

**FINAL**

**Site Investigation Report**

**Smoky Canyon Mine, Caribou County, Idaho**

**July 2005**

***Prepared for:***

**The J.R. Simplot Company  
1130 West Highway 30  
Pocatello, ID**

***Prepared by:***

**NewFields  
4720 Walnut St., Suite 200  
Boulder, CO 80304**

## 10.0 BASELINE HUMAN HEALTH RISK EVALUATION

This report section provides an exposure-level assessment of the potential for unacceptable risks to human health at the Site. The evaluation is based upon the receptors and exposure scenarios that could present elevated risks to human health as identified in the Area-Wide HHERA (TetraTech EMI, 2002) and the Area-Wide RMP (IDEQ, 2004). IDEQ concludes that regional human health risks due to conditions associated with phosphate mining are unlikely. However, sole use of a Site-specific location over extended periods of time could result in elevated risks.

After screening a broad range of receptor and exposure pathway combinations, IDEQ identified ingestion of surface soil and fish consumption as the “only two exposure pathways associated with risks and hazards greater than acceptable levels.” The potential for elevated levels of risk were based upon child subsistence lifestyle and child Native American exposure scenarios. The Area-Wide HHERA points out that the primary driver for elevated risks due to soil ingestion is the soil “background” concentrations for arsenic. However, the fish consumption risks are driven by elevated selenium concentrations in fish tissue, which can be directly related to mining activities.

### 10.1 Site-Specific Approach

The data/information from the SI were initially reviewed relative to the above overall findings of the Area-Wide HHERA, as well as the three most likely receptors identified by IDEQ:

- 1) Recreational hunter and fisher and child;
- 2) Native American; and
- 3) Theoretical subsistence lifestyle.

Because the environmental conditions at the Site are similar to those considered in the Area-Wide HHERA and because subsistence lifestyle receptors are not currently present at the Site, the calculated level of risk for the Site would primarily be dependent upon subjective assumptions for exposure (use and duration) and otherwise would not substantially differ from the findings of the Area-Wide HHERA. Rather than repeating those assessments, a more conservative approach was utilized. This involved identifying areas (potential exposure points) of the Site that could contribute to unacceptable exposures for these receptors, regardless of the level of use and whether the exposure pathway is complete. For this assessment, risk management criteria identified for human health in IDEQ’s Area-Wide RMP were considered along with other relevant state and federal criteria. In addition, the relationship of any potential human exposure pathways to ecological risk drivers was considered.

## 10.2 Evaluation of Potential Exposure Points

Figure 10-1 identifies the full spectrum of potential exposure pathways for the receptors identified by the Area-Wide HHERA and other potential receptors. The primary exposure pathways and specific points of potential exposure for the Site are characterized in the following sections.

### 10.2.1 Air

No significant air transport of COPCs is occurring at the Site therefore, consistent with the Area-Wide HHERA, this exposure pathway is not a concern.

### 10.2.2 Groundwater

Observed and potential exceedances of the MCLs for the consumption of groundwater are confined to the areas immediately below or adjacent to source areas and are limited to selenium. Exceedance of the MCL for selenium (0.050 mg/L) was observed in the shallow alluvial aquifer and Wells Formation aquifer below and downgradient of the Pole Canyon overburden disposal area. Dilution within the Wells Formation appears to reduce concentrations to levels below the MCL with increasing distance from this source area. No other exceedances of the MCLs were observed for the Wells Formation. The Culinary Well for the Site is completed primarily in the Wells Formation, and the groundwater it extracts is well below the MCL for COPCs (selenium present at 0.007 to 0.031 mg/L).

Consistent with the fate and transport analysis for alluvial groundwater flow at the mouth of the Pole Canyon overburden disposal area, selenium concentrations may exceed the MCL in discrete zone(s) of the larger alluvial aquifer within the Sage Valley floor along the Pole Canyon Creek flow path. The highest total selenium concentration observed at monitoring well GW-22 is 0.08 mg/L. This concentration was measured in a sample collected from a discrete depth interval within the aquifer. Selenium concentrations measured in samples collected from other discrete depth intervals and from the entire screened depth at that well had concentrations less than the MCL. There is currently no use of this aquifer for water supply; however, a domestic well, if constructed in this area, would not likely produce groundwater with selenium concentrations greater than the MCL (pumping from the entire screened interval = 0.02 mg/L selenium). No other means of potentially unacceptable exposure to groundwater were identified.

As noted in the fate and transport and ecological risk analysis portions of this report (Sections 8 and 9), discharge of groundwater to surface water at Hoopes Spring and some overburden seeps presents unacceptable ecological risks and/or results in exceedances of the stream standard for total selenium of 0.005 mg/L. Although consideration of exposure concerns related to the groundwater MCL exceedances described above will be important in the EECA, the driver

for the majority of removal actions for groundwater will likely be the potential for surface water impacts.

### 10.2.3 Surface Water

Surface water features at the Site that could potentially pose a human health exposure concern (i.e., greater than drinking water standard of 0.05 mg/L selenium) are limited to Pole Canyon Creek, downstream of the Pole Canyon overburden disposal area, and a few small areas of seepage associated with the D and E Panel overburden disposal areas. These seeps do not present a likely source of drinking water for any of the receptor categories and ephemeral flow in Pole Canyon Creek downstream of the Pole Canyon overburden disposal area limits the likelihood of more than incidental exposure.

