	BW 0.0019	0.0057	0.0198	<0.00006	<0.012	<0.0001	<0.0003	<0.0026	<0.0045
DC-MW-4	10/12/2003	Dissolved	D	B 0.0185	BW 0.0024	0.0063	0.0204	<0.00006	<0.012	<0.0001	<0.0003	<0.0026	<0.0045
DC-MW-4	10/12/2003	Total	N	2.73	BWN 0.0019	N 0.0087	0.0392	e <0.00006	<0.012	0.0037	0.0651	0.0058	2.9
DC-MW-4	10/12/2003	Total	D	2.72	BWN 0.002	N 0.0086	0.0395	e <0.00006	<0.012	0.0037	0.0625	0.0052	3.06
DC-MW-4	6/30/2004	Dissolved	N	--	--	--	--	--	--	<0.0001	--	--	B 0.0135
DC-MW-4	6/30/2004	Total	N	--	--	--	--	--	--	<0.0001	--	--	0.128
DC-MW-5	10/10/2003	Dissolved	N	B 0.0176	B 0.0011	<0.0006	0.0277	<0.00006	<0.012	0.00016	<0.0003	<0.0026	<0.0045
DC-MW-5	10/10/2003	Total	N	0.0242	N <0.0006	N <0.0006	0.0299	e <0.00006	<0.012	0.00034	B 0.0012	<0.0026	2.13
DC-MW-5	6/25/2004	Dissolved	N	--	--	--	--	--	--	0.00069	--	--	<0.0108
DC-MW-5	6/25/2004	Total	N	--	--	--	--	--	--	0.00075	--	--	1.09
DC-MW-5	10/15/2004	Dissolved	N	--	--	--	--	--	--	0.00057	--	--	<0.0124
DC-MW-5	10/15/2004	Total	N	--	--	--	--	--	--	0.00065	--	--	B0.0152
DC-MW-6	10/9/2003	Dissolved	N	B 0.0143	BW 0.0019	B 0.00083	0.0355	<0.00006	B 0.0143	0.00078	<0.0003	<0.0026	<0.0045
DC-MW-6	10/9/2003	Total	N	209	BWN 0.00083	N 0.0625	1.18	E 0.0096	0.241	0.131	1.4	0.324	183
DC-MW-6	6/23/2004	Dissolved	N	--	--	--	--	--	--	0.0011	--	--	0.025
DC-MW-6	6/23/2004	Total	N	--	--	--	--	--	--	0.154	--	--	45.5
PRESERVATIVE BLANK													
EQUIPBLAN	6/30/2004	Dissolved	B	--	--	--	--	--	--	<0.0001	--	--	<0.011
EQUIPBLAN	6/30/2004	Total	B	--	--	--	--	--	--	<0.0001	--	--	<0.011
FIELDBLANK	6/24/2004	Dissolved	FB	--	--	--	--	--	--	W<0.0001	--	--	<0.0108
FIELDBLANK	6/24/2004	Total	FB	--	--	--	--	--	--	<0.0001	--	--	<0.0108

Notes:

D	Field duplicate sample.
B	Not detected above quantitation limit but present above method detection limit (SVL).
E	Estimated value due to presence of interference (SVL).
N	Located in QC column indicates natural sample.
N	Located in analyte column indicates percent recovery not within control limits 75-125% (SVL)..
NE	Not Established.
W	Post-digestion spike recovery out of control limits 85-115% (SVL).
--	Field data or laboratory samples were not collected or analyzed.
e	Field duplicate results exceed acceptable limits - PQL based determination.
<	Indicates analyte not detected above laboratory practical quantification limit (PQL).
(mg/L)	Milligrams per liter.
*	Duplicate analysis not within control limits (SVL).
**	Standards from IDAPA 58.01.11.200. For Idaho, water quality standards are based on the total fraction for groundwater. Standard values followed by an "s" indicate a secondary standard.
	Shading indicates results above ID DEQ Standards, regardless of physical state (Total or Dissolved).

Well MC-MW-3 and MC-MW-4 formerly known as MC-MW-11 and MC-MW-6, respectively.

TABLE B-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.015**	**0.05s**	**0.002**	**NE**	**0.05**	**NE**	**NE**	**0.1s**	**0.002**	**NE**	**5.0s**
PANEL F (MANNING CREEK LEASE AREA)														
MC-MW-1	10/30/2003	Dissolved	N	<0.0004	0.0034	<0.0001	B 0.002	B 0.00049	--	--	<0.001	B 0.00051	B 0.00029	0.0066
MC-MW-1	10/30/2003	Total	N	0.002	0.0522	<0.0001	<0.001	B 0.00042	--	--	<0.0001	<0.0003	0.0109	* 0.0311
MC-MW-1	5/19/2004	Dissolved	N	<0.0007	B0.0018	<0.0002	<0.0013	B 0.00066	--	--	--	--	--	<0.0002
MC-MW-1	5/19/2004	Total	N	B 0.001	<0.001	<0.0002	<0.0013	<0.0003	--	--	--	--	--	B 0.0015
MC-MW-1	6/24/2004	Dissolved	N	<0.0007	<0.0006	*<0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011
MC-MW-1	6/24/2004	Total	N	B 0.00072	<0.0006	*< 0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011
MC-MW-2	10/14/2003	Dissolved	N	<0.0004	0.0689	<0.0001	<0.0011	0.0025	--	--	<0.0001	B 0.00053	B 0.0016	0.059
MC-MW-2	10/14/2003	Total	N	0.0265	1.52	0.00049	0.42	0.0231	<0.0002	0.0231	B 0.00034	B 0.0014	0.2	1.48
MC-MW-2	6/30/2004	Dissolved	N	<0.001	<0.0006	<0.0002	B 0.0053	B 0.00088	--	--	--	--	--	0.0052
MC-MW-2	6/30/2004	Total	N	<0.001	SB0.002	<0.0002	B 0.0066	B 0.00095	--	--	--	--	--	S 0.0123
MC-MW-4	10/14/2003	Dissolved	N	<0.0004	0.135	<0.0001	<0.0011	0.0018	--	--	<0.0001	B 0.00058	B 0.00041	0.311
MC-MW-4	10/14/2003	Total	N	0.0101	0.258	<0.0001	0.0114	0.0021	--	--	<0.0001	<0.0003	0.0079	0.327
MC-MW-4	6/24/2004	Dissolved	N	B0.0013	0.0565	*<0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011
MC-MW-4	6/24/2004	Total	N	B 0.00072	0.056	*< 0.0002	<0.0017	B 0.00036	--	--	--	--	--	0.0023
MC-MW-5	10/14/2003	Dissolved	N	<0.0004	0.0088	<0.0001	0.0506	0.507	--	--	<0.0001	B 0.00048	0.39	0.309
MC-MW-5	10/14/2003	Total	N	W 0.0037	0.0733	B 0.00014	0.243	0.477	0.072	0.405	0.0025	B 0.00086	0.578	1.5
MC-MW-5	6/24/2004	Dissolved	N	<0.0007	B0.0016	*<0.0002	0.034	0.0262	--	--	--	--	--	0.227
MC-MW-5	6/24/2004	Total	N	<0.0007	0.004	*< 0.0002	0.0325	0.0313	--	--	--	--	--	0.223
MC-MW-5	10/5/2004	Dissolved	N	<0.001	S0.0374	<0.0002	0.69	0.325	--	--	--	--	--	S4.75
MC-MW-5	10/5/2004	Total	N	<0.001	0.0314	<0.0002	0.608	0.342	--	--	--	--	--	3.83
PANEL G (DEER CREEK LEASE AREA)														
DC-MW-1	10/9/2003	Dissolved	N	<0.0004	0.901	<0.0001	B 0.0073	0.0019	--	--	<0.0001	e <0.0003	B 0.001	0.0148
DC-MW-1	10/9/2003	Total	N	0.0403	2.43	B 0.00019	0.13	0.006	--	--	B 0.00082	B 0.0012	0.268	0.585
DC-MW-1	6/23/2004	Dissolved	N	<0.0007	0.467	*<0.0002	B 0.0023	0.0036	--	--	--	--	--	B0.004
DC-MW-1	6/23/2004	Total	N	0.0161	1.27	*< 0.0002	0.0554	0.0078	--	--	--	--	--	0.258
DC-MW-2	10/12/2003	Dissolved	N	<0.0004	0.011	<0.0001	0.0266	0.0086	--	--	<0.0001	Be 0.00031	0.0182	0.138
DC-MW-2	10/12/2003	Total	N	0.012	0.786	0.00043	0.568	0.0123	--	--	0.0021	W 0.0047	0.499	4.01
DC-MW-2	6/30/2004	Dissolved	N	B0.0014	0.0289	<0.0002	0.0239	<0.0003	--	--	--	--	--	0.0277
DC-MW-2	6/30/2004	Total	N	B 0.0018	S0.0392	<0.0002	0.0232	B 0.00036	--	--	--	--	--	S 0.0553
DC-MW-3	10/11/2003	Dissolved	N	<0.0004	0.0267	<0.0001	B 0.0013	0.0011	--	--	<0.0001	e <0.0003	<0.0002	<0.0018
DC-MW-3	10/11/2003	Total	N	B 0.0019	0.0847	<0.0001	<0.001	B 0.00093	<0.0002	B 0.00093	<0.0001	B 0.00091	B 0.00097	0.0226
DC-MW-3	6/30/2004	Dissolved	N	<0.001	<0.0006	<0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011

