

2.0 REMOVAL ACTION OBJECTIVES AND GOALS

This section provides Site-specific objectives and goals for removal actions at the Site. Preliminary RAOs were identified in the SI Report based on the regulatory and screening criteria for COPCs summarized below in Section 2.1. These preliminary RAOs were reviewed and revised as necessary to define the more specific RAOs presented in Section 2.2. Specific numerical RAGs (e.g., selenium concentrations and associated locations or areas to which they apply) that are necessary to achieve the RAOs are defined in Section 2.3 for each environmental medium of concern.

2.1 Regulatory and Screening Criteria for COPCs

Considerable evaluation was performed as part of the Area-Wide Investigation (AWI) that is relevant to the development of regulatory and screening criteria for COPCs at the Site. In particular, the Area-Wide Risk Management Plan (IDEQ, 2004) provides a detailed description of the development of regional RAGs intended to achieve compliance with existing ARARs, including risk-based criteria to be considered (TBC). The Area-Wide Risk Management Plan contains a detailed description of ARARs, as identified by the USFS, BLM, IDEQ, Idaho Department of Lands and Shoshone Bannock Tribes. As such, the development of RAOs and RAGs builds upon the IDEQ analysis. The RAGs fully consider pertinent chemical and location-specific ARARs and TBCs, as discussed in the subsections below. Action-specific ARARs are considered in Section 6 (the detailed analysis of removal action alternatives).

COPCs

A key component of the SI was the description of the nature and extent of contamination resulting from past mining activities within the Site (SI Section 7.0). The COPCs at this and other phosphate mining sites in southeastern Idaho were defined in the Area-Wide Risk Assessment as cadmium, chromium, copper, nickel, selenium, vanadium, and zinc (TetraTech EMI, 2002). Comparison of the Site-specific SI data to the regulatory and screening criteria for each COPC indicated that selenium has the widest distribution and concentrations that exceed background concentrations, regulatory standards, and/or risk-based criteria by the greatest amount for the various media evaluated at the Site. Therefore, selenium was used as a conservative indicator for characterizing source areas and the nature and extent of contamination, as well as for the fate and transport of COPCs at the Site. The following summary is provided for selenium since it serves as an indicator for all COPCs. However, all COPCs are considered when evaluating the effectiveness of removal action alternatives (see Section 6).

Removal action levels were established in the Area-Wide Risk Assessment and are a set of criteria that trigger further consideration of risks to human health and the environment and

possible development of remedial actions, as needed, to address those risks. Media exceeding the removal action levels are to be evaluated in this EECA. Removal action levels for selenium in each environmental medium, as utilized for screening in the SI, are described in the following subsections, summarized below, and shown in Table 2-1. Table 2-1 and the following discussion are also relevant to the development of final RAOs presented in Section 2.2 and the more specific RAGs presented in Section 2.3.

2.1.1 Groundwater

Groundwater is regulated by the State of Idaho (IDAPA 58.01.11). Idaho's Groundwater Quality Rule (GWQR) establishes the groundwater quality standards, and these are generally consistent with Federal Maximum Contaminant Levels (MCLs) for drinking water supplies. The GWQR implements certain policies from the Idaho Groundwater Quality Plan adopted by the state legislature in 1992. One of these policies specifically relates to mining and reads as follows "Mining. The policy of the State of Idaho is to protect groundwater and allow for the extraction of minerals above and within groundwater" (GWQR section 006.06).

Idaho's GWQR (58.01.11.400.01) provides that no person shall cause or allow the release, spilling, leaking, emission, discharge, escape, leaching or disposal of a contaminant into the environment in a manner that: causes a ground water quality standard to be exceeded; injures a beneficial use of groundwater; or is not in accordance with a permit, Consent Order or applicable BMPs, best available method (BAM), or best practical method (BPM).

2.1.2 Regulated Surface Water

Regulated surface water refers to natural waters of the State or United States. At the Site, these include Smoky Creek, Roberts Creek, Pole Canyon Creek, Sage Creek, South Fork Sage Creek and Crow Creek. These creeks are regulated by the State (under IDAPA 58.01.02 – Water Quality Standards and Wastewater Treatment Requirements) and by the Federal Agencies (under the Clean Water Act, 40 CFR 131.36 National Toxics Rule). Both regulations establish numeric criteria for selenium and other COPCs in surface waters. The State regulations include an anti-degradation policy and a list of designated stream segments in Idaho for various beneficial uses. The default protection status for undesignated streams is cold water biota and recreational use. The removal action level for selenium in streams with this protection status is 5 ug/L, which is also the water quality standard for selenium. The removal action level is applicable to all creeks at the Site.

