

**Memorandum**

Date . November 4, 1985

From Acting Director  
Office of Health Assessment

Subject Health Assessment, Silver Bow Creek  
Butte, Montana

To Mr. Ed Skowronski  
Public Health Advisor  
EPA Region VIII

**BACKGROUND**

Silver Bow Creek is an Environmental Protection Agency (EPA) National Priority List site in western Montana, consisting of about 24 miles of an intermittent mountain stream that flows through areas formerly used extensively in copper mining and smelting. This assessment addresses the request for a Partial Review of Actual or Potential Adverse Health Impacts resulting from Direct Contact With Silver Bow Creek in subarea I-1 and II-2, and the potential health implications of using water from these areas of Silver Bow Creek to irrigate food crops. The following discussion and conclusions are derived from documents cited below. We understand that further data collection and data analysis must still be done. We have assumed that environmental samples were collected and analyzed in a manner consistent with the best scientific practices that meet all EPA requirements.

**DISCUSSION**

The primary contaminants of interest in Silver Bow Creek are heavy metals in solution or in bottom sediments. The full extent of contamination may not be known, but among the several heavy metals reported in the creek, arsenic, cadmium, and lead have the greatest potential for causing toxic effects due to the low levels of exposure at which they may affect humans and animals. Dermal absorption of these metals has not been widely studied, but existing information suggests there should be negligible absorption through intact skin for the chemical forms and concentrations reported for the stream. Prolonged contact with creek water at the highest reported concentrations may cause irritation of eyes and mucous membranes, but because these high concentrations were reported at only a few sample stations with low concentrations downstream from

them, it appears that prolonged contact with these higher concentrations (about three to ten times the EPA primary drinking water standard for cadmium and lead) is not likely. Based on the information provided, there should be no significant acute or chronic adverse health effects from contact with stream water.

Cadmium and lead accumulate in the body, and there is some chance that individuals wading in the water will fall and ingest water with levels of these metals at concentrations above the drinking water standards. There should be particular concern for children since they are more susceptible to chronic toxic effects of exposure to these compounds. There is no assurance that much higher levels of these metals may not occur unpredictably in the creek, so we suggest that individuals use caution during activities that involve wading or immersion in the creek to avoid ingestion of creek water or organisms that live in the water.

A major route of human exposure to cadmium is through ingestion of food containing or contaminated with the metal. Some plants readily take up and translocate cadmium to leaves and fruits. In contrast, arsenic and lead are not known to accumulate substantially in plants, although there are numerous reports of relatively high levels of these metals deposited on the surfaces of leaves. Little information is published about specific plants, accumulation within specific organs, or bioconcentration of cadmium, but because cadmium accumulates in the body, can produce severe and permanent damage in the liver and kidneys, and is known to be translocated from soil solutions into fruits and leaves of some plants, it would be prudent to avoid eating crops that are irrigated with either flood irrigation or sprinklers unless the water or food is known not to have an elevated concentration of cadmium. Average daily cadmium intake in the United States via food has been reported to be about 40 ug/day and the EPA Primary Drinking Water Standard is 0.01 mg/l.

#### CONCLUSIONS

Based on the information provided, we believe that contact with water in Silver Bow Creek will not lead to any significant acute or chronic adverse health effects. Because children playing in the water may swallow water containing significantly elevated concentrations of toxic metals known to accumulate in the body, warning signs and public notices should be provided to warn them and responsible adults of the potential health threat of ingesting creek water.

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Crops irrigated with water from Silver Bow Creek may accumulate significant concentrations of cadmium. Unless the water or parts of the vegetables consumed are known not to have significantly elevated levels of cadmium, eating them will increase the likelihood of cadmium toxicity.

We hope this information is useful to you. Please call me (FTS 236-4551) if you have any questions.

  
for Stephen A. Margolis, Ph.D

DOCUMENTS REVIEWED

Silver Bow Creek CERCLA Remedial Investigation Interim Surface Water and Point Source Memorandum. Stiller and Associates, Inc., Helena, Montana.

REFERENCES

Fassett, D. W. 1980. Cadmium in Metals in the Environment. H. A. Waldron ed. Academic Press.

US EPA. 1980. Ambient Water Quality Criteria for Cadmium. Doc. 440/5-80-025.

US EPA. 1984. Health Assessment Document for Inorganic Arsenic. Final Report Doc. 600/8-83-021F.

National Research Council. 1980. Lead in the Human Environment. National Academy of Sciences. Washington, D.C.