TABLE B-3
SUMMARY OF GROUNDWATER DATA
ANALYSIS FOR METALS
PANELS F AND G
BASELINE STUDY

Site	Sample Date	Type	QC	Lead (mg/L)	Manganese (mg/L)	Mercury (mg/L)	Nickel (mg/L)	Selenium All (mg/L)	Selenium IV (mg/L)	Selenium VI (mg/L)	Silver (mg/L)	Thallium (mg/L)	Vanadium (mg/L)	Zinc (mg/L)
IDAHO DEQ Standard**				**0.015**	**0.05s**	**0.002**	**NE**	**0.05**	**NE**	**NE**	**0.1s**	**0.002**	**NE**	**5.0s**
DC-MW-3	6/30/2004	Dissolved	D	<0.001	<0.0006	<0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011
DC-MW-3	6/30/2004	Total	N	W< 0.001	S0.0495	<0.0002	<0.0017	<0.0003	--	--	--	--	--	S< 0.0011
DC-MW-3	6/30/2004	Total	D	<0.001	S0.0544	<0.0002	<0.0017	<0.0003	--	--	--	--	--	S< 0.0011
DC-MW-4	10/12/2003	Dissolved	N	<0.0004	0.0259	<0.0001	B 0.0054	0.0011	--	--	<0.0001	e <0.0003	B 0.00058	0.0104
DC-MW-4	10/12/2003	Dissolved	D	<0.0004	0.0261	<0.0001	B 0.0042	0.0011	--	--	<0.0001	B 0.00031	B 0.00057	0.0106
DC-MW-4	10/12/2003	Total	N	B 0.0016	0.0601	<0.0001	0.0194	0.0078	0.0016	0.0062	B 0.00049	B 0.00046	0.0435	0.138
DC-MW-4	10/12/2003	Total	D	0.002	0.063	<0.0001	0.0204	0.0076	--	--	B 0.00051	<0.0003	0.044	0.14
DC-MW-4	6/30/2004	Dissolved	N	<0.001	0.0138	<0.0002	B 0.0068	<0.0003	--	--	--	--	--	<0.0011
DC-MW-4	6/30/2004	Total	N	B 0.0015	S0.0183	<0.0002	B 0.0057	<0.0003	--	--	--	--	--	S< 0.0011
DC-MW-5	10/10/2003	Dissolved	N	<0.0004	0.018	<0.0001	0.0133	0.0143	--	--	<0.0001	e <0.0003	B 0.0013	0.037
DC-MW-5	10/10/2003	Total	N	<0.0004	0.0213	<0.0001	B 0.0066	0.0142	--	--	<0.0001	<0.0003	0.0155	0.075
DC-MW-5	6/25/2004	Dissolved	N	<0.0007	<0.0006	*<0.0002	0.0136	0.0105	--	--	--	--	--	0.0977
DC-MW-5	6/25/2004	Total	N	B 0.0011	B0.002	*< 0.0002	0.0128	0.0115	--	--	--	--	--	0.113
DC-MW-5	10/15/2004	Dissolved	N	B0.00062	<0.001	<0.0002	0.0131	0.0079	--	--	--	--	--	S0.0937
DC-MW-5	10/15/2004	Total	N	BW 0.00069	<0.001	<0.0002	B 0.0096	0.0097	--	--	--	--	--	0.0861
DC-MW-6	10/9/2003	Dissolved	N	<0.0004	2.12	<0.0001	B 0.0098	0.0015	--	--	W <0.0001	e <0.0003	0.0062	0.022
DC-MW-6	10/9/2003	Total	N	0.095	9.33	0.0011	1.15	0.0422	--	--	W 0.0062	B 0.0026	0.959	5.5
DC-MW-6	6/23/2004	Dissolved	N	<0.0007	0.339	*<0.0002	B 0.0062	0.0017	--	--	--	--	--	0.0064
DC-MW-6	6/23/2004	Total	N	0.021	12.6	*< 0.0002	0.238	0.0121	--	--	--	--	--	1.22
PRESERVATIVE BLANK														
EQUIPBLAN	6/30/2004	Dissolved	B	<0.001	<0.0006	<0.0002	<0.0017	<0.0003	--	--	--	--	--	B0.0029
EQUIPBLAN	6/30/2004	Total	B	0.0011	<0.0006	<0.0002	<0.0017	<0.0003	--	--	--	--	--	0.0016
FIELDBLANK	6/24/2004	Dissolved	FB	<0.0007	<0.0006	*<0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011
FIELDBLANK	6/24/2004	Total	FB	<0.0007	<0.0006	*< 0.0002	<0.0017	<0.0003	--	--	--	--	--	<0.0011

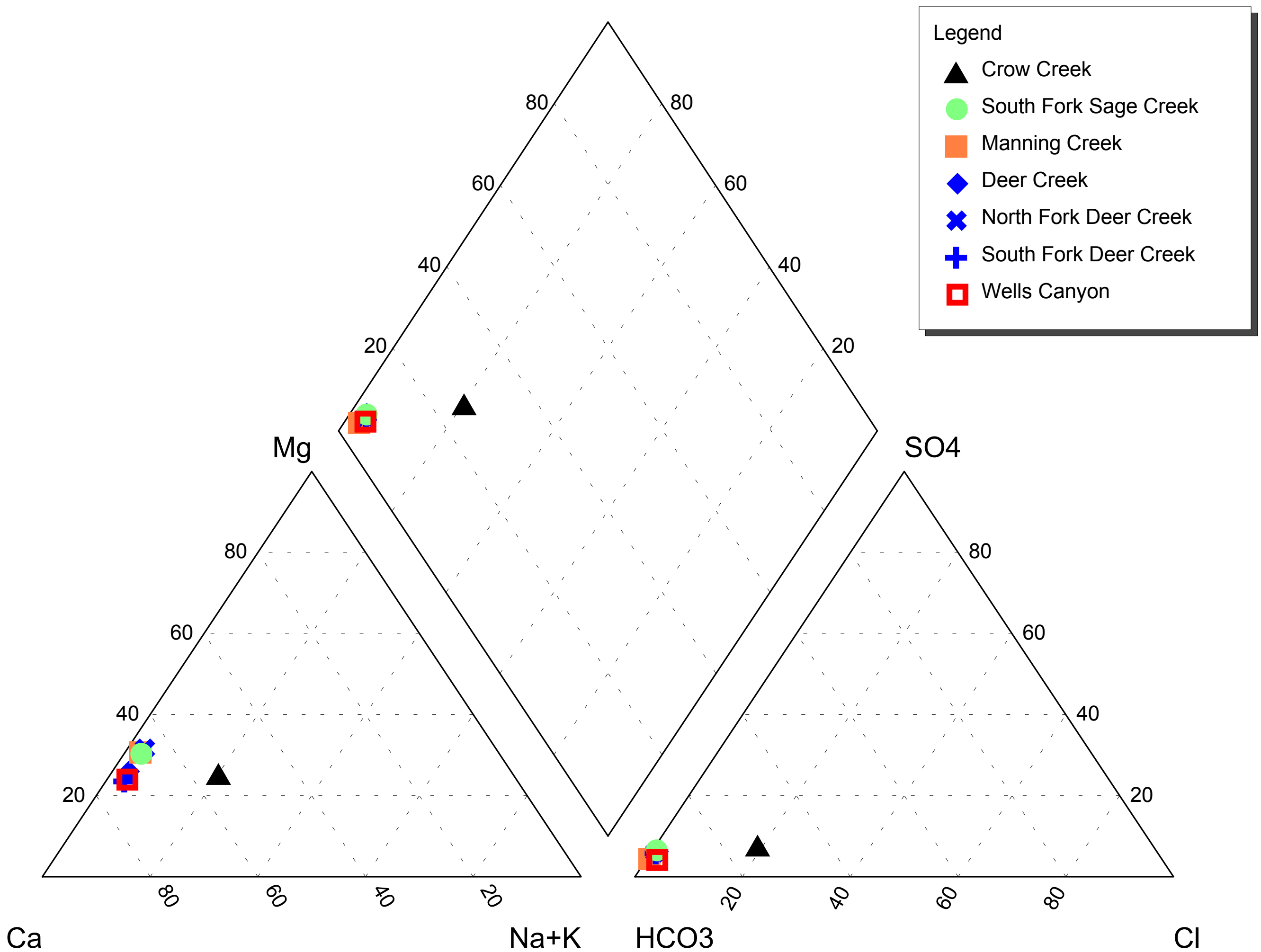
Notes:

- D — Field duplicate sample.
- B — Not detected above quantitation limit but present above method detection limit (SVL).
- E — Estimated value due to presence of interference (SVL).
- N — Located in QC column indicates natural sample.
- N — Located in analyte column indicates percent recovery not within control limits 75-125% (SVL)..
- NE — Not Established.
- S — Serial dilution difference is >10% and original sample concentration is >50X the instrument detection limit (SVL).
- W — Post-digestion spike recovery out of control limits 85-115% (SVL).
- -- — Field data or laboratory samples were not collected or analyzed.
- e — Field duplicate results exceed acceptable limits - PQL based determination.
- < — Indicates analyte not detected above laboratory practical quantification limit (PQL).
- (mg/L) — Milligrams per liter.
- * — Duplicate analysis not within control limits (SVL).
- ** — Standards from IDAPA 58.01.11.200. For Idaho, water quality standards are based on the total fraction for groundwater. Standard values followed by an "s" indicate a secondary standard.
- Shading indicates results above ID DEQ Standards, regardless of physical state (Total or Dissolved).

