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
Panel F, Including Lease Modifications
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**.

Panel F Haul/Access Road

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.

Panel G

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.

Panel G West Haul Access Road

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.

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 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.

Panel F, Including Lease Modifications

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.

Panel F Haul/Access Road

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

No Panel F South Lease Modification

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.

Panel F, Including Lease Modifications

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.

Panel F Haul/Access Road

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.

Panel G

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**.

Panel G West Haul/Access Road

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**.

Power Line Between Panels F and G

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

No Panel F North Lease Modification
The reduction in total emissions from not mining the North Lease Modification would be 9.4 tons.

No Panel F South Lease Modification
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

Panel F, Including Lease Modifications

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.

Panel F, Haul/Access Road

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.

Infiltration Through Reclaimed Mine Panels

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.

Predicted Infiltration Chemistry

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.

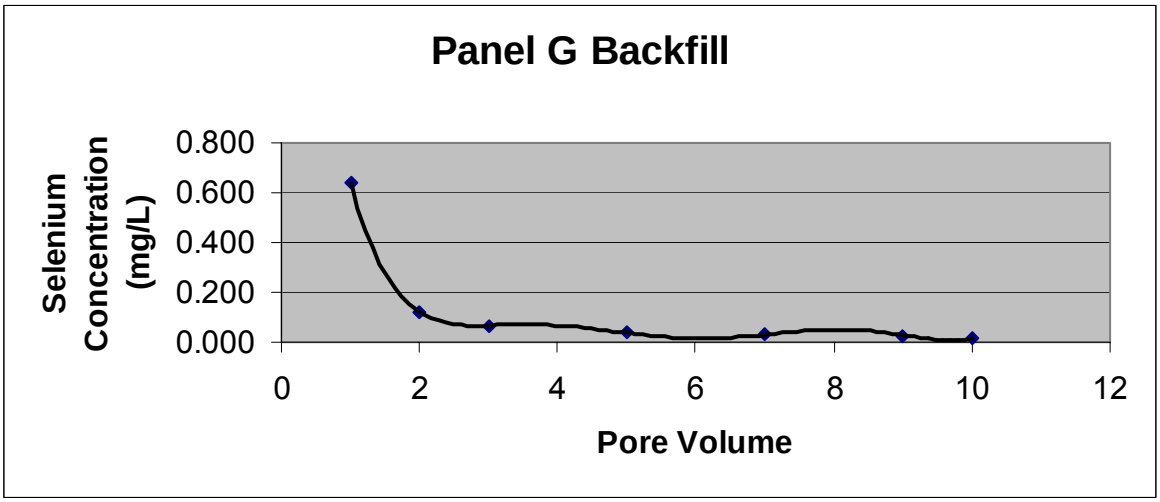

Figure 4.3-1 Weighted Average Panel G Backfill Selenium Concentration

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.

