Health Consultation

PUBLIC COMMENT RELEASE

LOWER BRIDGE MINE

TERREBONNE, OREGON

SEPTEMBER 30, 2008

COMMENT PERIOD END DATE: NOVEMBER 10, 2008

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
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.

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HEALTH CONSULTATION

PUBLIC COMMENT RELEASE

LOWER BRIDGE MINE

TERREBONNE, OREGON

Prepared By:

Oregon Department of Human Services
Environmental Health Assessment Program
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Public Comment Release

This document is being released for public comment. The public comment period is an opportunity for the public to comment on EHAP's findings or proposed activities contained in this draft document. The public comment period for this document is from October 15, 2008, through November 24, 2008. Comments are requested and should be directed to:

Environmental Health Assessment Program (EHAP)
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Or you can submit your comments electronically by sending them to ehap.info@state.or.us

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Summary

The Oregon Office of Environmental Public Health's Environmental Health Assessment Program (EHAP) has prepared this Health Consultation (HC) regarding Lower Bridge Mine in Terrebonne, Oregon at the request of Senator Ben Westlund. In this HC, EHAP has addressed community concerns regarding the public health impact on current nearby residents from potential contaminants and dusts at the site. Community members have also expressed concerns about the public health implications of a proposed residential development on the site. Because this development may or may not occur, EHAP chose to focus this evaluation on current conditions and current land uses in the interest of communicating critical findings to the public in a timely manner. Should the proposed residential development occur in the future, EHAP may address the related public health concerns in a future HC.

Lower Bridge Mine is a 550+ acre diatomaceous earth (DE) strip mine located 5.5 miles west of Terrebonne, OR. Past activities at the site include DE mining and processing DE to form a type of crystalline silica (cristobalite) useful in filtration systems and metal castings. The mine site has also been used for asphalt mixing, sand and gravel mining, and hazardous waste storage.

Community concerns related to current public health issues at the site include:

- Residual contaminants in soil and groundwater from historical hazardous and radiological waste storage onsite
- Physical safety hazards related to dilapidated buildings and piles of scrap metal and scrap wood onsite
- Inhalation of dust from the site and the possibility that dust contains cristobalite

EHAP developed the conclusions, recommendations, and public health action plan in this health consultation based on information gathered during a site visit on July 2, 2008, a meeting with community members on August 13, 2008, evaluation of existing environmental data, and review of medical and toxicological literature.

Contact with soil and groundwater potentially affected by former hazardous and radiological waste storage on the site poses ***no apparent public health hazard*** under current use conditions. This is because soil and groundwater samples showed no contaminant levels above health-based screening levels. Also, recent radiological surveys found radiation levels to be the same as local background. Under current land use conditions, EHAP has not issued any recommendations related to soil or groundwater potentially affected by former hazardous and radiological waste.

Because limited physical barriers exist to prevent teenagers, unsupervised children, or others from trespassing on the site, dilapidated buildings and piles of scrap metal and scrap wood pose a ***public health hazard*** to trespassers. EHAP recommends that site owners remove these buildings and scrap wood and metal piles, ensure that they are structurally sound, or enhance efforts to physically restrict public access to these areas.

EHAP also recommends that adults keep away and that parents keep children off of the site, and away from these dilapidated structures.

Airborne dust from any source could cause short-term respiratory irritation such as sneezing, coughing, eye/nose/throat irritation, and difficulty breathing during dust storms. EHAP was unable to determine whether dust from the site could cause long-term health effects in nearby residents because existing air monitoring and crystalline silica (cristobalite) analysis data are insufficient in number. Therefore, EHAP has concluded that airborne dust from the site is an ***indeterminate public health hazard***. EHAP recommends that air monitoring be conducted near residences located downwind from the site to determine the particle size and average concentrations of dust in the air and to measure the amount of cristobalite in the dust.

