

# Letter Health Consultation

---

CHAMPAGNE CREEK MINE SITE AND TREATMENT PONDS

ARCO, IDAHO

Prepared by  
**Idaho Department of Health and Welfare**

MARCH 3, 2015

Prepared under a Cooperative Agreement with the  
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Agency for Toxic Substances and Disease Registry  
Division of Community Health Investigations  
Atlanta, Georgia 30333

## **Health Consultation: A Note of Explanation**

An ATSDR health consultation is a verbal or written response from ATSDR to a specific request for information about health risks related to a specific site, a chemical release, or the presence of hazardous material. In order to prevent or mitigate exposures, a consultation may lead to specific actions, such as restricting use of or replacing water supplies; intensifying environmental sampling; restricting site access; or removing the contaminated material.

In addition, consultations may recommend additional public health actions, such as conducting health surveillance activities to evaluate exposure or trends in adverse health outcomes; conducting biological indicators of exposure studies to assess exposure; and providing health education for health care providers and community members. This concludes the health consultation process for this site, unless additional information is obtained by ATSDR which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

You May Contact ATSDR TOLL FREE at  
1-800-CDC-INFO

or

Visit our Home Page at: <http://www.atsdr.cdc.gov>

LETTER HEALTH CONSULTATION

CHAMPAGNE CREEK MINE SITE AND TREATMENT PONDS

ARCO, IDAHO

Prepared By:

Idaho Department of Health and Welfare  
Division of Public Health  
Bureau of Community and Environmental Health  
Under a cooperative agreement with the  
Agency for Toxic Substances and Disease Registry



C.L. "BUTCH" OTTER – GOVERNOR  
RICHARD M. ARMSTRONG – DIRECTOR

IDAHO DEPARTMENT OF  
**HEALTH & WELFARE**

SONJA SCHRIEVER, RN – CHIEF  
BUREAU OF COMMUNITY & ENVIRONMENTAL HEALTH  
450 West State Street, 6<sup>th</sup> Floor  
P.O. Box 83720  
Boise, Idaho 83720-0036  
PHONE 208-334-6950  
FAX 208-334-6573

March 3, 2015

Mr. Daniel Kotansky  
Supervisory Hydrologist  
Bureau of Land Management  
1405 Hollipark Dr.  
Idaho Falls, ID 83401

Dear Mr. Kotansky:

On June 6, 2014, the Bureau of Community and Environmental Health (BCEH) staff met with the US Bureau of Land Management (BLM) to discuss potential human health effects of the Champagne Creek abandoned mine. BLM requested BCEH review environmental data to determine whether levels of heavy metals in soil, surface water, and ground water pose a human health problem. Based on the analysis of available data and site visit information, BCEH determined that recreationalists who accidentally eat contaminated soil or drink contaminated surface water from Champagne Creek are not likely to be harmed. However, trespassers who accidentally come in contact with acidic water from the treatment ponds could develop eye and skin irritation. Although BCEH determined health effects from exposures at the site are unlikely, BCEH recommends BLM coordinate with the Idaho Gold Corporation to fence or place signage along the south unnamed tributary to Champagne Creek to warn sporadic recreationalists and trespassers of the presence of contaminated soils and water at the site. BCEH also recommends BLM include signs at the treatment ponds and ensure the health and safety plan addresses contaminants on site. A limitation of the findings is that it is not known if groundwater has been impacted downstream from the site since private well sampling data were not available for analysis. Our program is available to assist with private well testing, developing warning signs for the area, and providing educational outreach to the community, if needed.

### **Background and Statement of Issues**

The site is located north of the Craters of the Moon National Monument and Preserve, approximately 18.5 miles southwest of Arco, Idaho. Historic gold, silver, lead and zinc mining occurred intermittently since the early 1900s (Anderson, 1929). The site is comprised of two main areas: the abandoned Moran Tunnel adit area and the south unnamed tributary to Champagne Creek (BLM, 2014). Water quality impacts from acid mine drainage to Champagne Creek were first detected by BLM in the late 1970s (BLM, 2014). In 1999, BLM began the initial phase of the Moran Tunnel clean-up project with the installation of four treatment ponds and a fence to restrict public access to the treatment pond area which

occupies approximately two acres. BLM has also installed a fence along Champagne Creek to restrict cattle access. BLM plans to continue improvements to the passive treatment system for acid mine drainage from Moran Tunnel while Idaho Gold Corporation is expected to develop some alternatives to reduce impacts from an intermittent spring located at the base of a waste rock pile that impacts the unnamed tributary to Champagne Creek with acid mine drainage. (BLM, 2014). Trespassers and recreationalists can be exposed to site contaminants through accidental ingestion of contaminated soil or surface water.