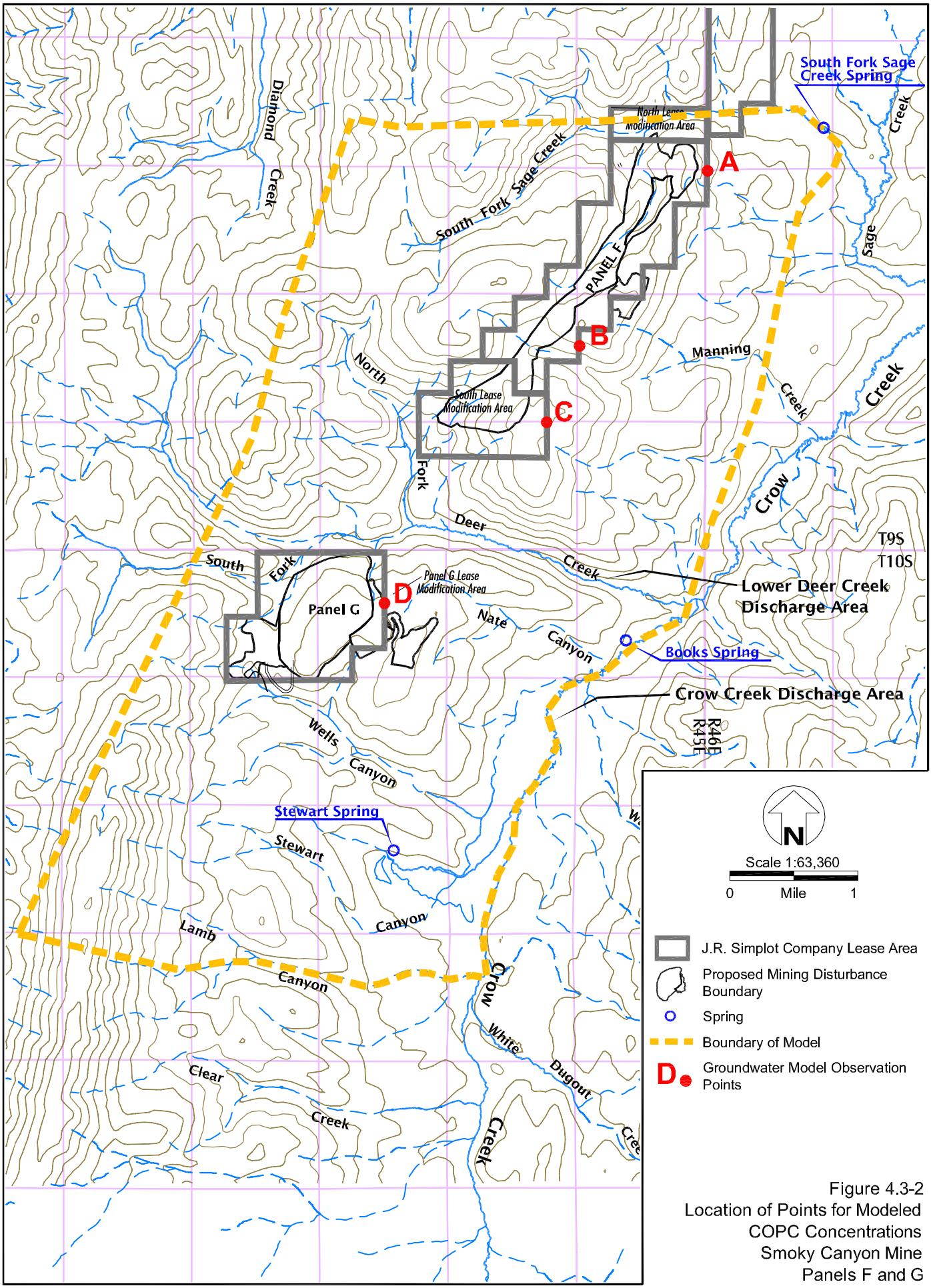

Figure 4.3-2
Location of Points for Modeled COPC Concentrations
Smoky Canyon Mine
Panels F and G

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

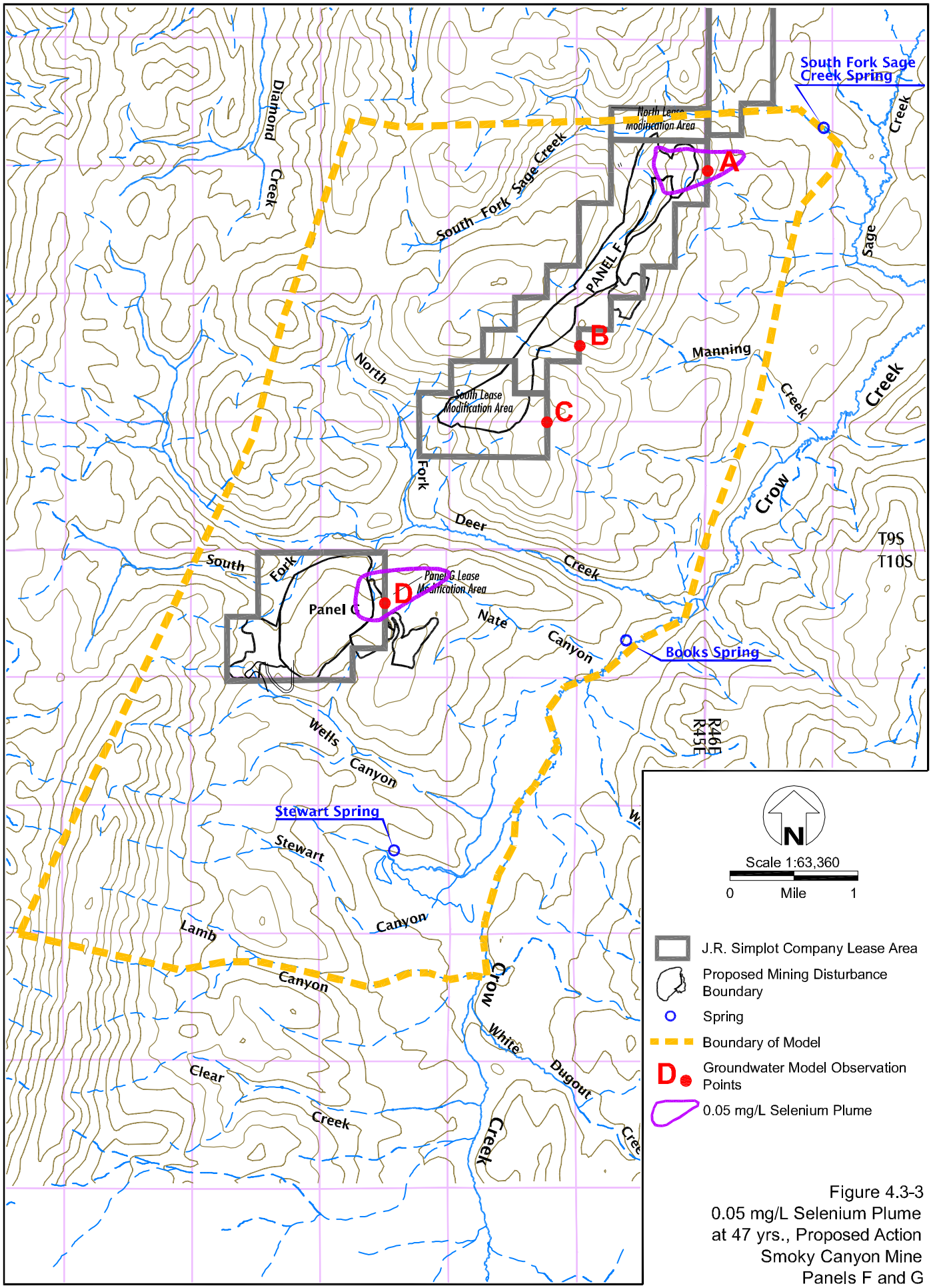

Figure 4.3-3
0.05 mg/L Selenium Plume
at 47 yrs., Proposed Action
Smoky Canyon Mine
Panels F and G