Purpose and Health Issues

This health consultation (HC) was prepared by the Oregon Office of Environmental Public Health's Environmental Health Assessment Program (EHAP) in cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). In May 2008, Senator Westlund petitioned EHAP to assess the public health impacts of the Lower Bridge Mine on nearby residents. EHAP evaluated the potential health impacts of airborne dust composed of diatomaceous earth originating at the site, residual hazardous waste stored at the site, and physical safety hazards associated with dilapidated structures and alleged buried waste on the site.

It should be noted that the conclusions presented here are based on current uses and conditions on and around the site. Should the land use change in the future, particularly to residential use, EHAP would recommend that further environmental sampling and evaluation be conducted (see recommendations).

Background

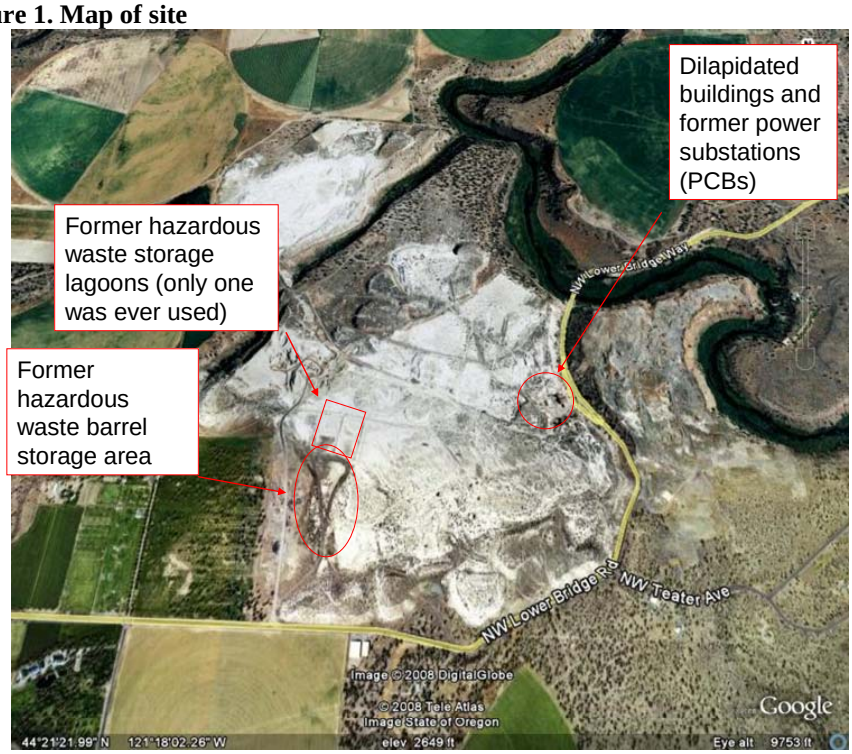
Site Description and History

Lower Bridge Mine is located 5.5 miles west of Terrebonne, Oregon on Lower Bridge Road (10000 and 70420 NW Lower Bridge Rd., Terrebonne, Oregon). The surrounding land is agricultural and rural residential (Figure 1). The nearest residences are approximately 0.5 miles away. Prevailing winds at Redmond Municipal Airport (approximately 12.5 miles southeast of the site) are from the south from September through March and from the west/northwest from April through August. However, residents report that more locally, winds tend to come from the west and follow the course of the Deschutes River Basin.

Starting in the early 1900's the site was strip-mined for diatomaceous earth (DE). For a 30 year period, the site was also used to process raw DE (composed mainly of amorphous silica) into a form of crystalline silica known as cristobalite. Two electrical power substations also existed on the site. Polychlorinated biphenyls (PCBs) were detected in the soil around one of the substations. In addition, hazardous and radiological waste was

stored on the site for a period of approximately 8 years. In the mid-1980's the Oregon Department of Environmental Quality (DEQ) oversaw the cleanup of the identified hazardous waste material.

