Appendix 2D

BMPs for Erosion, Sedimentation, and Selenium Control

Best Management Practices
for
Erosion, Sedimentation, and Selenium Control
at the
Smoky Canyon Mine
Panels F and G

Various design and management practices have been recognized by regulatory agencies and the mining industry to be effective in controlling environmental impacts from mining operations. Some of these practices have wide applicability throughout the industry and have a significant history of proven effectiveness when properly implemented. These widely accepted and proven management practices are herein referred to as "Best Management Practices" (BMPs). BMPs that are potentially applicable to this project are found in published lists by government agencies including: *Best Management Practices for Mining in Idaho* (IDL 1992), *Catalog of Stormwater BMPs for Idaho Cities and Counties* (IDEQ 2005), *Forest Stewardship Guidelines for Water Quality* (IFPC 2005), and *BMP Fact Sheets from EPA* (EPA 2005). These BMPs are widely used and accepted for control of erosion and sedimentation.

The requirements for BMP implementation often defer to other industry resources with broad experience. Use of existing BMPs for control of selenium mobilization and migration from phosphate mines was reviewed by the Idaho Mining Association (IMA) and described in two publications: *Existing Best Management Practices at Operating Mines* (IMA 2000a), and *Best Management Practice Guidance Manual for Active and Future Mines* (IMA 2000b). These two IMA manuals also described adaptations of accepted BMPs for control of selenium and proposed some new management practices for selenium control that had not been previously published. The BMPs described in the IMA manuals are a mixture of proven management practices, such as those published by the IDL, and other management practices that may be widely practiced but their effectiveness has not yet been fully proven to the regulatory agencies. Because of the wide application and familiarity of the management practices described by IMA, these are still referred to herein as BMPs.

In March 2004, a cooperative document entitled *Selenium Management Practices (Draft)* was prepared by: Agrium Conda Phosphate Operations, Astaris LLC, Bureau of Land Management, Idaho Department of Lands, J.R. Simplot Company, Monsanto Company, and U.S. Forest Service (Agrium et al 2004). This document describes are variety of management practices that can reduce impacts from selenium and other contaminants of potential concern (COPCs) and which have been used already on phosphate mining properties in Southeastern Idaho.

The Smoky Canyon Mine has proposed site-specific BMPs for its operations at Panel B and C that have been previous reviewed and approved by the federal agencies (BLM 2002). Many of these same BMPs are also applicable to the proposed Panels F and G.

Mining activities associated with the Smoky Canyon Mine Panels F and G must also follow the direction of the Revised Forest Plan (RFP) for the Caribou National Forest (USFS 2003). Applicable standards and guidelines for the Project fall under the categories of General Mining (RFP page 3-12) and Drastically Disturbed Lands (RFP pages 3-13 to 3-14). With regard to selenium, standards associated with General Mining in the Revised Forest Plan dictate that,

"*BMPs shall continue to be developed, refined, and implemented to ensure that no release of hazardous substances into the environment exceeding established state and/or federal standards occurs*".

Due to the variability among physical mining environments, any one BMP cannot be universally implemented. Good engineering practices dictate that BMPs are selected and implemented "as applicable," with respect to site conditions. General descriptions of the BMPs in this document have been published either by the EPA, IDL, IMA, or USFS and are considered herein to likely be effective at the Smoky Canyon Mine Panels F and G.

Following is a list of BMPs and associated "effectiveness determinations" for the control of erosion, sedimentation, and selenium mobilization that would be implemented for mining activities at the Simplot Smoky Canyon Mine Panels F and G. A separate and complimentary set of BMPs would be followed for the haul/access roads related to Panels F and G.

Two types of effectiveness evaluations would be performed for BMPs. The first type consists of on-going evaluations of the BMPs to ensure that they are functioning as designed. The second type consists of an annual review of overall BMP effectiveness. Data used to evaluate the effectiveness of BMPs and any new management practices is collected through a number of existing Smoky Canyon Mine monitoring plans, which would be modified to include Panels F and G, as well as information provided by routine visual inspections. Responsibilities for BMP effectiveness evaluations have been assigned to specific department staffs at the mine including: Engineering, Production, and Environmental. Annual reviews of BMP effectiveness would also be conducted by the mine Storm Water Pollution Prevention (SWPPP) Plan team in accordance with the mine Storm Water Pollution Prevention Plan.

Overburden Fill Grading

Final grading should be completed as soon as possible following overburden disposal. During reclamation, the fill slopes should graded at a maximum 3h:1v (horizontal: vertical) slope to reduce surface water run-off velocity.