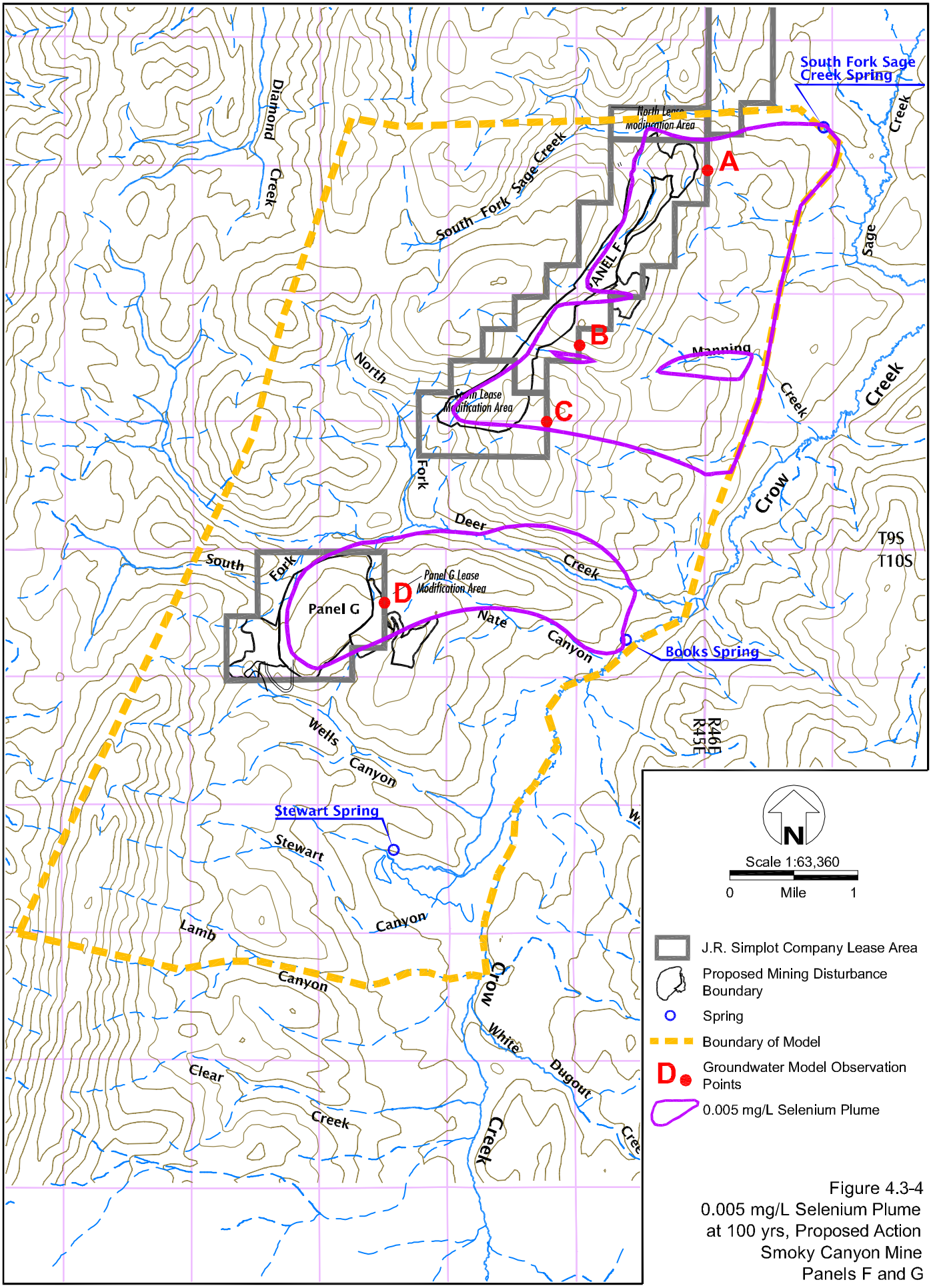

Figure 4.3-4
0.005 mg/L Selenium Plume
at 100 yrs, Proposed Action
Smoky Canyon Mine
Panels F and G

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.

Panel F Haul/Access Road

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.

Panel G

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.

