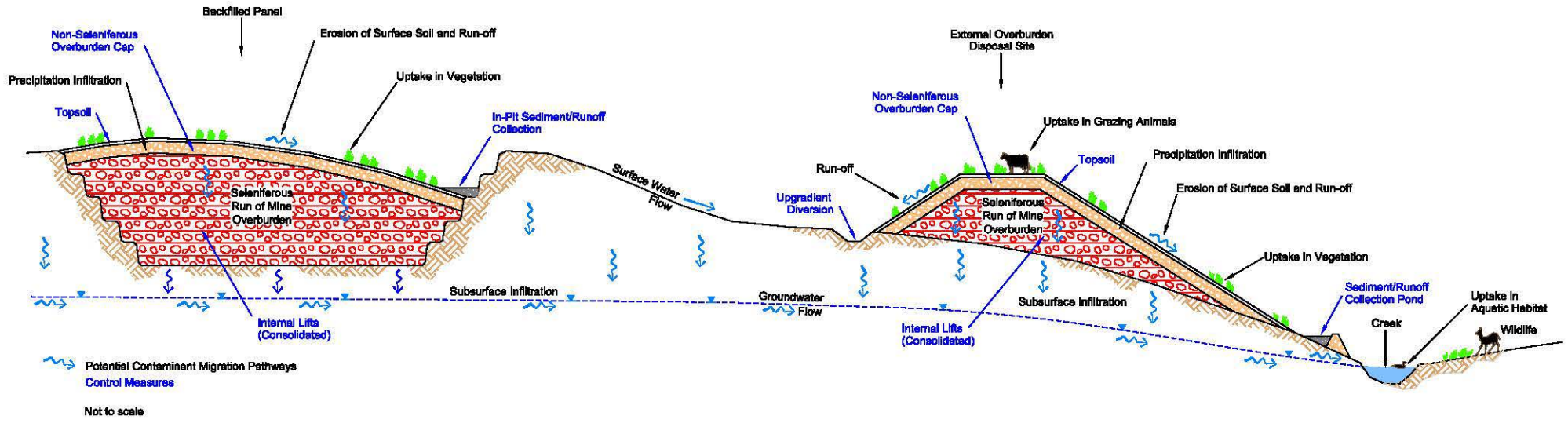
SELENIUM ISSUE



Modified from: Montgomery Watson, 2000. Draft BMP Guidance Manual for Active and Future Mines, April 2000.

CONTAMINANT LEACHING & MOBILIZATION CONCEPTUAL MODEL

Selenium is a naturally occurring element that is present in elevated concentrations in some phosphate overburden throughout southeastern Idaho. Selenium is an essential nutrient for animals and humans in small dietary concentrations but causes chronic or acute poisoning at higher levels. The Environmental Protection Agency and the Agency for Toxic Substances and Disease Registry have determined that small amounts of selenium taken daily would not be expected to cause any adverse human health effects over a lifetime of such intake. In minerals, selenium compounds are essentially insoluble but can oxidize to more soluble compounds through the alteration and weathering processes. Seleniferous overburden that is removed during mining and placed in fills is subject to this oxidation and soluble forms can then be leached from the overburden by water. Particles of various selenium compounds can also be eroded from the overburden by wind and water and then transported off the mine site, if not controlled with Best Management Practices.

Selenium is less toxic to vegetation and terrestrial and aquatic plants can accumulate selenium in their tissue by absorbing it from the water within the soil or aquatic environments. Animals eating this vegetation can bioaccumulate selenium compounds in their bodies which can lead to toxic effects if the selenium dose is high enough. There have been mortalities of livestock attributed to selenium in Idaho. Carnivores that eat other animals that are exposed to selenium can also be exposed to toxic levels of selenium. No selenium mortalities of carnivores or other game have been observed in the local area.

The main potential pathways for migration of selenium from phosphate mines include: surface erosion of seleniferous materials, transport of seleniferous sediment and dissolved forms in surface water, uptake in vegetation, ingestion by animals, leaching of seleniferous overburden by precipitation, and transport of dissolved selenium in groundwater.

Practices that would be employed at the Dairy Syncline Mine to reduce the selenium migration pathways from proposed mine expansions include: dust control on roads, standard erosion controls, containing all runoff at the mine site, placing seleniferous overburden in pit backfills, capping seleniferous overburden, and building overburden fills to avoid overburden seeps. Simplot is conducting site investigations at historic Smoky Canyon facilities to develop appropriate mitigation for current selenium impacts.