EPA is currently considering establishment of a fish tissue selenium concentration guidance of 7.9 mg/Kg dry weight (DW), in lieu of the current water quality based standard. This standard would need to be accepted by the State of Idaho because surface water quality in Idaho is state regulated. Review of Site-specific data show little effective difference between the existing

criteria and the proposed criteria in terms of stream segments currently exceeding the stream standard.

2.1.3 Non-Regulated Surface Water

Non-regulated surface waters at the Site include seep flow areas and associated detention basin waters and stormwater detention basins. The Area-Wide Risk Management Plan developed removal action levels for three potential exposure scenarios:

- The most stringent tier is equivalent to the regulated surface water level and is for surface water features that provide sensitive habitat for nesting, breeding, or resident avian/waterfowl receptors. There are no mining features present in Area A that provide such habitat.
- The second tier is applicable to surface water features that provide an extended use watering source for domestic animals. This selenium action level is set at 50 ug/L based on veterinarian handbook recommended drinking water concentrations for domestic animals. Surface water features within the Site that could provide this habitat include stormwater detention basins that receive seepage from overburden throughout the year..
- The least stringent tier level of 201 ug/L selenium is based on transitory terrestrial receptor ingestion through drinking (transient use) and does not include the pathways presented by the introduction of aquatic plant and benthic invertebrate ingestion, as encountered in the first tier for more sensitive habitats and receptors. Surface water features within the Site that provide this habitat include the detention basins.

This tiered approach is applicable to individual Site features (i.e., individual seep flow areas and detention basins) and considers the actual risk that may be presented by these surface water features based on their existing or future use.

2.1.4 Sediments

For sediment removal action levels, DEQ assumed two scenarios: protection of aquatic life in regulated waters; and protection of terrestrial receptors in non-regulated waters. For sediments in areas supporting aquatic life, DEQ applied National Oceanic and Atmospheric Administration (NOAA) Probable Effects Levels (PELs), where available. In the absence of PELs (as is the case for selenium), the literature-referenced effective concentration (EC₁₀) for reproductive effects in freshwater birds and fish was used. For selenium, this value is 2.5 mg/Kg DW. This value is less than the regional background level and therefore the removal action level was set to the 2.6 mg/Kg DW background level.

For non-regulated water areas, the sediment removal action level was based on incidental ingestion by terrestrial and avian receptors. For selenium, the removal action level was set at half the no-observed-adverse-effects level (NOAEL) single media estimate for sensitive species, at 5.2 mg/Kg. This level is relevant to each individual site feature (i.e., each seep flow area or detention basin) that has the potential for incidental ingestion.

2.1.5 Soil

Two screening levels were used for comparison to selenium concentrations in soil and other surface materials sampled at the Site: the Site-specific selenium reference concentration (baseline condition) for soil (2 mg/Kg) and the USFS' interim guidelines for selenium concentrations in soil used for reclamation (<13 mg/Kg and <0.1 mg/l extractable selenium). These screening levels were used to identify soil to be used in capping activities. IDEQ has not developed area-wide removal action levels for soil. Comparisons to Site-specific reference concentrations were used to identify locations where selenium concentrations are elevated relative to those in soil from areas not disturbed by mine activities. The Site-specific reference condition, or baseline condition, for local near-surface soil was evaluated using data from soil samples collected in undisturbed areas either before mining disturbances took place or in areas not disturbed by mining. The results of the soil screening comparison are only relevant to the locations where soil caps are being constructed as part of a remedy. The vegetation criteria are the main criteria that were applied to overburden areas for the purpose of screening.

Soil with selenium concentrations greater than 13 mg/Kg and extractable selenium concentrations less than 0.1 mg/l may also be suitable for use in reclamation following additional evaluation to demonstrate that vegetation planted on those soils would not exceed the recommendation for less than 5 mg/Kg selenium in vegetation (as described below).