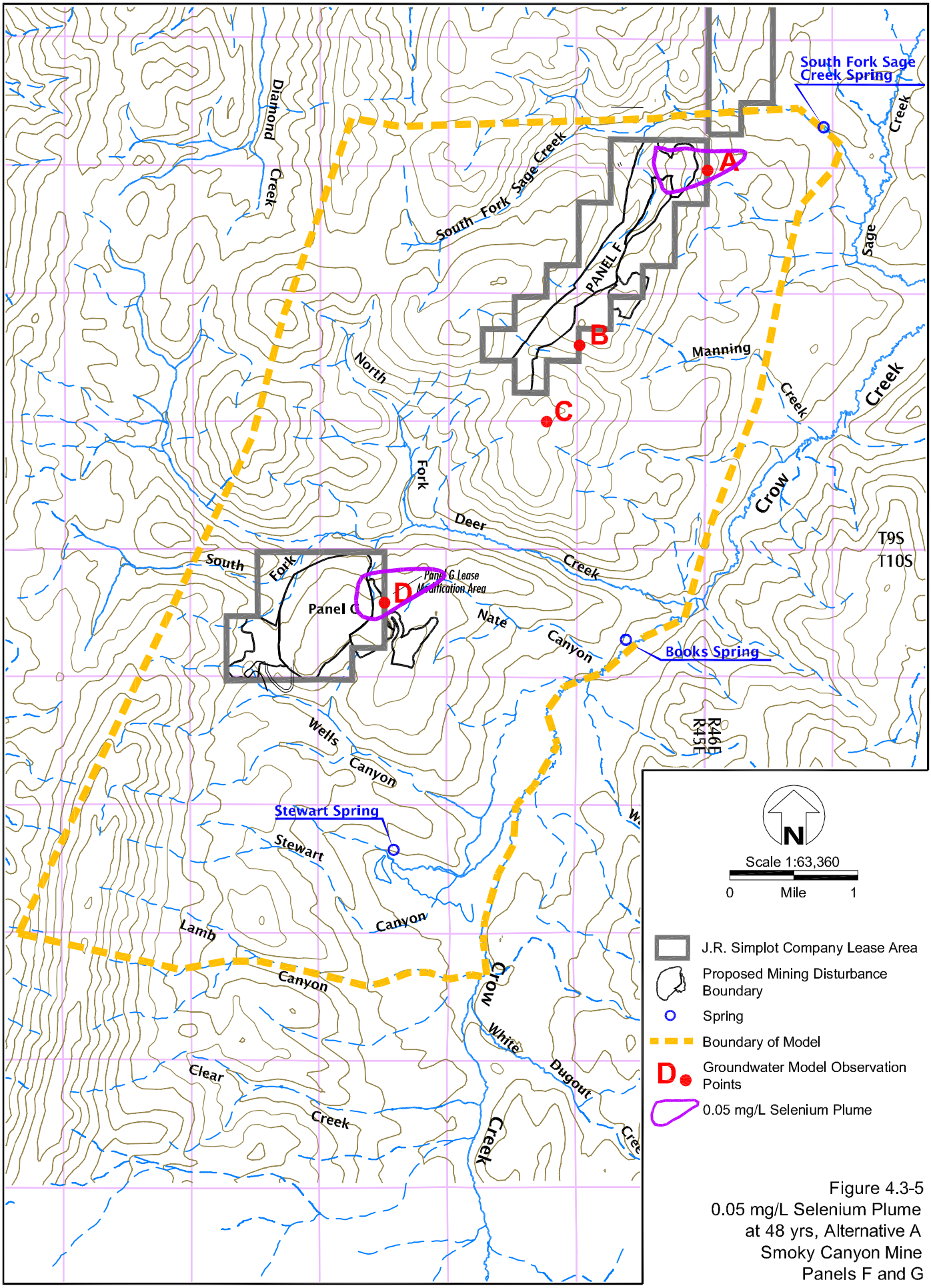

Figure 4.3-5
0.05 mg/L Selenium Plume
at 48 yrs, Alternative A
Smoky Canyon Mine
Panels F and G

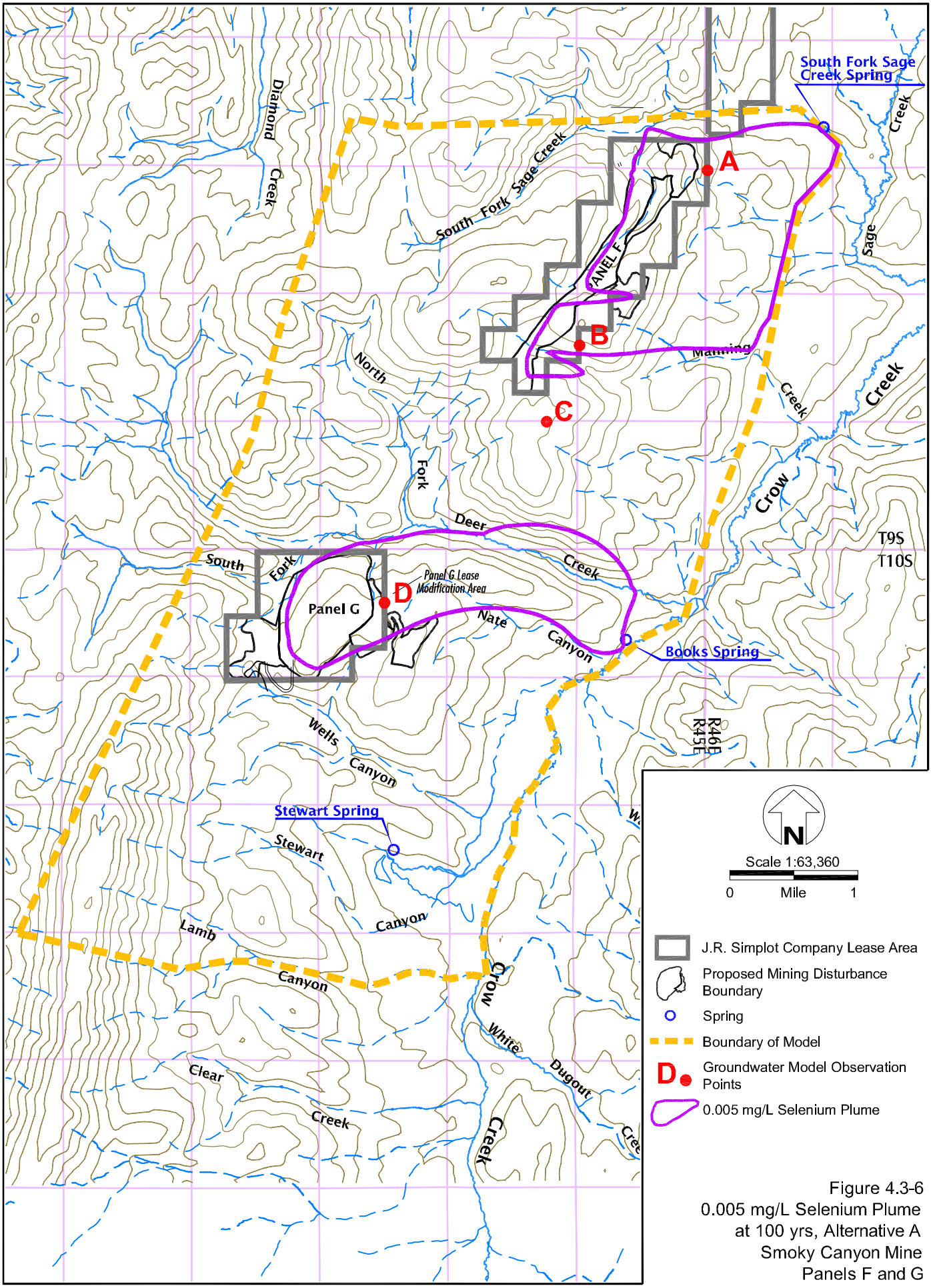

Figure 4.3-6
0.005 mg/L Selenium Plume
at 100 yrs, Alternative A
Smoky Canyon Mine
Panels F and G