Effectiveness Determination: Production and Environmental staff shall inspect overburden fill areas for evidence of ponding. Ponding should not be evident 24-hours after the conclusion of a storm event. If ponding is observed, Production and Engineering staff will review surveyed profiles to mitigate the area of concern. Corrective action will be reported in the annual environmental report.

Haul Road Run-Off Controls

Grading and other controls on haul roads controls run-off and minimizes erosion and sedimentation. Haul roads should be graded away from fill slopes, or crowned, so that concentrated flow is not allowed to run along or across and erode the roads. Berms shall be maintained to prevent run-off. Other controls such as appropriately located rolling dips, water bars, and water deflectors could be used to reduce erosion of the road surface or road base.

Effectiveness Determination: Production and Environmental staff shall inspect roads for presence of collection and diversion ditches, dips, and water bars as needed. There should be minimal evidence of concentrated flow erosion of road surfaces or fills.

Construction of Fills for Roads and Facilities

Fills, road or parking areas should be constructed of chert or other non-seleniferous material and designed with stable slopes. Slopes with topsoil should have temporary vegetation.

Effectiveness Determination: Production staff shall document on shift reports inspections of fills for road and other facilities for construction material type and evidence of erosion. Slopes should be constructed of durable rock. This BMP only applies to roads and fills outside of disturbed pit limits.

Snow Removal

Man-made accumulations of additional snow on active external overburden areas should be avoided, to the extent practicable, by disposing of snow that is picked up for any purpose in designated areas where the snow and snow melt will not be incorporated into an active external overburden disposal facility. Snow disposal areas should be located where snow-melt would flow to sediment control ponds or open pits to prevent sediment being released outside run-off control areas.

Effectiveness Determination: Production and Environmental staff shall inspect for evidence that snow storage and disposal areas are uphill of control ponds or open pits. There should be minimal spring runoff from snowmelt within the mine disturbance area that is not routed through sediment control ponds or silt traps.

Concurrent Reclamation

Reclamation of disturbed areas that are no longer needed for active mining operations should be conducted concurrent with other mining operations.

Effectiveness Determination: Engineering staff shall review annual reports to determine if areas no longer needed for mining are being reclaimed. Production staff shall ensure that reclamation of such areas commence when they are no longer needed for active mining operations.

Soil Salvage and Reuse

Salvaging topsoil and vegetation growth medium from disturbed areas prior to mining is important for the long-term reclamation success of these areas. Topsoil should be removed and either is direct hauled to regraded surfaces ready to receive topsoil or is placed in topsoil stockpiles for temporary storage.

Effectiveness Determination: Production staff shall inspect areas being stripped of vegetation and topsoil to determine if all suitable topsoil is being removed to the extent reasonable. Engineering staff shall conduct an annual inspection of all topsoil storage piles to ensure that soil salvage quantity meets baseline objectives. There should be minimal erosion of topsoil

storage piles. Production staff shall ensure that temporary crops of vegetation are established on stockpiles to reduce soil loss.

Reuse of topsoil should follow the selenium guidelines published by the USFS. A layer of approximately one to three feet of topsoil should be placed over external and/or backfill overburden disposal areas at the time of final reclamation. Environmental staff shall inspect areas shortly after they are topsoiled to ensure coverage with topsoil thickness of at least 12 inches.

Soil Stabilization

Stable reclaimed areas are promoted through the use of stabilization techniques such as: placement of soil on slopes that are 3h:1v or less; scarifying soil surfaces to reduce run-off; seedbed preparation to enhance the germination rate of seeds; incorporation of fertilizer and other methods to enhance successful growth of vegetation and/or direct run-on/run-off.

Effectiveness Determination: Production and Engineering staff shall review regrading surveys to determine that all final slopes are 3h:1v or less. The Production, Engineering, and Environmental staff shall conduct a late spring or early summer inspection of all reclaimed areas to ensure they are topsoiled and reseeded and that a significant portion of each is protected with applicable soil stabilization methods and is not susceptible to excessive erosion. There should be minimal evidence of erosion and off-site transport of sediment from reclaimed areas.

Capping Seleniferous Overburden

Seleniferous overburden can contribute selenium in runoff and contribute to bioaccumulation in vegetation. Reclamation techniques seek to cover seleniferous overburden with a minimum of four feet of low-seleniferous chert on Panels F and G. Topsoil would then be spread on top of the chert layer to complete the cap.

Effectiveness Determination: Production staff shall inspect capped areas after they are constructed to ensure 100% of seleniferous shale overburden is covered with chert cap. Engineering will obtain and review survey information indicating chert cap is at least 4-feet thick over each capped area on Panels F and G, check areas of topsoil cover to ensure 100% of all capped areas are covered with topsoil, and check topsoil cover to ensure 95% of each area is covered with at least 12-inches of topsoil.