2.1.6 Vegetation

In 2002, IDEQ performed additional data collection and risk assessment (Appendix C, Area-Wide Human Health and Ecological Risk Assessment [HHERA]; TetraTech EMI, 2002) to support risk management decisions for the southeast Idaho phosphate resource area. The resulting Area-Wide Risk Management Plan (IDEQ, 2004) recommends a removal action level for selenium in vegetation of 5 mg/Kg DW. As explained by IDEQ (2004), a mean concentration of 5 mg/Kg selenium meets the regional beneficial use goals of the land management agencies (i.e., domestic animal grazing). IDEQ (2004) indicates that cattle, and probably wildlife, may be able to tolerate short periods of feeding on vegetation with selenium concentrations higher than their regional removal action level. Livestock have a much narrower home range than grazing wildlife such as deer or elk. Therefore, livestock are more prone to ingesting larger amounts of selenium when grazing in reclaimed phosphate mining areas relative to grazing wildlife, which have wider home ranges. IDEQ established their removal action level for selenium in

vegetation at a level considered protective for livestock and thus also protective for grazing wildlife.

IDEQ indicates that areas where vegetation has an average selenium concentration above 5 mg/Kg may need to be addressed to restore unrestricted grazing use, as intended by the original mine plans. Alternatively, land managers can develop grazing management practices for those areas when such practices will not shift undue management burdens on the grazing lease holders or land management agencies (IDEQ, 2004).

The USFS and BLM have developed interim guidelines that specify the acceptable selenium content of vegetation established on reclaimed areas. The interim guidelines were developed for the FMC Dry Valley Mine (USFS and BLM, 2000) but were also referenced during planning for the Panels B & C operations at the Smoky Canyon Mine (BLM and USFS, 2002). The USFS/BLM vegetation guidelines, or goals, consider the potential for acute and chronic selenium exposures for wildlife and livestock, as well as the potential for lethal doses to sensitive species such as horses and sheep, that may graze on reclaimed areas and are consistent with the IDEQ removal action level.

The USFS/BLM reclamation goals for unrestricted grazing use are as follows:

- No more than 0.5 percent of the vegetation measured over the surface of the reclaimed mine area shall exceed 20 mg/kg selenium DW;
- No more than five percent of vegetation measured over the surface of the reclaimed mine area may contain selenium concentrations greater than 10.0 mg/kg DW;
- Forty-five percent of vegetation measured over the surface of the reclaimed mine area may contain selenium concentrations ranging between 5.0 and 10.0 mg/kg DW; and
- Fifty percent of the vegetation measured over the surface of the reclaimed mine area must contain selenium concentrations less than 5.0 mg/kg DW.

These more specific aspects of the guidelines are identified as TBCs to supplement the IDEQ removal action level.

2.1.7 Aquatic Biota

For purposes of evaluating ecological risks, additional biological data were collected for the SI to assess COPC uptake into biota for which regulatory standards and/or removal action levels were not available. Samples were collected to help determine whether mining has caused

enhanced uptake of COPCs into these biota that may then lead to increased exposure of wildlife that feed at the Site.

Site-specific COPC concentrations in biological tissue were compared to regional exposure point concentrations (EPCs) from the Area-Wide HHERA that represent the regional background concentrations (TetraTech EMI, 2002). In most cases, the Site concentrations are similar to the regional EPCs. Selenium concentrations in fish tissue are elevated at Hoopes Spring and Lower Sage Creek. Correspondingly, the SI relied upon the conclusions drawn in the Area-Wide HHERA and the Area-Wide Risk Management Plan (IDeq, 2004). EPA's screening level of 20 mg/Kg WW selenium for recreational fish consumption was also considered (EPA, 2000).

2.2 Removal Action Objectives

Preliminary RAOs were identified in Section 11.2.2 of the SI Report. Further evaluation of Site conditions and regulatory and technical issues has allowed for the development of the following more specific objectives:

- Control releases of selenium from overburden that currently result in exceedances of MCLs in groundwater in the alluvial aquifer and Wells formation aquifer.
- Control releases of selenium from overburden that result in exceedances of removal action goals for surface water, sediment, fish, and vegetation in regulated surface water bodies.
- Reduce risks to livestock and wildlife due to exposure to selenium in non-regulated surface water and associated vegetation and sediments to acceptable levels.
- Reduce the potential for risks to livestock within grazing lease areas due to exposure to selenium in selenium-accumulator vegetation species in the Pole Canyon ODA and the A Panel ODA to acceptable levels.

In order to meet these RAOs, specific media-based RAGs are developed in the following subsection.