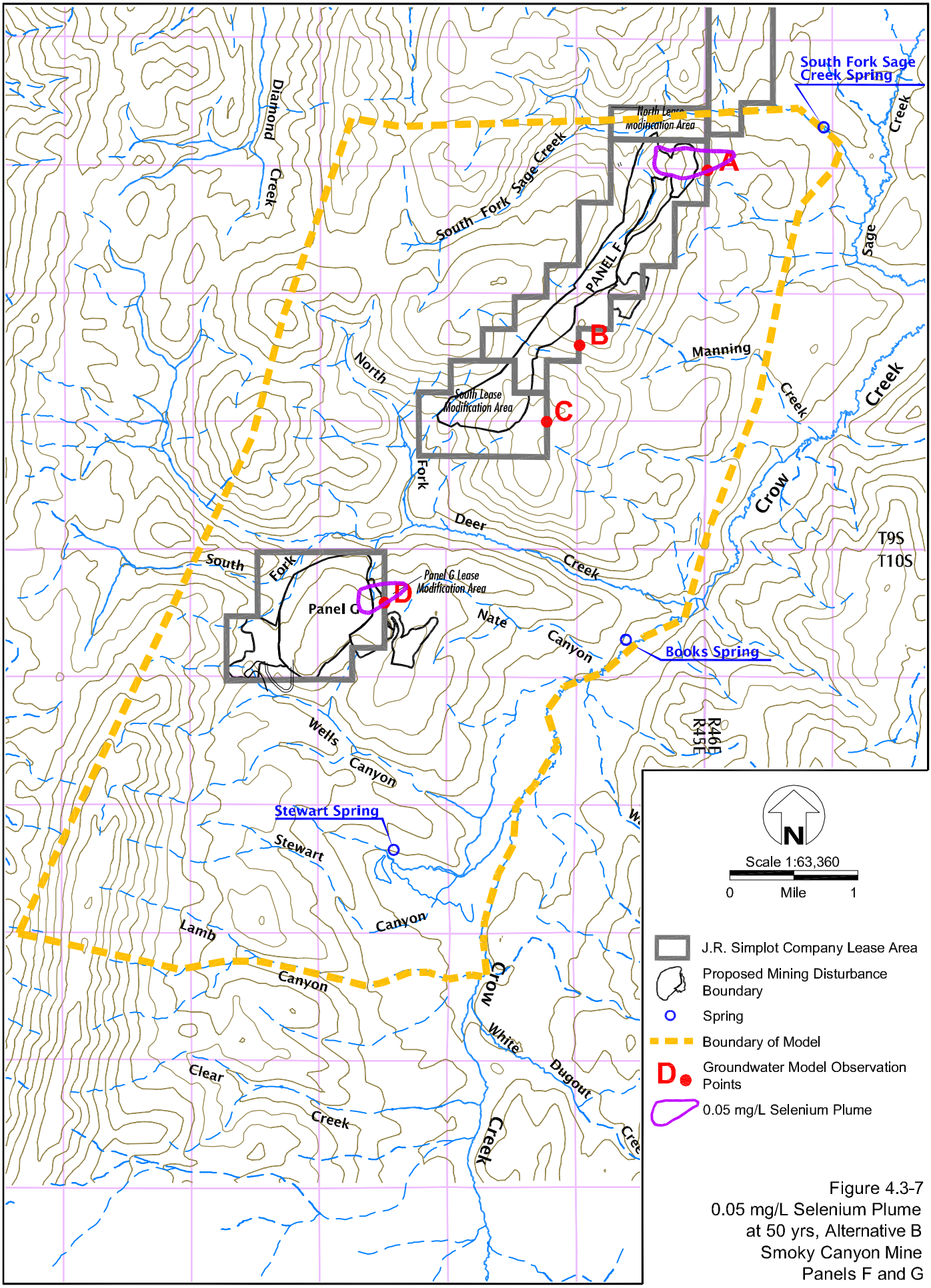

Figure 4.3-7
0.05 mg/L Selenium Plume
at 50 yrs, Alternative B
Smoky Canyon Mine
Panels F and G