Pit Backfilling

Pit backfilling and subsequent revegetation helps restore these areas to stable and productive post-mining uses. Pit backfilling in the F and G Panels would allow these areas to be revegetated and support the post-mining land use.

Effectiveness Determination: Engineering staff shall review annual reports to ensure compliance with approved backfilling plans.

Riprap and Gabions

Chert riprap can be placed in areas subject to erosion, such as below culverts, drainage outlets and ditches thereby reducing erosion and sedimentation. Gabion walls made of chert could also be selectively used to protect road fills from erosion by flowing water.

Effectiveness Determination: The SWPPP team will annually inspect all culvert and drainage outlets to ensure they are protected as needed with riprap or comparable erosion control methods. Gabion walls will be inspected at least once during construction by engineering staff to ensure they are built with non-seleniferous, durable rock.

Run-on Collection/Runoff Control (Control of Surface Water)

Drainage and diversion channels are constructed as necessary to divert run-on water around disturbance areas and collect runoff from disturbed area to route it to settling ponds and other sediment control features. Ditches are excavated with a berm placed on the downhill side of the ditch and should pass the 100-year, 24-hour storm event without damage or erosion.

Effectiveness Determination: After their construction, engineering staff shall inspect the run-on diversion ditches for compliance with design dimensions, grade, and erosion protection. The SWPPP team will inspect other run-on and runoff collection and diversion ditches annually to ensure they are functioning properly and are stable from excessive erosion.

Sediment Controls

Construction of sediment traps, silt fences, catch basins and sediment settling ponds reduce the velocity of flowing water and allow sediment in water to settle out in a controlled manner. To the extent possible, these features are located off areas of seleniferous overburden. To minimize the potential for dissolved constituents in the runoff from entering surface water, the hydraulic connection between the ponds and surface water is minimized in one of two ways, depending upon the substrate where a given pond is located. Those ponds on the outside edge (generally east side) are primarily located over the Wells Formation. In these areas, surface soils and alluvium are removed before construction, in order to minimize lateral subsurface flow and encourage vertical infiltration into the deep groundwater associated with the Wells Formation. Ponds on western, or highwall side are primarily located on the Dinwoody Formation. Surface soils are also removed in these locations, but little infiltration can occur vertically into the Dinwoody so these ponds rely more heavily on evaporation to remove water rather than infiltration.

Sediment ponds are designed to contain the runoff and sediment from the 100-year, 24-hour storm event.

Maintenance of the ponds would be done to provide the design capacity for sediment and water at all times. A preventive maintenance program is kept active to ensure that storm water control facilities are clean and operating effectively. Management of these controls includes periodic repairs and cleaning to remove sediment and restore capacity or functionality. As identified during bi-monthly inspections, ponds may be scheduled for removal of sediments and/or water, earthwork to repair berms, ditches, or outflow structures, etc. Further, should these inspections

note that unintended types of maintenance wastes, vehicle fluids, or any other non-storm waters have entered ponds, removal is immediately scheduled.

Effectiveness Determination: Environmental staff shall visually inspect all ponds as conditions allow on a bi-monthly basis. The SWPPP team shall annually inspect the entire perimeter of active and reclaimed mining areas to ensure that runoff from disturbed areas is directed to sediment ponds or silt traps. These inspections are documented in the SWPPP records. An annual storm water evaluation report will be prepared by Simplot Corporate personnel.

Seeding and Revegetation (Reclamation and Revegetation)

Revegetation of disturbed slopes reduces run-off quantity and velocity that would otherwise contribute to runoff volumes. As soon as practicable, disturbed areas would be graded, topsoiled and reseeded with techniques and seed mix that are acceptable to the USFS. Infiltration is also reduced as plants consume water, which leads to transpiration.

Effectiveness Determination: Engineering staff shall obtain the proper seed mix according to USFS recommendations. Production staff will inspect reclaimed areas to ensure appropriate seeding coverage and that seed drilling techniques were used.

Range Management

Livestock grazing in reclaimed areas should be controlled until the reclaimed areas have become stabilized and are deemed ready for grazing by Simplot and the USFS. The USFS is responsible for ensuring appropriate alignment of grazing allotments.

Effectiveness Determination: Environmental staff shall conduct routine inspections of reclaimed areas. The presence of livestock will be documented by mine personnel and reported in the annual environmental monitoring report to the USFS and BLM.

Avoid Perennial Drainage Channels

Avoiding placement of mine overburden in perennial drainage channels helps reduce infiltration of stream flow into the overburden. Permanent placement of seleniferous overburden material in perennial channels should be avoided, but crossing drainages with temporary road fills is required to access the mining areas. These crossings would be built from chert and designed so they can be reshaped during reclamation to resemble the surrounding area.