2.3 Media-Specific Removal Action Goals

This section provides a description of the RAGs for each environmental medium to be addressed by the removal action. The RAGs are shown in Table 2-2 and are the numerical levels for selenium at specific locations, or over specified areas, that are necessary to achieve

the RAOs described in the previous section. The goals are based on the removal action levels and the associated applicable location or area, as discussed in Section 3.

2.3.1 Groundwater

The RAG for selenium in groundwater at the Site is 50 ug/L, which is the MCL for human consumption.

2.3.2 Regulated Surface Water

The RAG for selenium in regulated surface water at the Site is 5 ug/L (total). The point of compliance for this RAG is all locations of natural waters of the State of Idaho or the United States.

2.3.3 Non-Regulated Surface Water

The RAGs for selenium in non-regulated surface water at the Site are 50 ug/L for waters that are utilized by wildlife or livestock for an extended period of time and 201 ug/L for water that are utilized by transient wildlife or livestock. The point of compliance for this RAG is at the individual detention basins.

2.3.4 Soil

The RAG for surficial soil used in conjunction with removal actions at the Site is less than 13 mg/Kg selenium. However, soil with selenium concentrations greater than 13 mg/Kg may also be suitable for use following additional evaluation to demonstrate that vegetation planted on those soils would not exceed the recommendation for less than 5 mg/Kg selenium in vegetation (as described below).

2.3.5 Sediments

The RAGs for selenium in sediments at the Site are 2.6 mg/Kg DW for sediments supporting aquatic life, and 7.5 mg/Kg DW for sediments not supporting aquatic life. The points of compliance for these RAGs are all locations of natural waters of the State of Idaho or United States within the Site, and the average for each individual detention basin, respectively.

2.3.6 Vegetation

The RAG for selenium in vegetation at the Site is for the average selenium concentration in the mined areas to not exceed 5 mg/Kg. Although the average concentration in vegetation across the Site is below 5 mg/Kg, the forage vegetation on the ODAs has an average selenium concentration higher than 5 mg/Kg. The elevated selenium concentrations in a relatively small proportion of the forage vegetation on the ODAs raise the average concentration above 5 mg/Kg (refer to Appendix A). The forage vegetation with elevated selenium concentrations includes selenium-accumulator species.

Additional consideration will be given to the following BLM/USFS interim guidelines for vegetation in reclaimed areas:

- No more than 0.5 percent of the vegetation measured on the reclaimed mine area shall exceed 20 mg/Kg selenium DW.
- No more than 5 percent of the vegetation measured on the reclaimed mine area shall contain selenium concentrations greater than 10.0 mg/Kg DW.
- No more than 45 percent of the vegetation measured on the reclaimed mine area shall contain selenium concentrations between 5.0 and 10.0 mg/Kg DW.
- At least 50 percent of vegetation on the reclaimed mine area must contain selenium concentrations less than 5.0 mg/Kg DW.

These interim guidelines and the 5 mg/Kg action level described in Section 2.1.6 relate to goals for unrestricted grazing. Grazing in and around the Site is currently controlled by four different USFS livestock grazing allotments. Cattle grazing is limited to the Sage Valley area just east of the Site; other portions of the Site may be grazed by sheep. Based on the allotment requirements (areas of allotments, permitted type and number of animals and number of permitted grazing days), which restrict the amount of time that livestock can graze on the ODAs, and considering the selenium concentrations for existing forage vegetation, it is concluded that livestock grazing on the forage growing on the ODAs are not likely to experience chronic exposure effects (see Appendix A). However, exclusive grazing on the selenium accumulator species present could result in short-term acute exposures. Therefore, reducing the abundance of selenium-accumulator species in the ODAs, and limiting the introduction of such species to those areas in the future, is necessary to protect livestock under current grazing allotments.

The long-term goal is to provide protection for unrestricted grazing. Therefore the selenium levels described above are appropriate for the definition of RAGs. The physical layout of the allotments is also relevant, since animals will be restricted to grazing within specific allotments.

Therefore the specific areas (decision units) to which the goals will be applied are the areas disturbed by mining within each allotment. These areas are shown on Figure 2-1.

2.3.7 Aquatic Biota

RAGs for aquatic biota are primarily defined by the surface water and sediment criteria. However, for human fish consumption the RAG is: fish tissue (fillet) for recreational angler species (e.g., trout) must be below 20 mg/Kg WW.