Well MC-MW-3 and MC-MW-4 formerly known as MC-MW-11 and MC-MW-6, respectively.

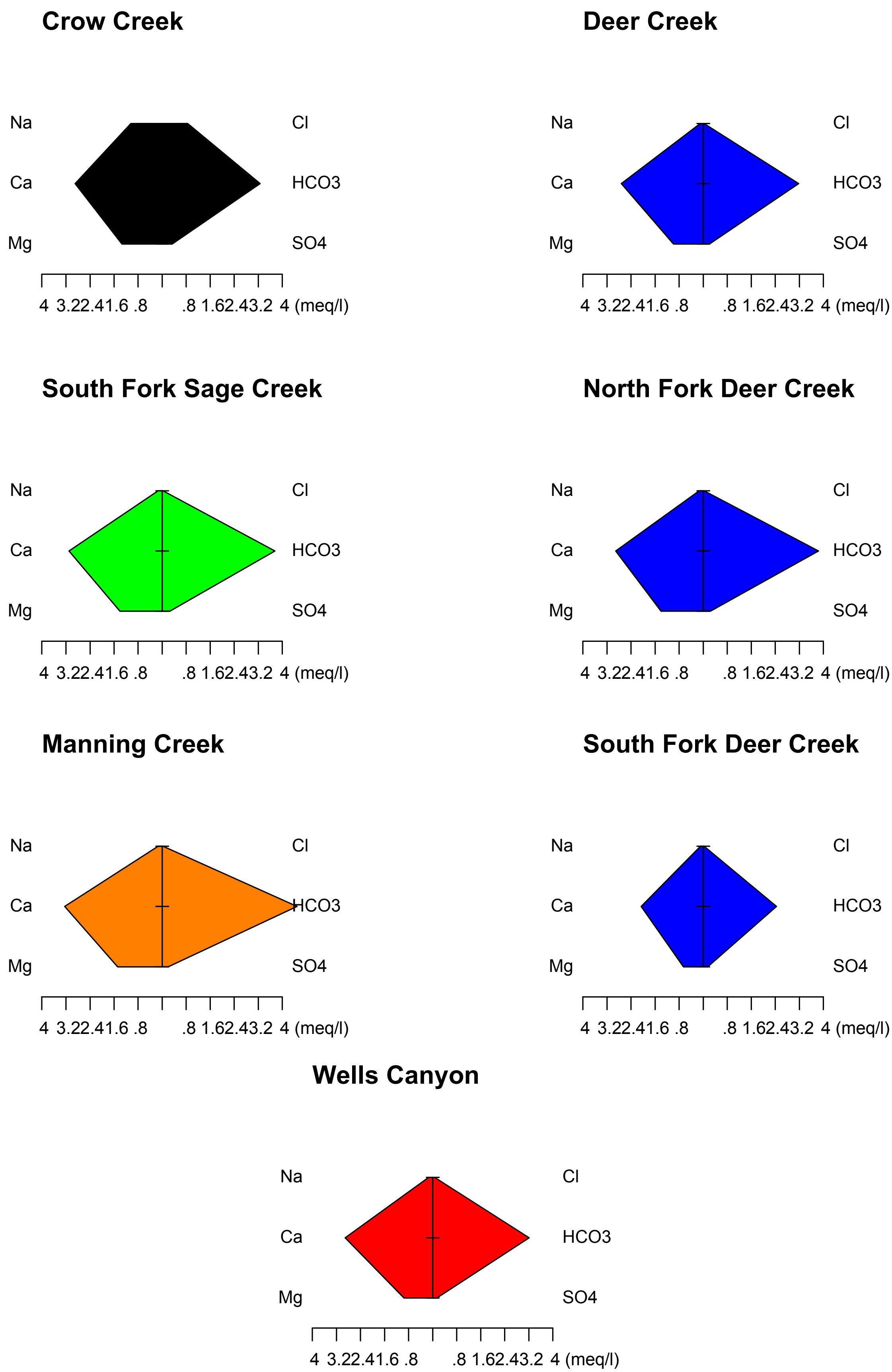
Graphical Plots (Piper and Stiff Diagrams)
Figures H-1 to H-9

Median Surface Water Quality



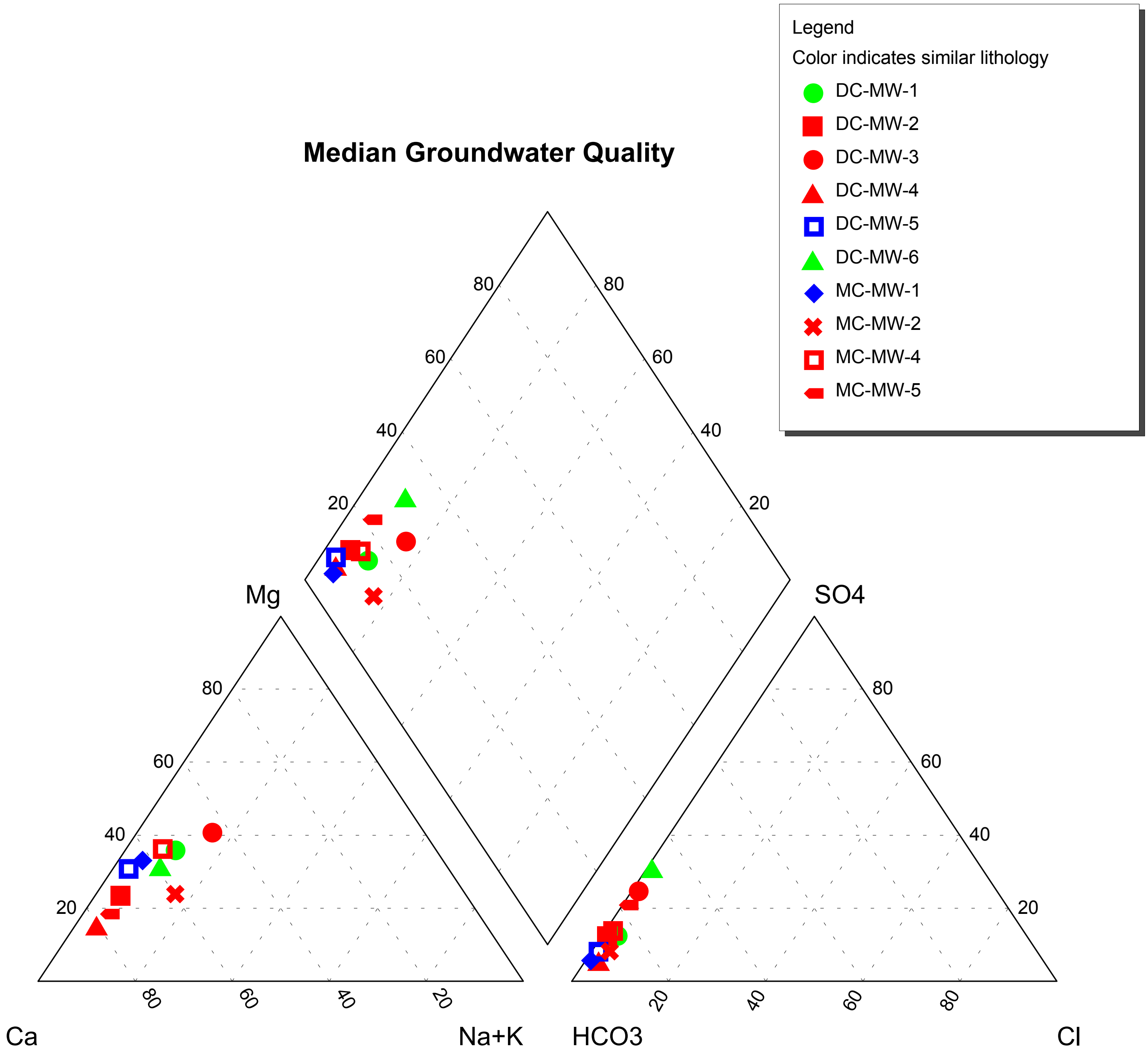
DESCRIPTION: Piper Diagram - Median surface water quality for all stations and samples within the drainage.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-1