Figure 1. Map of site



Site Visit

On July 2, 2008, EHAP staff visited the mine site. The site visit included a walk-through tour of the former DE processing area and associated structures (Figure 2). EHAP noted that the former DE processing building appeared dilapidated and observed evidence of frequent trespassing (graffiti, bonfire remains, bullet holes, vandalism, etc.). In the immediate vicinity of the former DE processing building, EHAP staff saw a scrap metal pile composed mainly of sheet metal and some metal piping (Figure 3), two scrap wood piles (Figure 2 in front of building), and an area of large discarded machinery parts (Figure 4). From now on the scrap metal pile and discarded machinery parts will be referred to collectively as "scrap metal."

Partial perimeter fencing locked gates at main access roads, and large boulders in strategic locations limited access by motor vehicles. "No Trespassing" signs surrounded the perimeter of the property, however, there were limited physical barriers to prevent pedestrians from entering the site.

During the site visit, EHAP staff also walked in some of the DE that covers the top-soil-stripped portion of the site. There was no wind during EHAP's visit, but it was evident that the fine, dry, powdery DE would very easily become airborne in moderate to high winds. EHAP also observed a watering pivot covering a large area of the top-soil-stripped

portion of the site. DEQ staff informed EHAP staff that this pivot had been put in place to suppress dust emissions from the site.

EHAP also observed the four rectangular waste storage lagoons that had been constructed to receive hazardous waste. EHAP noted the area where hazardous and radiological waste storage barrels had been kept. No hazardous materials or barrels were observed by EHAP staff, and the lagoons appeared empty except for sparse vegetation growing on the bottoms.

Figure 2. Old mine process building onsite (July 2, 2008; EHAP)

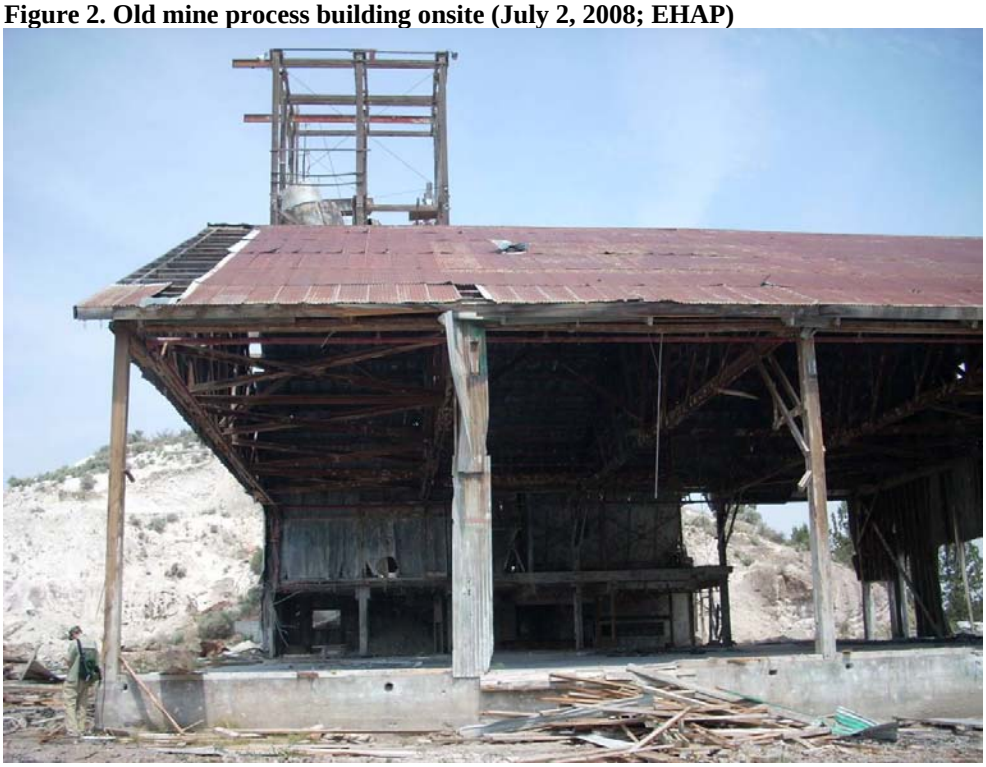
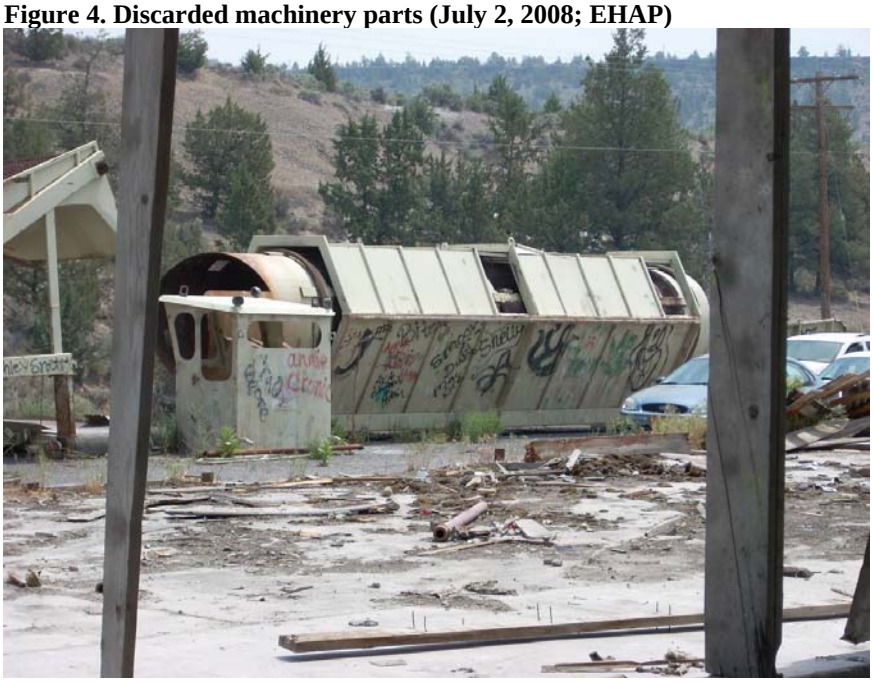