The closest occupied residence is a ranch, located approximately 2.4 miles downstream of the site. In addition to ranching, the property owner manages an alternative school (Wisdom Ranch). The school has been in operation since 2000 and has 10 male students (ages 17–19) who spend the school year living in yurts (semi-permanent cabins) located adjacent to Champagne Creek. The closest student yurt is located approximately 1.1 miles from the site. The rancher, his family, students, and staff at Wisdom Ranch School have access to drinking water from private wells.

## **Results and Discussion**

### *Environmental Data*

BCEH evaluated metal levels from surface soil sampling provided by BLM and collected by KC Harvey Environmental, LLC during their August 2012 vegetation assessment (KC Harvey, Environmental, LLC, 2012). Soil samples were taken from the most upper layer of soil (0–12 inch depth). A total of three grab soil samples and one replicate from three different locations (above Treatment Pond, below Treatment Pond and at Beaver Pond) were collected and analyzed for five metals. The soil samples were visually homogeneous throughout the 12 inches of soil profile. According to KC Harvey Environmental field observations, these wastes have a fluvial origin; thus, a variation between concentrations of the top 0–5 inches and levels in the 0–12 inch depth for these particular samples are not expected (Neuman, Dennis. KC Harvey, Environmental, LLC, June 17, 2014, personal communication). BLM also provided surface water monitoring data from 1981 to 2013 with measurements of ten metals at different locations along Champagne Creek. For the purpose of this letter, BCEH only included soil and surface water quality data from sites where people are most likely to be exposed to metals present in soil and surface water. Groundwater sampling data from monitoring wells at the site were available and showed levels of heavy metals above the ATSDR drinking water comparison values (CVs); however, BCEH determined these data could not be used to gauge drinking water exposures for residents living over a mile away since the exposure pathway was uncertain (See Pathway Analysis and Public Health Implications section for details).

### *Pathway Analysis and Public Health Implications*

For any environmental contaminant to be considered a health concern the contaminant has to be present at a high enough concentration to cause potential harm and a completed exposure pathway needs to be present. A pathway analysis considers five principle elements: a source of contamination, transport through an environmental medium, a point of exposure, a route of human exposure, and a receptor population. Completed exposure pathways are those in which all five elements are present, and indicate that exposure to a contaminant has occurred in the past, is presently occurring, or will occur in the future. BCEH analyzed the following exposure pathways: soil, surface water, water in the treatment ponds, and groundwater.

- Soil contamination currently exists in areas with public access (i.e., Above Treatment Ponds, and at Beaver Pond) where sporadic recreational activities (i.e., seasonal hunting, camping, and hiking) take place. Recreationalists may be exposed by accidental ingestion of contaminated soils. Moran Tunnel and the four treatment ponds are located in a fenced area; however, it is likely that the trespassers may come in contact with contaminated soils. Thus, the soil exposure pathway is complete.
- Toxic metals were also detected in surface water close to a camping area (above Moran Tunnel) and at Poison Gulch above the Ranch; thus, drinking contaminated water from Champagne Creek (above Moran Tunnel and at Poison Gulch above the Ranch) represents another likely route of exposure and is considered a completed pathway.
- Water in the treatment ponds has low pH. While the ponds are fenced off, an exposure is possible, so BCEH considers the ponds to be a potential exposure pathway.
- There are nine groundwater monitoring wells on the site, but they do not provide drinking water. Private water wells supply drinking water to the residents of the ranch, students and staff at Wisdom Ranch School. Recent water quality data from these private wells are not available. Thus, BCEH cannot evaluate the groundwater pathway.

#### *Remediation Worker Exposure*

While the site is being remediated, it is likely that remediation workers will be exposed during the clean-up activities by accidentally eating, breathing or coming in contact with contaminated soil. While it is anticipated that worker exposure would be brief (i.e., eight hours per day, five days per week, for four months), BCEH recommends that workers follow a site-specific health and safety plan that minimizes exposures.