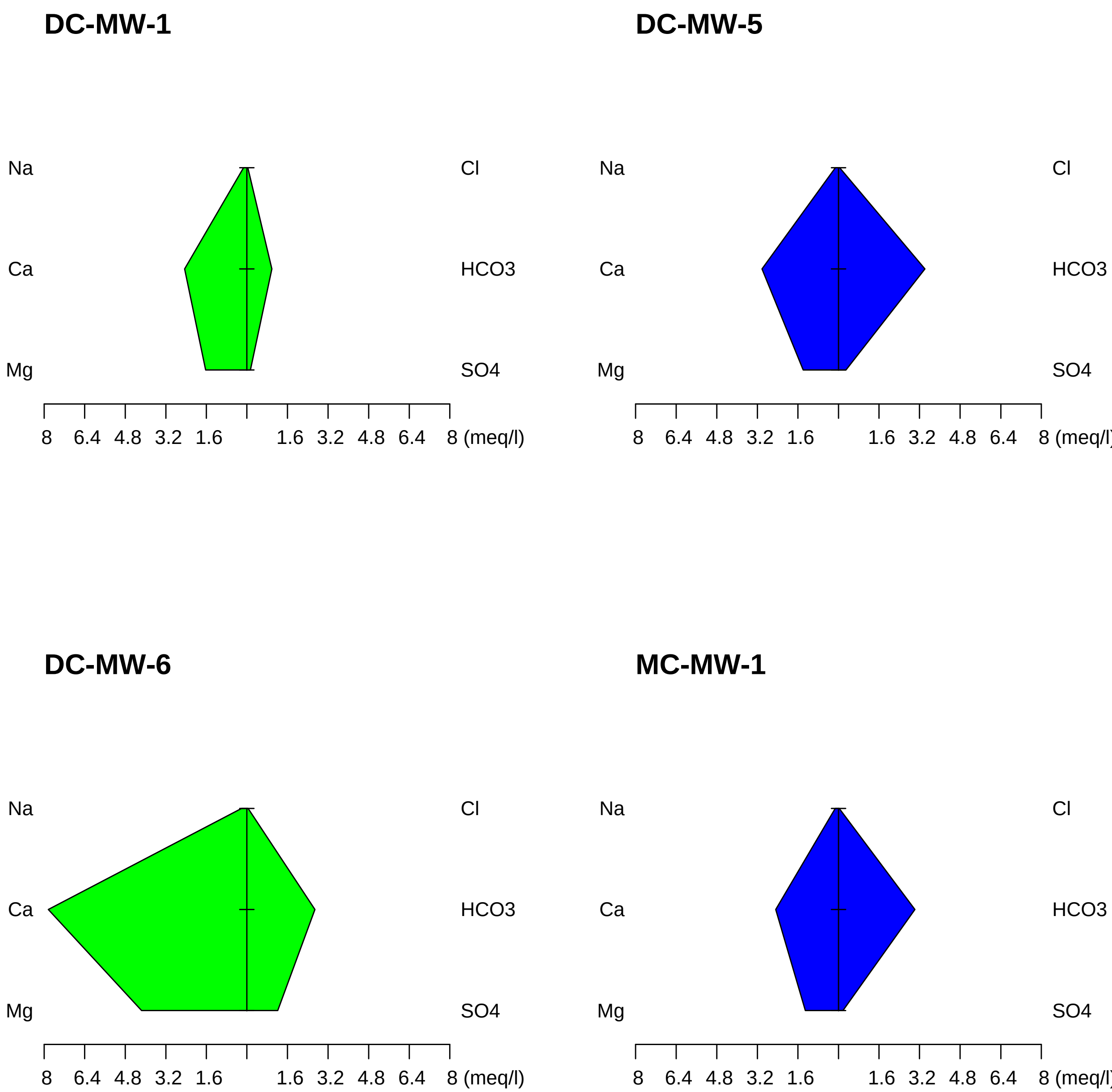
DESCRIPTION:	Stiff Diagram - Median surface water quality for all stations and samples within the drainage.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-2



DESCRIPTION:	Piper Diagram - Groundwater quality for all wells and samples colored by similar completion lithology.

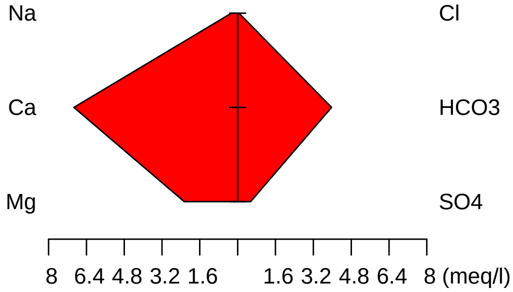
MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-3



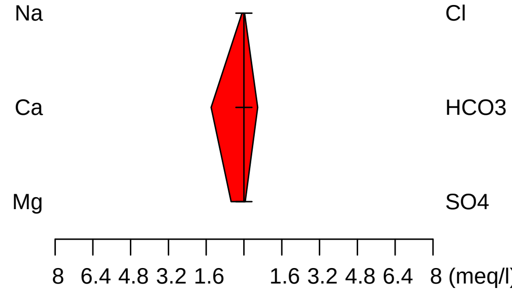
DESCRIPTION: Stiff Diagram - Groundwater quality - Green = Alluvial completion, Blue = Wells Formation completion.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-4

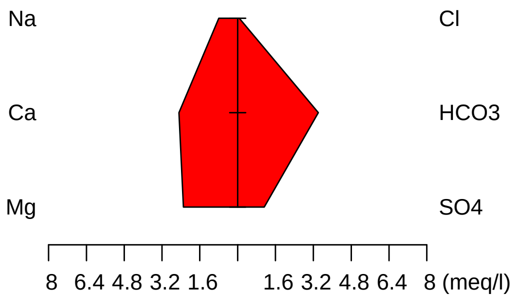
DC-MW-2 (Meade Peak)



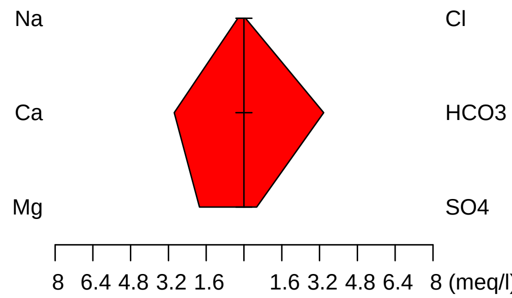
MC-MW-2 (Rex Chert)



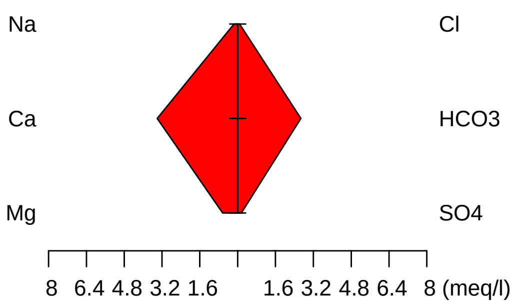
DC-MW-3 (Rex Chert)



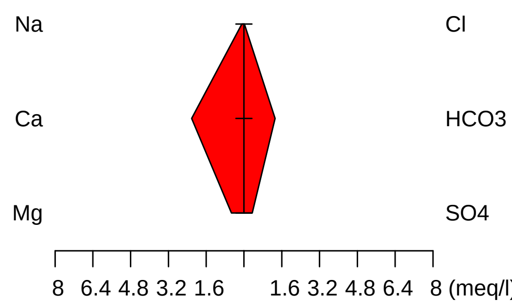
MC-MW-4 (Rex Chert)



DC-MW-4 (Meade Peak)