Effectiveness Determination: Engineering staff shall review the annual operations report information to ensure that placement of seleniferous mine overburden in perennial channels is avoided.

Avoid Ephemeral Drainage Channels

Avoidance of ephemeral and intermittent drainage channels in the location of seleniferous overburden disposal sites reduces the effects of infiltration on the overburden. Mine panels and their external overburden disposal sites that are located on drainage divides can avoid most ephemeral drainage channels. Ephemeral channels that cross the proposed mine disturbance would be collected and diverted in ditches around the active mining area. Permanent

placement of seleniferous overburden material in ephemeral drainages should also be avoided to the extent practicable. Road crossings should be built from non-seleniferous material and designed so they can be reshaped to resemble the surrounding area.

Effectiveness Determination: Engineering staff shall review the annual operations report information to ensure that placement of seleniferous overburden in ephemeral drainages is avoided to the extent practicable. When road fills are constructed over ephemeral drainages, Production staff shall ensure they are built with non-seleniferous material.

Characterization and Selective Handling of Seleniferous Overburden

Geochemical assays, extraction tests, and column leach tests on Phosphoria Formation rocks at the Smoky Canyon Mine have demonstrated that the Meade Peak member shales have interbedded intervals of high to low selenium content. For the purpose of proper application of these BMPs, the mine considers all shale overburden from the stratigraphic interval extending from the Hanging Wall Mudstone to the Fish scale Shale to be seleniferous overburden. Rex Chert (including limestone) has been demonstrated by testing to be essentially non-seleniferous. Seleniferous overburden should be placed in approved pit backfills and external dumps and then capped with non-seleniferous materials.
Effectiveness Determination: Production staff shall track the origin and placement of overburden materials. Environmental staff shall verify with periodic testing or visual inspections during mining that overburden materials have been properly handled. Determinations will be verified by reviewing assay data.

Modification or Elimination of Low Permeability Foundation Material

Low permeability layers of soil or shale in foundations of external overburden disposal area slopes should be modified or removed to avoid the perching of water to prevent seeps at the face of external overburden disposal sites. Low permeability horizons in topsoil and subsoil under specific areas of overburden fills should be removed during topsoil stripping.

Effectiveness Determination: Engineering staff shall inspect foundation areas of external overburden fill slopes to ensure low permeability soil is removed to the extent practicable. Environmental staff will annually inspect the entire perimeter of all down gradient toes of external overburden fills in early summer looking for evidence of overburden seeps or springs.

Control of Groundwater Impacts

Where groundwater quality impacts are predicted from infiltration of seepage from seleniferous overburden fills, control of these impacts has been investigated. Groundwater monitoring should be done according to agency-approved monitoring plans.

Effectiveness Determination: Environmental and Engineering staff shall oversee installation of groundwater monitoring devices in compliance with approved monitoring plans. Environmental staff shall oversee collection of monitoring data from the groundwater monitoring system in accordance with approved monitoring plans and review groundwater monitoring data for compliance with applicable standards. Monitoring data will be submitted to regulatory agencies according to approved monitoring plans.

Permanent Drainage Channels over Overburden

Where drainage channels must be permanently routed over overburden fills there is a concern for potential future erosion of the channel into underlying overburden and that seepage from the channels will enter the underlying overburden and potentially leach contaminants of potential concern from the overburden. Such channels should be designed to be stable without damage for the peak flow from the 100-year, 24-hour storm on top of snowmelt. To prevent seepage into underlying seleniferous overburden, the a clay liner should be installed under the channel or the overburden directly underlying the channel bottom and for a distance of 50 feet on either side of the channel should consist of chert or other non-seleniferous overburden. The channel surface should be protected from erosion with chert riprap.

Effectiveness Determination: Production staff will monitor pit backfills and external overburden fills during construction to verify that the proper material is placed under the alignment of any proposed permanent channels over these areas. Environmental staff will verify with photographs that a clay liner or chert is placed under the channels and that the channels are protected from erosion with riprap and vegetation.

Sediment Controls around Overburden Disposal Sites

Water-retaining features designed to control runoff and sedimentation at mine sites, including sediment ponds and silt traps should be located off seleniferous overburden fills.

Effectiveness Determination: Environmental staff shall inspect all ponds as conditions allow on a monthly basis. The SWPPP team shall annually inspect the entire perimeter of active and reclaimed mining areas to ensure that runoff from disturbed areas is directed to sediment ponds or silt traps. These inspections are documented in the SWPPP records. An annual storm water evaluation report will be prepared by Simplot Corporate personnel.

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