Figure 3. Scrap metal pile (July 2, 2008; EHAP)

Figure 4. Discarded machinery parts (July 2, 2008; EHAP)



Community Concerns

EHAP collects and documents community concerns as part of the health consultation process, in order to learn what is important to the affected communities, and gather information about local activity on or near the site. This section summarizes concerns that EHAP is able to address, as well as concerns that are beyond the scope/capacity of EHAP to address.

Concerns that are beyond EHAP's scope of work:

- Community members have voiced concerns that contaminants and activities at the mine site could degrade the surrounding natural wildlife habitat, including that of endangered fish species in the Deschutes River. We respectfully direct these questions to the appropriate agencies.
- EHAP has heard community members' desire for answers about land use and permitting issues, and we respectfully direct these questions to the appropriate agencies.
- Community members have expressed distrust of state agencies, site owners, and potential developers.
- Community members have expressed distrust of environmental sampling data. After a thorough review of the data collection and sampling methodologies, EHAP has found these data to be of adequate quality to support the findings presented in this report.
- Community members have alleged that there is additional, unidentified, buried waste on the site. One specific example is an allegation that copper waste has been buried or stored on the site. Neither DEQ nor EHAP have been able to identify any buried waste. In order for alleged buried waste to harm nearby residents, there would have to be a way for chemicals in the waste to move offsite to areas where people could be exposed to them. Buried waste cannot move in the wind, so migration into and through groundwater would be the pathway of most concern at the site. Because no contaminants were found at unsafe levels in either of the two groundwater aquifers underlying the site (See Discussion and Appendix B for more detail), it is unlikely that unsafe levels of chemical contaminants from alleged buried waste could move offsite to affect nearby residents.
- Community members have also alleged that there was a discrepancy between the number of hazardous waste storage barrels brought onto the site and those removed from the site during the 1980's clean-up effort. EHAP has verified that 691 barrels were removed to a landfill near Arlington, OR, and 106 (those containing radioactive waste) were removed to Hanford, totaling 797 barrels removed from the site[1]. EHAP has found no discrepancy in the number of barrels accepted on site and those removed.