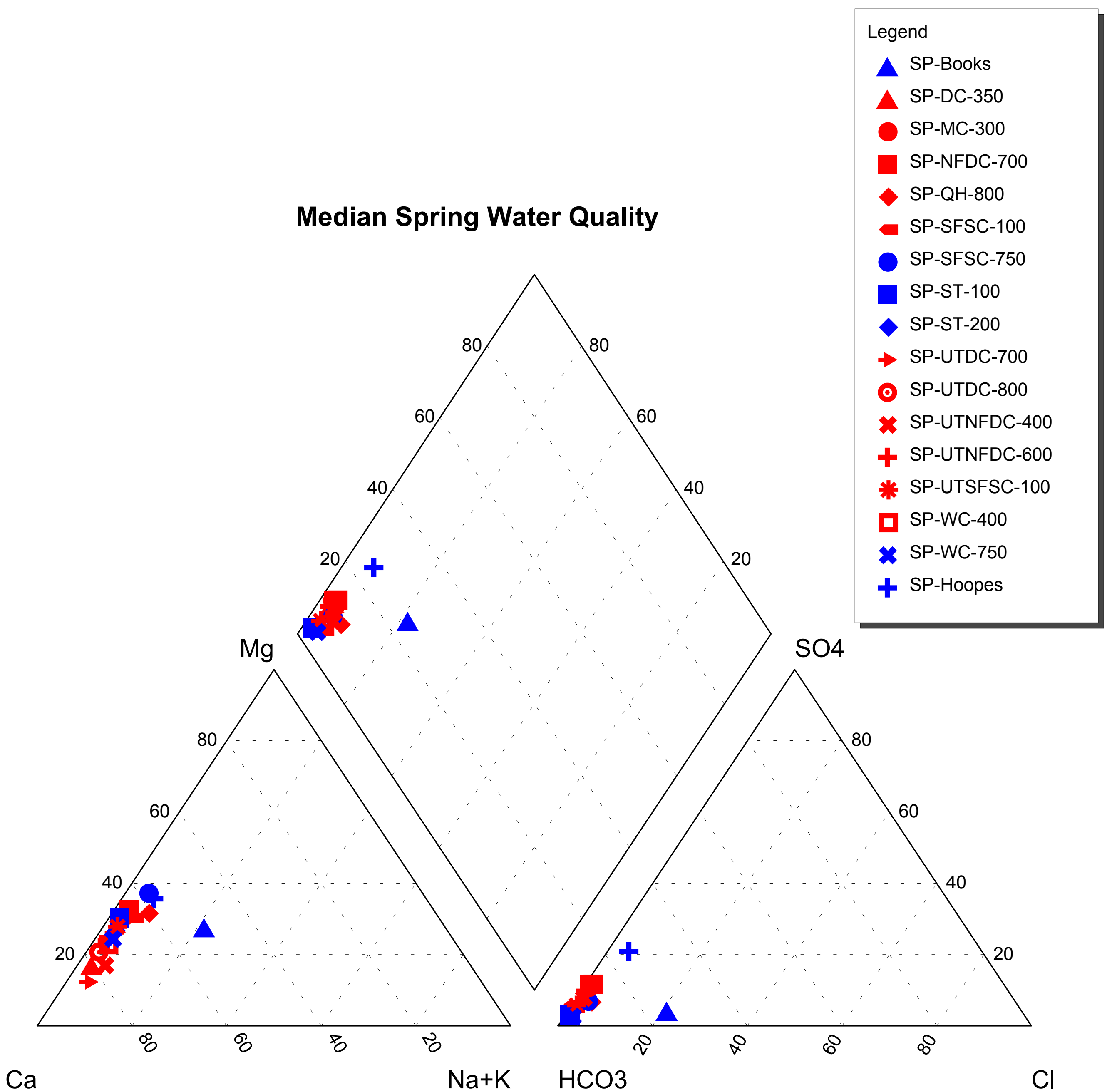


MC-MW-5 (Meade Peak)



DESCRIPTION: Stiff Diagram - Groundwater quality - Rex Chert - Meade Peak Formation completion.

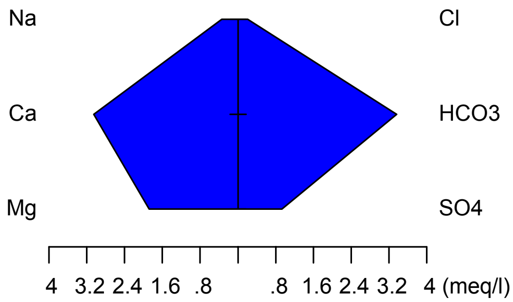
MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-5



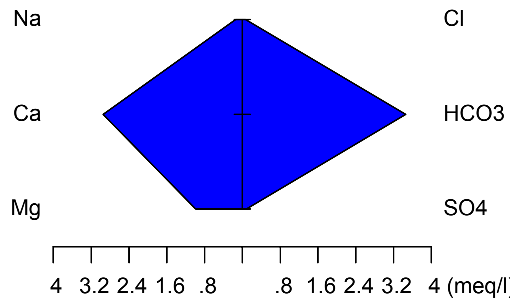
DESCRIPTION:	Piper Diagram - Median spring water quality colored by similiar lithology.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-6

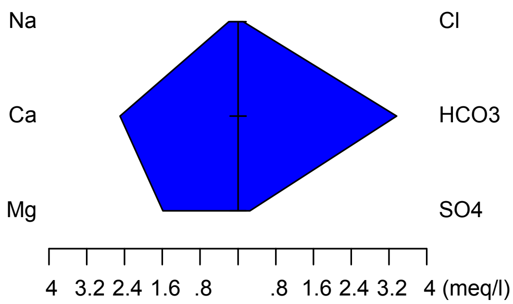
SP-Hoopes



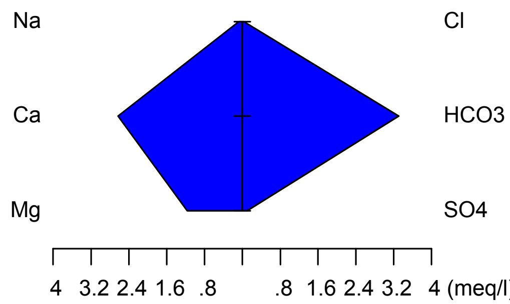
SP-WC-750



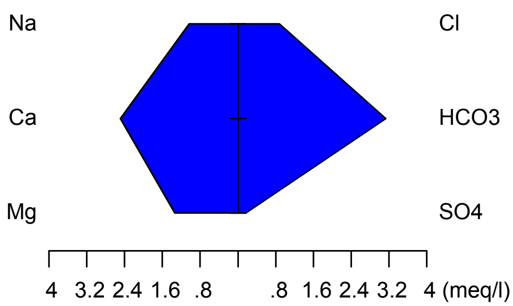
SP-SFSC-750



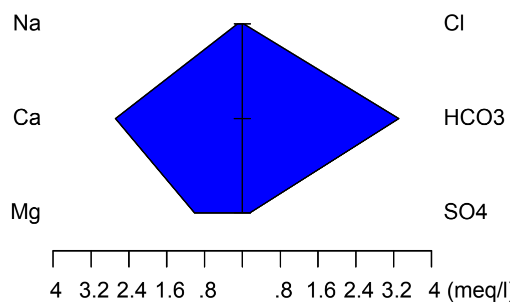
SP-ST-100



SP-Books



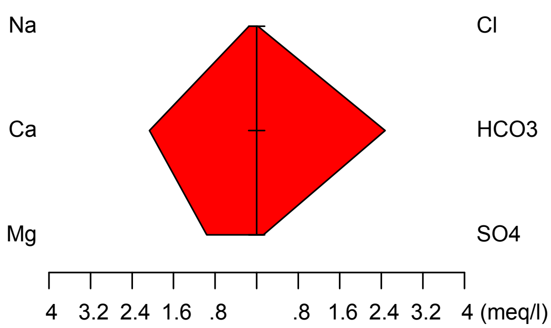
SP-ST-200



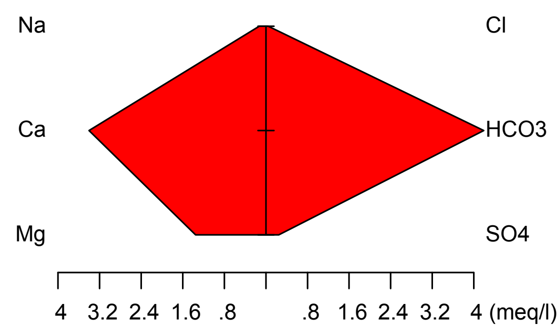
DESCRIPTION: Stiff Diagram - Median spring water quality. Blue indicates Wells Formation as source.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-7

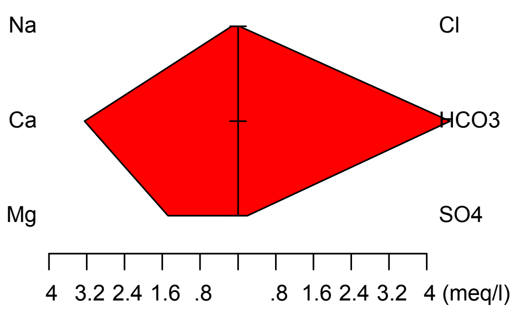
SP-SFSC-100



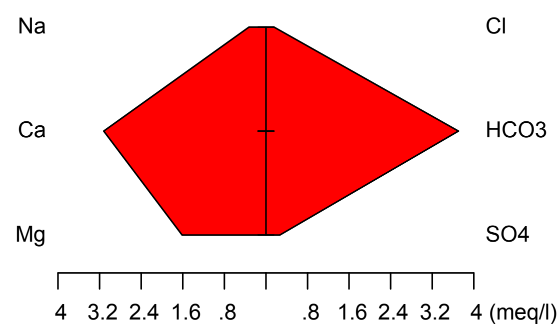
SP-UTSFSC-100



SP-MC-300



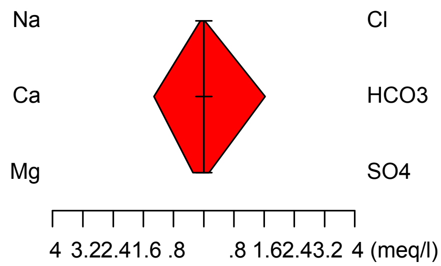
SP-QH-800



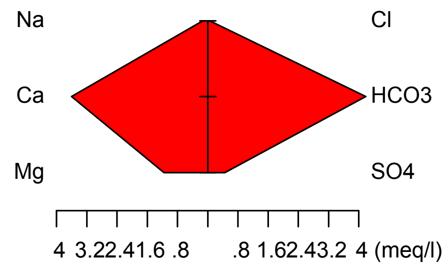
DESCRIPTION: Stiff Diagram - Median spring water quality. Panel F Lease Area. Red indicates source not likely Wells Fm.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO: 2560432.420
	CLIENT: J.R. Simplot	FIGURE: H-8