#### *Evaluation Process*

The Agency for Toxic Substances and Disease Registry (ATSDR) has developed comparison values (CVs) to select chemicals of potential health concern that warrant further evaluation. These CVs include environmental media evaluation guides (EMEGs) for non-cancerous health effects and cancer risk evaluation guides (CREGs) for cancer effects (ATSDR, 2005). If a contaminant concentration exceeds the comparison value (CV), it is selected for further evaluation. Contaminant concentrations below CVs are considered safe and are not evaluated further. Concentrations above the available CVs are not necessarily a health concern, but further investigation is needed to ensure people who are exposed will not be harmed. Site specific exposure scenarios are part of the evaluation, and they are incorporated into health risk estimations.

#### *Exposure Scenarios for soil and drinking water ingestion*

For those metals above a CV, BCEH evaluated the toxicological effects associated with potential ingestion of contaminated soils and contaminated surface water by calculating an estimated dose. While metals in general are poorly absorbed through the skin a small fraction of some metals, such as arsenic, can be absorbed through the skin. The levels of arsenic detected at this site are not high enough to be a dermal exposure concern. Thus, the dermal route of exposure to metals was not considered in the analysis. Since students (all male, ages 17–19) from Wisdom Ranch School live near the site, can access the site and constitute the population most likely to be on site multiple times a year, BCEH considered a student recreationalist exposure scenario. For all calculations, BCEH assumed a conservative (i.e., health protective) approach using a 17-year old

male with a body weight of 170.7<sup>1</sup> pounds or 77.43 kilograms. Other assumption values for the estimated dose calculations are presented in Table 1.

**Table 1. Parameters and Values for Dose Calculations**

Exposure Media	Route of Exposure (incidental ingestion)	Standard intake rate for adults	Time of Exposure
Soil	Contaminated soil	100 milligrams/day	One day/week for 36 weeks over one year
Surface water	Contaminated water	2 liters/day	

*Metals in Soil*

Surface soil samples were analyzed for five metals (arsenic, cadmium, copper, lead, and zinc). The levels of arsenic and copper exceeded at least one CV. The levels of arsenic at the three sampling locations were below the non-cancer adult CV of 210 mg/kg, but above the cancer CV of 15 mg/kg (Table 2). The copper concentration at Beaver pond (7,920 mg/kg) was above the adult CV of 7,000 mg/kg (Table 2). Since arsenic and copper in soil were above the health screening guidelines, they were further analyzed by calculating estimated doses using the teenager recreationalist exposure scenario described above. The estimated doses compared to ATSDR’s minimum risk level (MRL) to determine if harmful health effects were possible. MRLs are an estimate of the daily human exposure to a substance that is not likely to harm a person’s health over a specified duration of exposure.

**Table 2. Concentration of metals in surface soil that exceeded comparison values**

Sampling Location	Metals	Concentration in mg/kg (single measurement)	Non-cancer CV for Adult <sup>a</sup> (mg/kg)	Cancer CV <sup>b</sup> (mg/kg)
Above Treatment Ponds	Arsenic	25	210	15
Below the Treatment Pond	Arsenic	54.9 <sup>c</sup>	210	15
At Beaver Pond	Arsenic	87.3	210	15
	Copper	7,920	7,000 <sup>d</sup>	NA

a = ATSDR Chronic Environmental Media Evaluation Guides (EMEGs)

b = ATSDR Cancer Risk Evaluation Guide (CREG) for Arsenic is 0.47 mg/kg. Since this value is below background levels, ATSDR recommends using 15 mg/kg.

c = Average of two measurements

d = ATSDR Intermediate Environmental Media Evaluation Guides (EMEGs)

mg/kg = milligram per kilogram

NA = Not available

The estimated dose for copper was 0.0009 milligram per kilogram of body weight per day (mg/kg/day), which is below the ATSDR intermediate oral MRL of 0.01 mg/kg/day. The risk is further reduced because of conservative assumptions (i.e., time of exposure of one day per week for nine months) and the unattractiveness of the Beaver Pond sampling location (i.e., yellowish standing water); therefore, BCEH does not expect exposure to soil contaminated with arsenic,

<sup>1</sup> Weight in pounds for children and adolescents from birth to age 19 in the United States 2007–2012 (Fryar, et al., 2012)

cadmium, copper, lead, and zinc at the Champagne Creek abandoned mine to result in harmful non-carcinogenic human health effects.