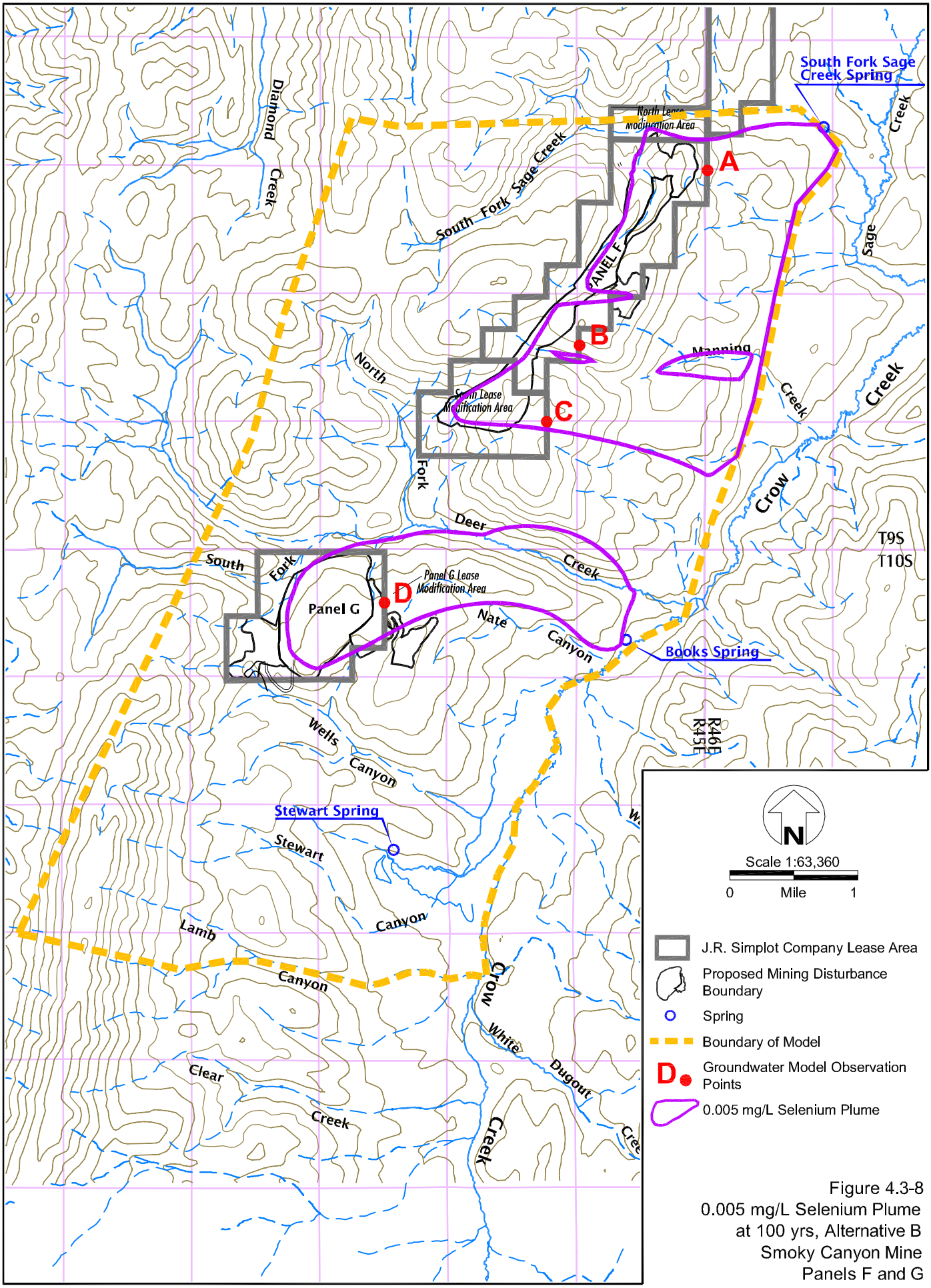

Figure 4.3-8
0.005 mg/L Selenium Plume
at 100 yrs, Alternative B
Smoky Canyon Mine
Panels F and G

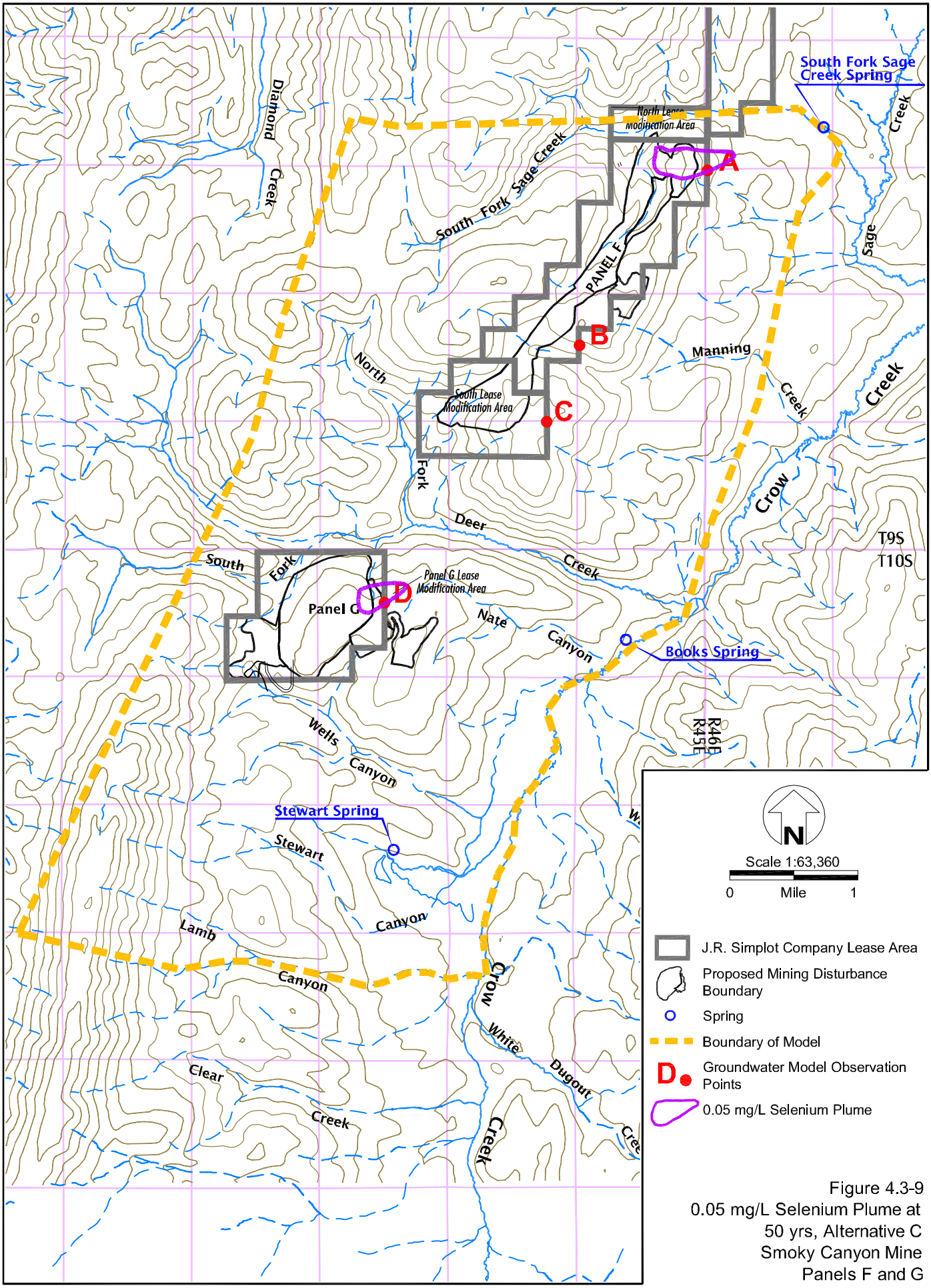

Figure 4.3-9
0.05 mg/L Selenium Plume at
50 yrs, Alternative C
Smoky Canyon Mine
Panels F and G

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.