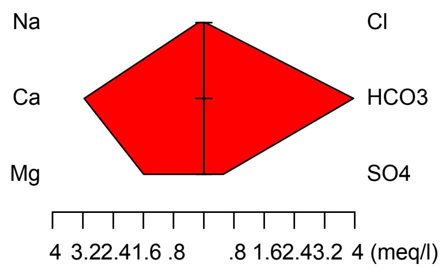
SP-UTNFDC-400



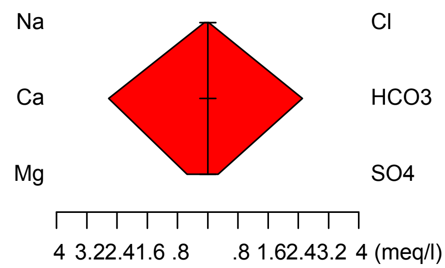
SP-UTNFDC-600



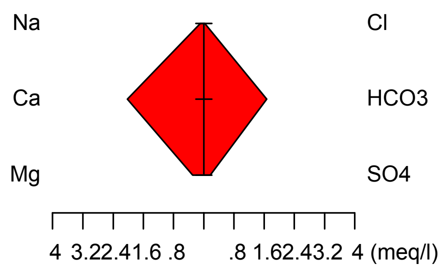
SP-NFDC-700



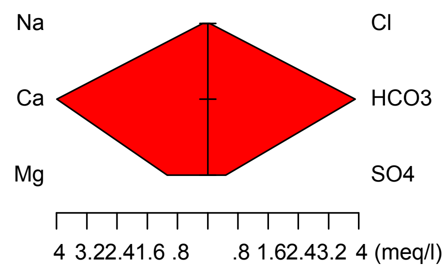
SP-DC-350



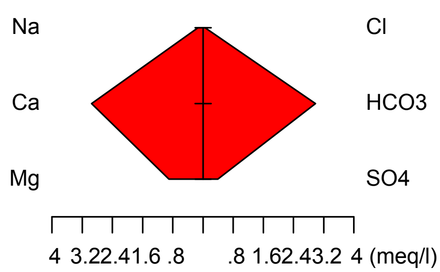
SP-UTDC-700



SP-UTDC-800



SP-WC-400



DESCRIPTION: Stiff Diagram - Median spring water quality. Panel G Lease Area. Red indicates source not likely Wells Fm.

MAXIM TECHNOLOGIES INC®	PROJECT: Smoky Canyon Mine Panels F and G	PROJECT NO:
	CLIENT: J.R. Simplot	FIGURE: H-9

Appendix 3B
Spawning Gravel Requirements for Cutthroat Trout

Spawning Gravel Requirements for Cutthroat Trout
Technical Memo

1.0 Introduction

Cutthroat trout spawn under specific stream conditions related to water temperature, substrate (gravel) characteristics, and other physical cues (e.g., water velocity). Female salmonids construct nests by first clearing away fine sediment to create a pocket that contains less sediment than the surrounding gravel (Hartman & McMahon 2004). Sediment intrusion into the nest can reduce intra-gravel permeability, thereby limiting the supply of oxygen to developing embryos (Reiser & White 1988). Numerous early (pre-1970) field and laboratory studies established that the amount of “fines” or fine sediments (usually < 6 mm in diameter) in spawning gravel is directly related to embryo mortality (reviewed in Chapman 1988), and the requirements of spawning trout (most often steelhead or rainbow) with regard to precise sediment content in gravel have since been studied extensively.

2.0 Cutthroat trout

Thurow and King (1994) first described the spawning requirements of Yellowstone cutthroat trout in southeast Idaho with regard to precise sediment content. They characterized spawning sites of Yellowstone cutthroat trout in a Snake River tributary (Pine Creek, southeast Idaho) and found that, on average, 20% of the gravel substrate was smaller than 6.35 mm and 5% was less than 0.85 mm. In general, cutthroat trout in their study spawned over substrate with a wider range of particle sizes (0.06-100 mm in diameter) than those found in the literature (Thurow & King 1994). Other studies (cited in Thurow & King) find that cutthroat prefer gravels from 19-76 mm (Cope 1957), 12-85 mm (Varley & Gresswell 1988), or 15-60 mm (Hickman & Raleigh 1982).

3.0 Other trout species in Idaho

Studies of other trout in Idaho add to the consensus that embryo survival is indirectly related to the percentage of fine sediment in spawning gravel, and at similar levels as were found for the Snake River Yellowstone cutthroat. McCuddin (1977) found steelhead survival in natural spawning areas decreased as the proportion of sand in the substrate increased above 10-20%. In that study, any percentage of 6-12 mm particles above 10-15% appeared to reduce survival, as did any percentage of fines (<6 mm) above about 20-25% (McCuddin 1977 *cited in Chapman 1988*). Reiser and White (1988) found a similar threshold for fine sediments. They incubated steelhead trout eggs in 16 mixtures of fine (<0.84 mm) and coarse (0.84-4.6 mm) sediments (representative of those found in the Idaho batholith) into laboratory gravel nests and found that embryos were more sensitive to increases in fines (<0.84 mm). They found a ratio of 30% fine sediment (and 70% gravel) was generally the lethal limit for steelhead embryos. Using sediments “imported” from streams in central Idaho, Tappel and Bjornn (1983) found that 90-93% of the variability in steelhead embryo survival (in the laboratory) was correlated negatively to the percentage of two different particle sizes in gravel: sediment less than 0.85 mm and sediment less than 9.5 mm in diameter, thus medium-sized sediment may also play an important role in survival of some species.

4.0 References

Chapman, D. W. 1988. Critical review of variables used to define effects of fines in redds of large salmonids. Transactions of the American Fisheries Society 117(1): 1-21.

Cope, O. B. 1957. The choices of spawning sites by cutthroat trout. Proceedings of the Utah Academy of Arts and Sciences, Arts, and Letters 34: 73-79. *Cited in Thurow & King 1994*

Hartman, G. F., and T. E. McMahon. 2004. "Aspects of fish reproduction and some implications of forestry activities." In Fishes and Forestry: Worldwide Watershed Interactions and Management, eds. T. G. Northcote and G. F. Hartman. Blackwell Science.

Hickman, T., and R. F. Raleigh. 1982. Habitat suitability index models: cutthroat trout. US Fish and Wildlife Service, Habitat Evaluation Procedures Group, Western Energy and Land Use Team. Fort Collins, Colorado. *Cited in Thurow & King 1994*

McCuddin, M. E. 1977. Survival of salmon and trout embryos and fry in gravel-sand mixtures. Master's Thesis. University of Idaho, Moscow, Idaho. *Cited in Chapman 1988*

Reiser, D. W., and R. G. White. 1988. Effects of two sediment size-classes on survival of steelhead and chinook salmon eggs. North American Journal of Fisheries Management 8: 432-437.

Tappel, P. D., and T. C. Bjornn. 1983. A new method of related size of spawning gravel to salmonid embryo survival. North American Journal of Fisheries Management 3:123-135.

Thurow, R. F., and J. G. King. 1994. Attributes of Yellowstone cutthroat trout redds in a tributary of the Snake River, Idaho. Transactions of the American Fisheries Society 123: 37-50.

Varley, J. D., and R. E. Gresswell. 1988. Ecology, status, and management of the Yellowstone cutthroat trout. American Fisheries Society Symposium 4: 13-24. *Cited in Thurow & King 1994*

Appendix 4A
Watershed Erosion Prediction Project Modeling

Watershed Erosion Prediction Project (WEPP) Modeling
Smoky Canyon Mine
Panels F and G Extension Area

Introduction

Quantifying the amount of soil erosion by water from any given land surface, or quantifying the amount of sediment that would be contributed from an eroded surface to a given stream channel on a storm, annual, or long term basis, is not possible to do with any degree of certainty. The USFS commonly estimates water erosion and sedimentation with a model titled: *Water Erosion Prediction Project* (WEPP), and its various use-specific, stand-alone modules.