Arsenic has been classified by EPA as a “known human carcinogen” (ATSDR, 2007). This classification is used only when there is sufficient evidence from epidemiologic studies to support a causal association between exposure to the agents and cancer. The arsenic concentrations in soil at the three locations tested exceeded the CREG value of 15 mg/kg (Table 2). Estimates of cancer risk from exposure to arsenic in soil above the Treatment Pond was six additional cancers in a population of 100 million people who are exposed. Below the Treatment Pond the cancer estimate was one additional cancer in a population of 10 million people. The estimated cancer risk from exposure to arsenic in soil at Beaver Pond was two additional cancers in a population of 10 million people. These estimated cancer risks are considered to be very low; both are below EPA’s target risk range. Thus, BCEH does not expect exposure to soil contaminated with arsenic at the Champagne Creek abandoned mine site to increase the risk of developing cancer above what is normally seen in U.S. populations.

#### *Metals in Surface water*

Surface water was monitored by BLM from 1980 to 2013 and analyzed for 10 metals (aluminum, arsenic, cadmium, chromium, copper, iron, mercury, nickel, silver, and zinc) at four locations. BCEH analyzed data from two locations (Poison Gulch above the Ranch and Champagne Creek above Moran Tunnel (Campground)) because these two sampling sites are accessible to the public, and it is highly unlikely that any trespasser will use water from the treatment ponds for human consumption. However; it is possible that trespassers may accidentally come in contact with water from treatment ponds, which is highly acidic. BLM monitoring records show that the lowest pH in Champagne Creek below Moran Tunnel treatment Ponds is 2.7. According to the World Health Organization (WHO) pH values below 4 can cause redness and irritation of the eyes, the severity of which increases with decreasing pH (i.e., exposure to pH 2.5 can cause irreversible and extensive skin damage) (WHO Working Group, 1986). Maximum values of all metal concentrations in surface water were below their CV except for cadmium, arsenic and copper at Poison Gulch above the Ranch and arsenic and copper at Champagne Creek above Moran Tunnel (Campground) (Table 3).



**Table 3. Concentrations of metals in surface water that exceed comparison values**

Location	Metals	Number of Samples	Range (mg/L)	Maximum concentration (mg/L)	Non-Cancer CV for Adult (mg/L)	Cancer CV (mg/L)
Poison Gulch above the Ranch	Cadmium	11	0.002–0.02	0.02	0.0035 <sup>a</sup>	NA
	Arsenic	5	0.002–0.025	0.025	0.011 <sup>a</sup>	0.000023
	Copper	35	0.007–0.642	0.642	0.35 <sup>b</sup>	NA
Champagne Creek above Moran Tunnel (Campground)	Arsenic	5	0.001–0.005	0.005	0.011 <sup>a</sup>	0.000023
	Copper	14	0–1.3	1.3	0.35 <sup>b</sup>	NA

a = ATSDR Chronic Environmental Media Evaluation Guides (EMEG)

b = ATSDR Intermediate Environmental Media Evaluation Guides (EMEG)

mg/L = milligrams per liter

NA = Not available

The estimated doses were calculated using the maximum values assuming the “worst-case” scenario in which people are exposed to the highest concentration found in the water. The dose calculation of cadmium at Poison Gulch above the Ranch (0.00002 mg/kg/day) was below the ATSDR chronic oral MRL of 0.0001 mg/kg/day. The estimated doses for copper at Poison Gulch above the Ranch (0.0007 mg/kg/day) and at Champagne Creek above Moran Tunnel (0.00037 mg/kg/day) were below the ATSDR intermediate oral MRL of 0.01 mg/kg/day. The estimated doses of arsenic at Poison Gulch above the Ranch (0.00003 mg/kg/day) and at Champagne Creek above Moran Tunnel (0.000005 mg/kg/day) were below the ATSDR oral chronic MRL of 0.0003 mg/kg/day. The cancer risk from exposure to arsenic in surface water at Poison Gulch above the Ranch was six additional cancers in a population of 10 million people exposed while the cancer risk at Champagne Creek above Moran Tunnel (Campground) was one additional cancer in a population of 10 million people. These estimated cancer risk calculations for long term exposure are below EPA’s target risk range. Thus, BCEH believes that exposures to metal contaminated water at Champagne Creek is not likely to increase the risk of developing cancer above rates normally seen in U.S. populations.