Both the seeps and Pole Canyon Creek have been identified as posing elevated ecological risks at lower selenium concentrations than the MCL and will correspondingly be addressed in the EECA primarily from an ecological perspective.

### 10.2.4 Fish

Elevated concentrations of selenium in fish tissue were identified for Hoopes Spring and lower Sage Creek (LSV-4) (3.4 to 7.3 mg/Kg WW). These values exceed the EPA screening level for subsistence exposure (2.46 mg/Kg WW), but are well below the EPA recreational exposure screening level (20 mg/Kg WW) (EPA, 2000). The stream reaches containing these fish have also been identified as posing elevated ecological risks for surface water in that they exceed the Idaho water quality stream standard of 0.005 mg/L.

The numbers and size of fish in these stream segments are limited, and sole-use subsistence is most likely not feasible. Nonetheless, the EECA should fully consider whether or not actions to manage ecological risks in these streams will also reduce the potential for unacceptable levels of risk due to ingestion of fish tissue from these stream segments.

### 10.2.5 Soil/Sediment Vegetation

Ecological risks associated with soil, sediment and vegetation conditions are primarily limited to overburden disposal areas, including lower Pole Canyon Creek and the overburden seep areas. These are the areas most likely to pose potential human health concerns. Outside of these areas, selenium concentrations in stream sediment within the Site watershed are not significantly elevated above upstream or regional background conditions. Localized areas of sediment with elevated levels of selenium at runoff ponds or overburden seeps are not viewed as a likely human health exposure risk.

According to the Area-Wide HHERA, potential human health exposure concerns could be linked to consumption of plants and incidental ingestion of soil from overburden disposal areas under sole-use subsistence scenarios. There is also the potential for exposure concerns associated with ingestion of aquatic species, such as watercress, from impacted water courses. Although these exposure scenarios are not currently present at the Site, and are not likely to occur on the overburden disposal areas and seeps, remedies for addressing ecological risks in these areas should also consider the potential for future human health exposure concerns, both in terms of direct exposure through incidental ingestion of soil and/or consumption of plants from those areas.

### 10.3 Other Considerations

Even though human health risks were not necessarily identified for Area-Wide exposure scenarios, IDEQ has established two regional health advisories for specific exposure scenarios within the Southeast Idaho Phosphate Mining Resource Area. These institutional controls were established to reduce the potential for increased exposure to COPCs. The health advisories were explained in the Area-Wide RMP (IDEQ, 2004) and are described below.

The first health advisory was a hunter's advisory issued in fall of 2000 by the Idaho Department of Fish and Game (IDF&G) and Idaho Department of Health and Welfare (IDHW) recommending limited consumption of elk liver by area hunters (IDF&G, 2000). Elk survey data collected by IDF&G and the Idaho Mining Association (IMA) in 1999 and 2000 indicated that selenium liver concentrations observed in a small percentage of the elk could result in acute gastrointestinal effects, such as nausea, if significant quantities of liver were consumed over a short period of time.

The second advisory was issued by IDHW in the fall of 2002 and recommended limiting consumption of fish from East Mill Creek by children under the age of seven based on elevated selenium concentrations observed in fish tissue from this stream (IDHW, 2002). While the Agencies recognized that extensive use of this stream is unlikely, based on past observations, this precautionary advisory was issued and posted at the Site to address any potential future use.

Further investigation of potential health effects from tribal member consumption of elk and other game was conducted by IDHW and the Agency for Toxic Substances and Disease Registry (ATSDR) (IDH&W and ATSDR, 2004). This consultation recommended specific levels of elk consumption (one daily 8-ounce meal of elk muscle or consumption of up to two 10-ounce meals of elk liver in a two-week period is unlikely to result in any adverse health effects). However, the consultation identified portions of the tribal population (e.g. insulin-dependent diabetics) that could have a greater sensitivity to selenium exposure. The consultation also recognized the potential for additional exposure as a result of tribal "traditional and non-traditional dietary practices."

In addition, ATSDR published several regional health consultations for the Southeast Idaho Phosphate Mining Resource Area regarding ingestion of beef, elk, sheep and fish (ATSDR, 2001), evaluation of regional groundwater (ATSDR, 2003a), and selenium concentrations in fish of the upper Blackfoot River watershed (ATSDR, 2003b), respectively. The consultations did not identify any apparent public health hazards from moderate ingestion of meat or fish other than the aforementioned advisories, or from the use of regional groundwater by the general public.

The Area-Wide RMP also recognizes the potential for elevated human health risks if residential structures are developed on top of overburden disposal areas. These risks would arise from incidental soil ingestion, persistent fugitive dust inhalation and radiological exposures occurring over a significantly extended period of time rather than during recreational use. Precautionary measures are recommended by IDEQ to prohibit residential development of impacted areas and mining waste units that could present potential future health risks. As stated in the Area-Wide RMP, these measures could include institutional controls, such as deed restrictions, covenants, environmental easements, land-use ordinances or administrative rule-making.