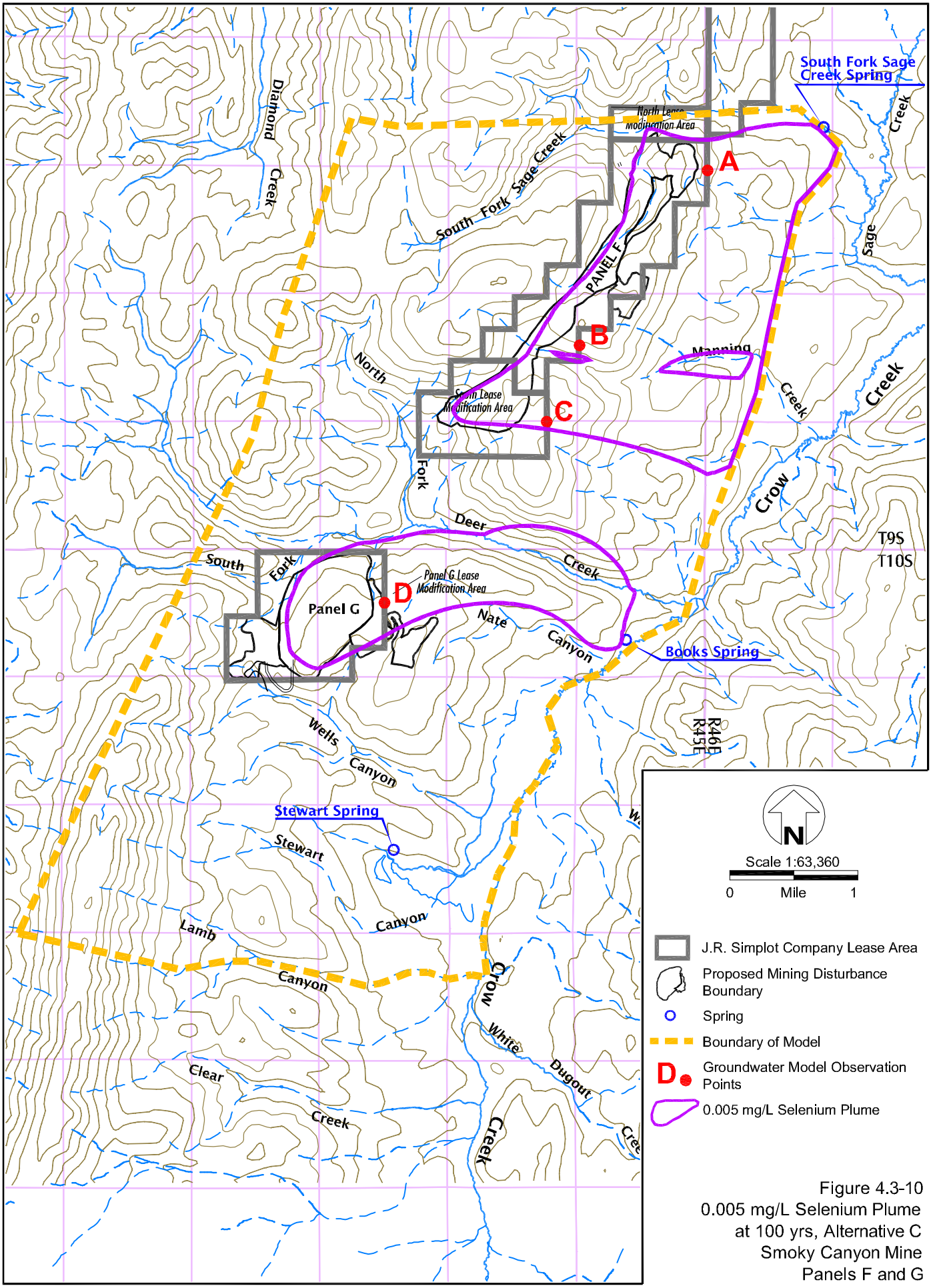

Figure 4.3-10
0.005 mg/L Selenium Plume
at 100 yrs, Alternative C
Smoky Canyon Mine
Panels F and G