The presence of recreationalists at Champagne Creek above Moran Tunnel (Campground) was confirmed during the site visit by the remains of a camp fire; however, BCEH believes that metal exposures to recreationalists is sporadic and other factors such as the isolated location, the presence of the wire fence along Champagne Creek and on the perimeter of the site, low flows in the stream, and poor accessibility to Champagne Creek minimize exposures to metals sampled in soils and surface water. Also, while teenagers from the school are likely to have the most

exposure due to their proximity and accessibility to the site, it is unlikely that this exposure would be more than is presented in this document.

### **Conclusion**

BCEH concludes that metals found in soil and surface water at Champagne Creek abandoned mine are not likely to harm the health of recreationalists and teenagers who trespass on the site because the levels of metals detected in soil and surface waters were below the levels known to cause harmful health effects. However, trespassers who accidentally come in contact with acidic water from the treatment ponds could develop eye and skin irritation.

### **Recommendations**

BCEH recommends that BLM:

- Coordinate with the Idaho Gold Corporation to fence or place signage along the south unnamed tributary to Champagne Creek to prevent accidental exposures to toxic metals.
- Post the treatment ponds with signs stating that the water is highly corrosive and that all contact be avoided.
- Ensure the worker health and safety plan for remediation activities addresses the possible exposure to contaminants on site.

### **Public Health Action Plan**

- BCEH will communicate the findings to BLM and offer any assistance for developing signage and provide outreach to the community as needed.
- BCEH will coordinate with BLM during the remedial activities to communicate possible risks.
- BCEH will coordinate with the Wisdom Ranch School manager to offer assistance for testing their private drinking water wells.

If you have any questions, please do not hesitate to contact me at 208-334-5682 or at [padenn@dhw.idaho.gov](mailto:padenn@dhw.idaho.gov).

Best regards,

Norka E. Paden, PhD.  
Toxicologist/Public Health Assessor  
Bureau of Community and Environmental Health  
Idaho Division of Public Health

cc: Jim Vannoy, MPH  
Program Manager  
Bureau of Community and Environmental Health  
Idaho Division of Public Health

## **References**

Anderson, A., 1929. *Geology and Ore Deposits of the Lava Creek Districts ID*, Moscow: Bureau of Mines and Geology.

ATSDR, 2005. *Public Health Assessment Manual*, Atlanta: U.S. Department of Health and Human Services.

ATSDR, 2007. *Toxicological Profile for Arsenic*, s.l.: US Department of Health and Human Services.

BLM, 2014. *CERCLA Engineering Evaluation/Cost Analysis Approval Memorandum*, Idaho Falls: Bureau of Land Management.

Fryar, C., Gu, Q. & Ogden, C., 2012. *Anthropometric reference data for children and adults: United States, 2007–2010*. National Center for Health Statistics, s.l.: Vital Health Stat 11(252).

KC Harvey, Environmental, LLC, 2012. *Champagne Creek Vegetation Assessment, Final Report*, Bozeman: s.n.

WHO Working Group, 1986. Health impact of acidic deposition. *Science of the Total Environment*, Volume 52, pp. 157-187.

## **REPORT PREPARATION**

This Health Consultation for the Champagne Creek Abandoned Mine was prepared by the Bureau of Community and Environmental Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented.

### **Author(s)**

Norka E. Paden, Ph.D., Idaho Division of Public Health  
Public Health Assessor/Toxicologist

Jim Vannoy, MPH, Idaho Division of Public Health  
Program Manager

### **State Reviewer(s)**

Jeff Fromm, Ph.D., Idaho Department of Environmental Quality  
Technical Services

Michael Stevenson, Ph.D., Emergency Preparedness Section Manager  
Idaho Bureau of Laboratories

### **ATSDR Reviewers**

Division of Community Health Investigations (DCHI)

Audra Henry, MS, Technical Project Officer

Kai Elgethun, Ph.D., MPH, Western Branch Associate Director for Science

Lynn Wilder, Ph.D., CIH, Division Associate Director for Science

Tina Forrester, Ph.D., Acting Division Director