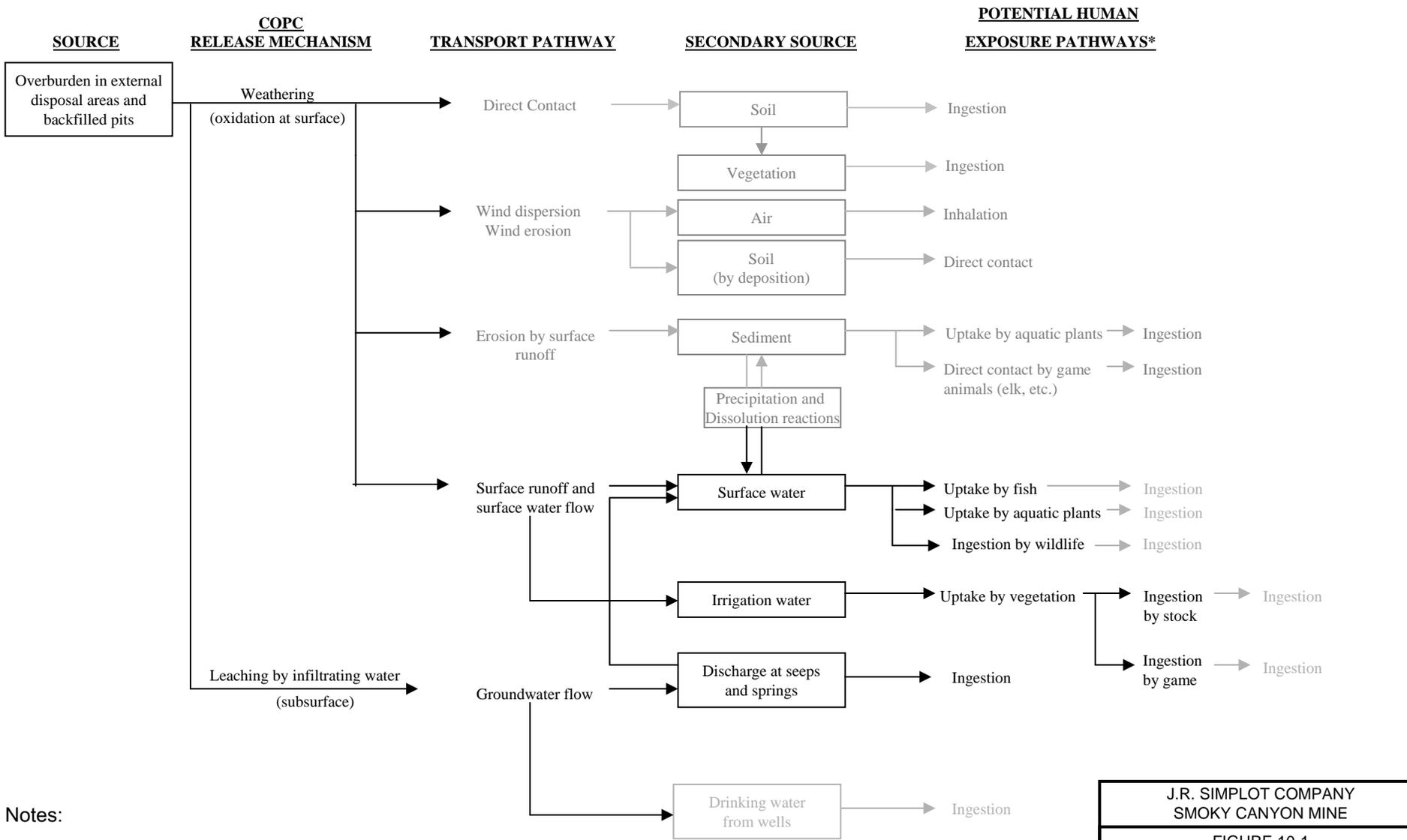
### **10.3.1 Conclusions**

Although the existing ecological risks and regulatory exceedances will be the primary remedial driver for all the areas that could potentially present a future human health concern, consideration of the most sensitive potential human exposure scenarios will be important during the EECA. The increased sensitivity of certain tribal members to these exposure scenarios should also be considered when developing risk management strategies as part of the EECA process. Review of this recent information does not indicate any new exposure scenarios beyond those considered in the Area-Wide HHERA, however, it does point out the potential for detrimental synergistic health effects for this sensitive portion of the population.

**FIGURE**

## Smoky Canyon Mine Site Area A

### Conceptual Site Model for Human Receptors



**Notes:**

1. \* Assumes no residential exposure.
2. Grey-scale model elements currently have little significance at the Smoky Canyon Mine Site, as detailed in Section 10.

J.R. SIMPLOT COMPANY SMOKY CANYON MINE		
FIGURE 10-1 AREA A CONCEPTUAL SITE MODEL FOR HUMAN RECEPTORS		
0442-004-900	DATE: 1/25/05	
REV: 1	BY: SAW	CHK: KJT
<span style="border: 1px solid black; padding: 2px;">NEWFIELDS</span>		