The WEPP soil erosion model has been developed by an interagency group of scientists including the USFS, Agricultural Research Service, Natural Resource Conservation Service (NRCS), BLM, and Geological Survey (USDA 2000). This model incorporates processes such as infiltration, runoff, soil detachment, transport and deposition, plant growth, senescence, residue decomposition, effects of tillage processes, and soil consolidation to evaluate erosion and sediment delivery potential. Actual erosion rates are highly variable due to large variations in local topography, climate, soil properties, and vegetative properties.

For the Smoky Canyon Mine Panel F and G Extension Area Environmental Impact Statement (EIS) the WEPP model was used to estimate erosion from the proposed major mine disturbances, and the stand-alone WEPP:Road module, titled "*Interface for Predicting Forest Road Runoff, Erosion and Sediment Delivery*", was used to estimated sedimentation to nearby streams from the proposed transportation alternatives. Custom climate parameters that are characteristic of the area were input into the WEPP module to approximate the most accurate climate conditions.

Model Descriptions, Assumptions, and Inputs

Complete documentation for both the WEPP program itself, and the road module, can be found at http://forest.moscowfsl.wsu.edu/fswepp/. Brief descriptions of the two are provided below. The WEPP documentation states that the accuracy of predicted values obtained by the model or its use-specific modules "are, at best, within plus or minus fifty percent." For this reason, the actual values obtained from the model for this EIS and presented herein should not be the focus of the analysis; instead the relative magnitudes should be used as a means of comparing the various alternatives.

Disturbed WEPP

The Disturbed WEPP (USDA 2000) model was utilized to represent erosion predictions for reclaimed areas during both interim vegetation establishment and at the completion of successful revegetation. Details specific to the Disturbed WEPP model can be found on the website http:/forest.moscowfsl.wsu.edu/fswepp/docs/distweppdoc.html. It should be noted that the WEPP model is not designed for mining disturbance areas of this type or size and the program does not have provisions to allow for the implementation of BMP=s, the degree of coarse fragments in the soil, or other variables which influence erosion and sedimentation.

Input data utilized in WEPP analysis includes 4 different soil textures, 8 different vegetation scenarios, various slope values, length of slope, percent cover, and a model time length of up to 30 years. WEPP simulates the conditions that impact erosion such as vegetation canopy, surface residue, and the soil water content for every day in a multiple-year run (USDA 2000). For each day that has a precipitation event, WEPP determines whether the event is rain or snow, and calculates the infiltration and runoff, routing the runoff over the surface and calculating the erosion or deposition rates for at least 100 points on the hill slope. It then calculates the average sediment yield from the hill slope.

The WEPP models for all disturbed areas for the Proposed Action and Alternatives were run with local climate data in order to take into account annual precipitation patterns, elevation, and temperatures to more accurately calculate the effects of runoff. The Rock:Clime subroutine in WEPP was used to generate a local precipitation and termperature data set by applying adjustments to the program's internal Palisades Dam, Idaho, weather data to better match the reported 30-35 inches of annual precipitation at Smoky Canyon. Analyses are based on 30 years of climate data. Mean annual averages are predicted using the probability of precipitation, type of precipitation, number of storm events, the upland erosion rate and the sediment leaving the profile.

Baseline Disturbed WEPP input parameters for both interim and successful revegetation conditions identify the dominant soil textures in the area as loam and silt loam. Horizontal slope lengths of 50 and 100 feet were utilized for all of the model alternatives. Reclaimed and regraded slopes would be less than 33 percent, with rock cover estimated at 20 or 40 percent, depending upon location.

Modeling for interim revegetation was calculated using 40 percent cover, which is approximately equivalent to the presence of short prairie grass. Interim revegetation conditions also include the establishment of cover crops on temporary growth medium stockpiles.

WEPP prediction parameters for successfully reclaimed mining areas include the baseline parameters identified above, and an average of 70 percent vegetation cover consisting of short prairie grass and tall prairie bunch grasses, which is consistent with the components of the revegetation seed mix.

WEPP:Road

WEPP:Road, was designed to predict erosion and subsequent sediment yield from forest roads based upon general information on climate, soil, road surface, local topography, drain spacing, road design, and ditch condition. These inputs differ in some instances than those required for the main WEPP program described above. Module-specific documentation for the WEPP:Road module can be found on the internet at http://forest.moscowfsl.wsu.edu/fswepp/docs/wroadimg.html.

WEPP:Road presumes three flow segments (a travelway/ditch component, a fill slope, and a forested buffer) to derive average annual sediment yield, in pounds to the nearest stream channel. WEPP:Road does not account for any mass failures, culvert failures, cut slope erosion, or erosion from cross-drain channel structures. It presumes that fill slopes have a 50-percent vegetated ground cover, and that there is a forested buffer between the road fill and the stream channel that has a 100-percent vegetation/litter ground cover. Essentially, WEPP calculates erosion from the road surface and the fill slope, and then uses the buffer slope characteristics to route the eroded material to the stream channel. The sediment delivery ratio varies depending upon the buffer length and slope. The closer a road segment is to a stream, and the larger the road is, the more likely it would be for it to contribute sediments, according to WEPP:Road. Research on sediment transport from forest roads in central Idaho (Ketcheson and Megahan, 1996) shows that source of the eroded material (i.e. fill slopes, cross drains, etc.) also affects transport distances; Seyedbagheri (1996) reported that road size (width, cut/fill lengths, volume of material) affects both unit erosion rate and transport distance.

WEPP:Road allows the user to choose a graveled road surface. This type of surfacing, which is proposed for all road alternatives herein, is one of the more effective treatments in regard to erosion control from roads. Otherwise, the model does not consider any other erosion or sediment control BMPs that may serve to reduce erosion or sediment loading (with the exception of the important BMP of fill slope vegetation, which WEPP:Road assumes as a given). In sum, WEPP:Road assumptions do not always closely match conditions for the proposed roads; in some cases causing an overestimation of sedimentation and in other cases, an underestimation.

For this analysis, the specific inputs to the WEPP:Road module were determined based on the following sources: Chapter 2 road design information (road width, fill slope gradient, surfacing; and road shape/ditch configuration); conceptual design road footprints provided by Simplot (fill slope length and road gradient); soil mapping (USDA 1976; USDA 1990) (to place individual reaches in one of four soil categories allowed by the model); and topographic mapping (buffer length and slope). Model iterations were made over a 15-year period to represent the approximate life of these roads, but it is generally shown that the first year or so after construction represents the greatest erosion potential (Ketcheson and Megahan, 1996). The same climate parameters that were used in Disturbed WEPP were used for WEPP:Road.

WEPP Modeling Results

Erosion from Mine Disturbances

WEPP model predictions for existing conditions indicate that the potential for erosion of a 20-year-old forest on 45 to 55 percent slopes over a 30-year period of time is 3 percent, indicating that one out of 30 years would have erosion. For the same age forest on slope values of 15 to 25 percent, or slopes of 0 to 15 percent, would still only incur erosion approximately 3 percent of the time, or one year out of 30. Changing vegetation for the same slope classes indicates that shrub and grass cover could have erosion occur 70 percent of the time over the 30-year period, or 21 out of 30 years.

Existing slope values in the study area range from 0 to 55 percent, with only 19 percent of the area having slopes less than 20 percent. Approximately 10 percent of the area is in the 45 to 55 percent slope range, and 26 percent is in the 35 to 45 percent slope range. A significant portion of the area contains map units with a wide range of slopes, from 10 to 55 percent, or consists of rock outcrop or disturbed area. Slope values for reclaimed slopes under the Proposed Action and Alternatives would have a range of 1 to 45 percent slope with the majority of reclaimed areas incorporating a gentle 3:1 (Horizontal:Vertical) slope surface during regrading and reclamation activities. Vegetation in the area consists of mixed forests, shrubs, and grasses. WEPP predictions for existing conditions indicate that there would be a 0 to 3 percent probability of erosion, with an average annual upland erosion rate of 0.04 tons per acre.

WEPP predictions for interim vegetation establishment on disturbed mine areas indicate that there would be a 47 to 67 percent chance of erosion during the first three years of reclamation, with an annual upland erosion rate ranging from 0.472 to 1.420 tons per acre. The average annual upland erosion rate for all WEPP model runs for interim vegetation establishment is 0.78 tons per acre.

Disturbed WEPP predictions for successfully established vegetation on areas of reclaimed mine disturbance indicate an annual upland erosion rate that would range from 0.027 to 0.458 tons per acre, with a 17 to 40 percent potential for this degree of erosion to occur. The average annual upland erosion rate for all WEPP model runs for successful vegetation establishment is 0.17 tons per acre.