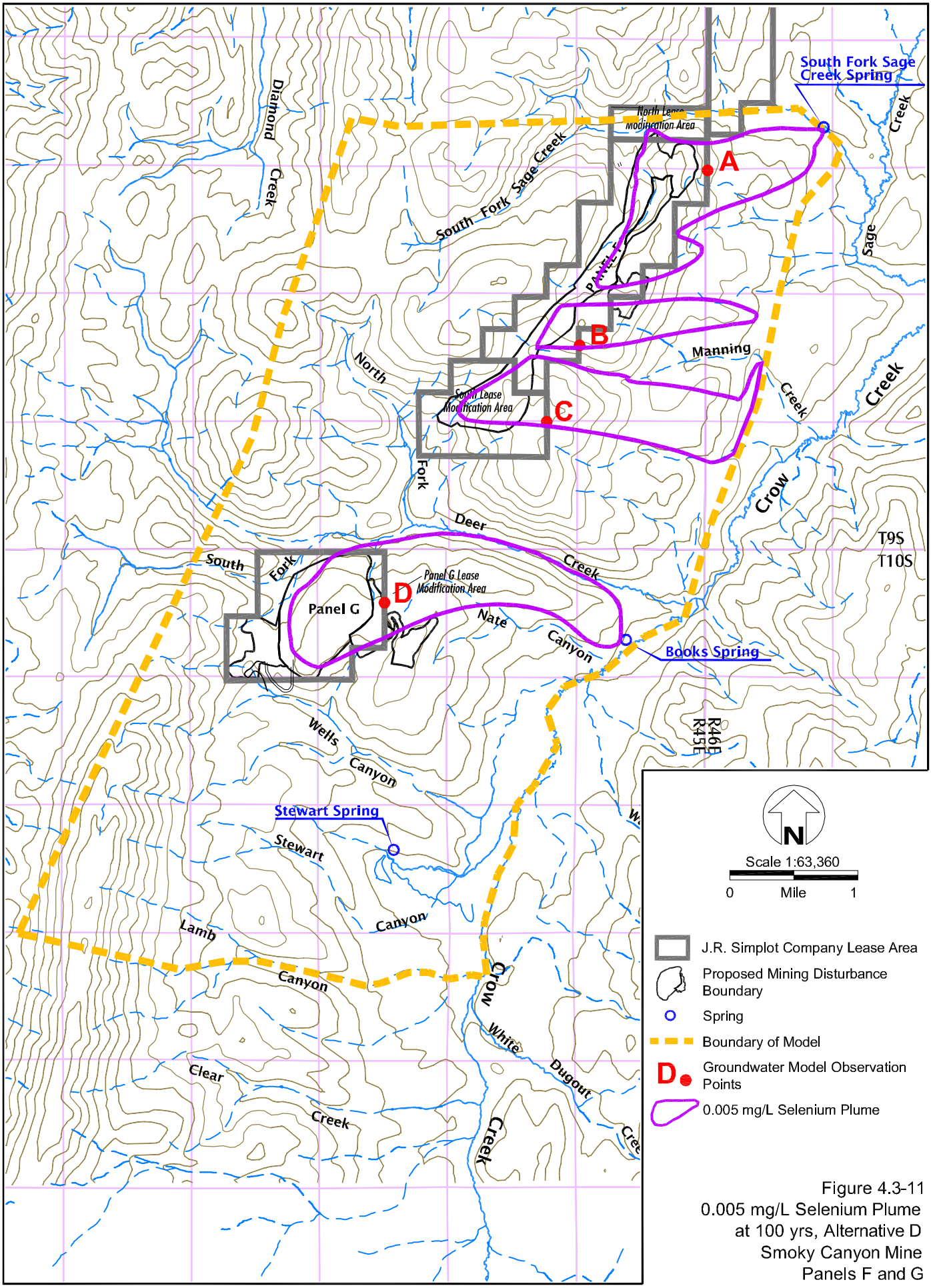

Figure 4.3-11
0.005 mg/L Selenium Plume
at 100 yrs, Alternative D
Smoky Canyon Mine
Panels F and G

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

Watershed Area Disturbance
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.

Other Pollutants

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.

Water Rights and Water Uses

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.

Panel G West Haul/Access Road

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

Special Status Plant Species

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.

Noxious Weeds

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.

Selenium Issues with Vegetation

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.

Special Status Plant Species

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

Panel F, including lease modifications
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.

Power Line Between Panels F and G

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.

No North Lease Modification
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**).

No South Lease Modification
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.

Special Status Wildlife Species

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.

Selenium Issues with Wildlife

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.

Special Status Wildlife Species

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.

Selenium Issues with Wildlife

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.

Panel F, including lease modifications

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.

Panel F Haul/Access Road

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.

Selenium Issues with Fish

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

Panel F, Including Lease Modifications

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
No Panel F North Lease Modification
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.

No Panel F South Lease Modification
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.

Wilderness Attributes

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.

Panel F, Including Lease Modifications

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)**.

Panel G West Haul/Access Road

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.

Power Line Between Panels F and G

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

No Panel F North Lease Modification

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

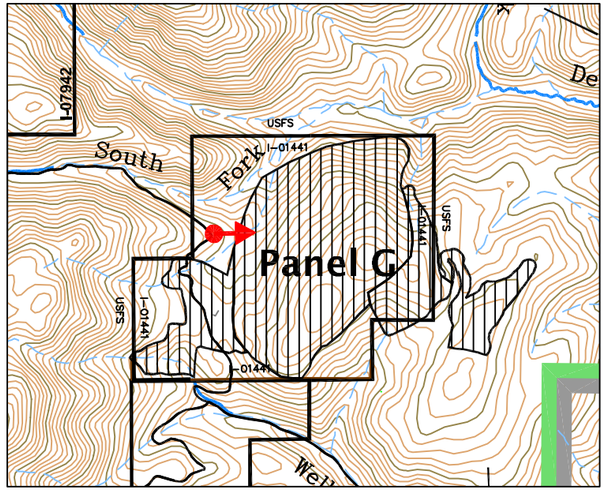

PHOTO LOCATION AND DIRECTION

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

Panel F, Including Lease Modifications

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.

Noxious Weeds and Invasive Species

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.

Big Game

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).

Wolves

Wolves would possibly alter their normal movement patterns to avoid the mining disturbance, but no direct impacts (i.e. mortality) would be expected.

Bald Eagles

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.

Small Mammals and Birds

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

Panel F, Including Lease Modifications
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.

Panel F Haul/Access Road
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.

Panel G
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.

Panel G West Haul/Access Road
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.

Power Line Between Panels F and G
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

No Panel F South Lease Modification

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.

No Panel F North Lease Modification

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 across 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 along 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

Panel F, Including Lease Modifications and the Panel F Haul/Access Road
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.

Panel G, Including the Panel G West Haul/Access Road

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.

Power Line Between Panels F and G

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.

Four-County Area

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.

Twenty-Seven-County Area

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.

Phosphate Industry

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.