Sedimentation to Streams from Road Disturbances

The following table shows the WEPP:Road results for the Proposed Action roads and Alternative roads. These numbers show the estimated quantity of eroded material that would make its way through the buffer and into the stream; the predicted quantities of eroded material are also calculated by WEPP:Road, but are not presented directly here. The last row of this table provides a range of values that are +/- 50 percent, which represents the level of model accuracy. As noted above, for these applications of the model, the range is likely to be even greater because the road design differs significantly from model assumptions.

SEDIMENTATION TO STREAMS FROM ROAD EROSION (TONS OF SEDIMENT, ANNUAL AVERAGE)

STREAM	P.A. PANEL F HAUL	P.A. WEST HAUL	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT. 5	ALT. 6	ALT. 7	ALT. 8
SOUTH FORK SAGE	1.45	0.5	1.10	0	0	3.5	3.5	0.05	0	1.00
LOWER SAGE*	0.15	0	1.20	1.70	1.70	0	0	0	0.05	0
MANNING	0	0	0	3.75	3.75	0.90	0.90	0	0	0
DIAMOND	0	0	0	0	0	0	0	0	0	0
DEER	0	31.95	0	2.05	5.00	21.55	35.5	1.55	0	7.50
NATE	0	0	0	4.05	4.05	0	0	0	0	0
WELLS	0	0	0	0.05	0.05	0	0	0	2.60	0
CROW**	0	0	0	3.3	2.50	0	0	0	1.15	0
TOTAL	1.60	32.45	2.30	14.90	17.05	25.95	39.90	1.60	3.80	8.50
RANGE	0.8-2.4	16.22-48.67	1.15-3.45	7.45-22.35	8.52-25.58	12.98-38.92	19.95-59.85	0.80-2.4	1.9-5.7	4.25-12.75

*Contributed to Sage Creek downstream of South Fork Sage; does not include quantities listed for South Fork Sage.

**Includes quantities contributed directly to Crow Creek or to one of the small, unnamed tributaries to it; does not include quantities listed for the other named tributaries listed in the table.

Additional Analysis Using WEPP Results

Mine Disturbances

Erosion control is an effective long-term solution to conserve soil resources, whereas sediment control is a short-term remedy to minimize the impact of unavoidable erosion that occurs during the construction period. Calculated erosion figures as determined from the Disturbed WEPP model (USDA 2000) would be reduced or eliminated with implementation of applicable BMPs. Implementation of BMPs would reduce potential for water erosion, control sediment collected in surface runoff, and mitigate the potential effects of erosion and sedimentation. BMPs utilized would consist of measures for sediment collection, erosion control, runon/runoff collection, soil stabilization, slope stabilization on reclaimed areas, seeding and revegetation, overburden dump construction, and range management, including:

- Use of concurrent reclamation techniques and placement of topsoil/growth medium on a prepared surface to provide a suitable seed bed.
- Avoiding the creation of flat or concave surfaces on overburden surfaces to reduce infiltration.
- The placement of check dams in diversion ditches to break the momentum of surface water runoff and reduce the flow velocities.
- Grading slopes to 3H:1V or less in order to reduce the soil loss associated with steeper slopes.
- Regraded areas would be ripped and scarified to reduce soil compaction.
- Reclaimed areas may be fenced as needed to protect vegetation from livestock grazing during the first few years of establishment.

These methods stabilize the reclaimed slopes and facilitate achievement of post-reclamation objectives.

Road Disturbances

In order to account for the fact that a number of BMPs that would be implemented on the proposed roads could either reduce erosion, or reduce the amount of eroded material that can potentially pass through the buffer (by using sediment control up-gradient of the buffer), additional analysis beyond WEPP:Road modeling was done. First, the literature was searched to find documentation on effectiveness of various BMPs used in the most relevant types of applications and in an analogous environment. Ketcheson and Megahan (1996) showed that forest roads in central Idaho that included maximum, intensive erosion control practices reduced erosion rates by 66 percent over similar roads with more typical erosion control. The USFS (1981) reported sediment traps below roads in Idaho that were estimated at 80 percent efficiency, and numerous other individual treatments with percent reduction in erosion of between 10 and 60. Numerous other authors have reported reductions in sedimentation from roads due to BMPs in the range of 75 to 88 percent (Burns et al, 1995; Burroughs and King, 1989; Belt et al 1992). Seyedbagheri (1996) provided qualitative and quantitative effectiveness information for road BMPs based upon many other researchers' work in Idaho; those results were wide-ranging, but the report generally showed that BMPs are effective. The roads for which these kinds of analyses are available are generally small scale forest roads rather than the very wide haul roads with large areas and volumes of disturbance, which are proposed here. Though the proposed alternate access roads and the proposed alternate conveyor road would have much smaller footprints than the haul roads, they too, are larger than most of the forest roads analyzed in the literature.

Next, using the above effectiveness information as a guide, a percent reduction assumption was made to apply to the Simplot Proposed Action and Alternative roads. As noted above, the scale of road disturbance is related to both unit erosion and transport, so BMPs may be inherently less effective than on smaller scale roads. Similarly, the rugged topography of many of the alternatives would also strain BMPs. Also as noted, WEPP:Road already accounted for graveling, fill slope vegetation cover, and cross drain use. Alternatively, Simplot's use of silt fences, sediment traps, windrows, etc., and a maintenance/inspection schedule that may be better than typical for forest roads, all need to be counted for their potential to reduce sediment loading. An estimate that the calculated erosion (not sedimentation) rates predicted by WEPP:Road could be reduced by 70 percent on haul roads and 75 percent on access roads due to BMPs not otherwise accounted for in the model seems reasonable.

One or the other of those percentage reductions were applied to each road reach in the analysis. Once reduced erosion rates, by reach, were determined, they were further reduced to account for the deposition in the buffer zone between the road and the stream. This latter reduction was done by applying the same percent reduction that resulted from the original WEPP:Road analysis. For example, if a given annual erosion rate on a haul road, as calculated by WEPP:Road, was 5,000 lbs, that number would be reduced to 1,500 lbs. If, in the original analysis, the entire 5,000 lbs was deposited in the buffer, with a resultant sediment loading of 0 lbs, the 1,500 lbs would similarly be reduced to 0. But, if the original analysis showed that 3,000 of the 5,000 eroded lbs reached the stream, the 1,500 lbs would be reduced by the same factor, with the final estimate of 900 lbs reaching the stream from that segment. The results of this analysis are given in the following table, which is also contained in Section 4.3 of the EIS. The implications of these results are described for each road in the appropriate EIS subsection.

REVISION OF SEDIMENT LOADING TO STREAMS FROM ROAD EROSION WITH BMP IMPLEMENTATION (TONS OF SEDIMENT, ANNUAL AVERAGE)

STREAM	P.A. PANEL F HAUL	P.A. WEST HAUL	ALT. 1	ALT. 2	ALT. 3	ALT. 4	ALT.5	ALT.6	ALT. 7	ALT. 8
SOUTH FORK SAGE	0.45	0.15	0.35	0	0	1.05	1.05	0	0	0.20
LOWER SAGE*	0.05	0	0.35	0.50	0.50	0	0	0	0	0
MANNING	0	0	0	1.20	1.10	0.25	0.25	0	0	0
DIAMOND	0	0	0	0	0	0	0	0	0	0
DEER	0	8.30	0	0.60	1.50	6.45	9.35	0.40	0	1.9
NATE	0	0	0	1.20	1.20	0	0	0	0	0
WELLS	0	0	0	0	0	0	0	0	0.65	0
CROW**	0	0	0	1.00	0.75	0	0	0	0.30	0
TOTAL	0.50	8.45	0.70	4.5	5.05	7.75	10.65	0.40	0.95	2.1
RANGE	0.25-0.75	4.22-12.67	0.35-1.05	2.25-6.75	2.52-7.58	3.88-11.62	5.32-16.00	0.20-0.60	0.48-1.42	1.05-3.15

*Contributed to Sage Creek downstream of South Fork Sage; does not include quantities listed for South Fork Sage.

**Includes quantities contributed directly to Crow Creek or to one of the small, unnamed tributaries to it; does not include quantities listed for the other named tributaries listed in the table.

Discussion of Results

It should be noted that the Disturbed WEPP model does not have provisions to allow for the implementation of BMPs, the degree of other coarse fragments in the soil, or other mitigative variables, which influence erosion and sedimentation. Disturbed WEPP also describes all vegetation in cropland format, which is not directly comparable to reclamation conditions. Rock fragment content over 50 percent is not accepted by WEPP. Above 50 percent, WEPP assumes there is not further impact from increased rock content. Many of the soils in the study area have naturally high coarse fragment content, which is not considered when running WEPP.

The sediment quantities estimated to enter streams from roads presented in the two relevant tables above should not be taken as specific values, but should be used to compare the alternatives. However, some sedimentation to area streams from the Proposed Action and from all alternatives should be expected. Although the BMPs may minimize or reduce this potential, it is not reasonable to expect that all sediment from mining operations and transportation routes can be kept from streams.

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