Community concerns EHAP is able to address:

EHAP is able to address many of the health concerns expressed by the community. These concerns are listed briefly here and discussed in detail in the next section (see Discussion).

- Residual contaminants in soil and groundwater from historical hazardous and radiological waste storage onsite and from two former power substations onsite
- Physical safety hazards related to dilapidated buildings and scrap metal and scrap wood piles
- Inhalation of dust from the site and the possibility that the dust contains cristobalite

Concerns about dust inhalation seem to be of most concern to the most people. The community is concerned that dust from the site may contain crystalline silica (cristobalite) and that inhalation of this dust could lead to long-term health effects such as cancer and/or silicosis. Another concern expressed by the community in a public meeting on August 13, 2008 is that dust from the site may accumulate in their homes, prolonging exposure to cristobalite in the dust. Each of these concerns is discussed in more detail in the following section.

Discussion

This discussion is divided into subsections based on the various site concerns expressed by the community at Lower Bridge Mine. Each subsection describes the sources of existing environmental sampling data for the specific concern it addresses, and evaluates the quality of those data, including the identification of important data gaps. Finally, each subsection contains an analysis and explanation of the public health implications of each concern.

Hazardous and radiological waste storage and polychlorinated biphenyls (PCBs)

For an 8-year period ending with a clean-up action in 1983, hazardous waste (including radiological waste) was stored at the Lower Bridge Mine site. The majority of the waste was stored in barrels on the surface; however, one out of the four rectangular lagoons dug in the DE to store sludges did receive one shipment of an ink sludge material. In 1983, the responsible party removed the hazardous waste and conducted confirmatory sampling of the soils underlying the former waste storage areas.

The community has expressed concern that the two former power substations onsite could have been a source of PCB contamination. In April and May 2008, the areas around the two substations were sampled for PCBs. The responsible party, Pacific Corp., subsequently removed some contaminated soil and conducted confirmatory sampling to ensure no PCBs were left in the area.

<u>Soil sampling from former hazardous waste storage areas</u>

EHAP reviewed confirmatory sampling data collected in the mid-1980s during the hazardous waste clean-up. Surface soil samples were taken from under the area where barrels containing chromium, lead, PCBs, cyanide, and radioactive sand-casting sludges had been stored. A composite surface soil sample was also taken from the bottom of a lagoon that had been used to store hazardous ink sludges.

This sampling consisted of two composite samples of soil. One of these was taken from the bottom of the lagoon that was used to store hazardous ink sludge. The second soil sample was taken from under the former barrel storage pad. While these samples are limited in number, the locations are appropriate since they represent the “worst-case scenario.” In other words, if any of the hazardous waste from before the clean-up remained, these were the most likely locations to find evidence of these contaminants. Samples were analyzed for the contaminants listed in Table 1 in Appendix A. This list of chemicals includes all of the contaminants known or suspected to have been in the hazardous waste stored on the site.

EHAP compared the highest concentration of each contaminant found in the soil from both locations against ATSDR health-based comparison values for soil. These values assume daily exposure to contaminants over an entire lifetime. None of the contaminants exceeded ATSDR comparison values (See Appendix A Table 1). Based on these findings, EHAP concluded that contact with soil from the former hazardous waste storage areas poses ***no apparent public health hazard*** to surrounding residents under current land use conditions. DEQ issued a "No Further Action" for this work on January 29, 1985.

Radiological concerns

Some of the hazardous materials historically stored at the mine site contained radiological materials, so EHAP reviewed radiological survey data collected in March 2008 conducted by a third party contractor[2]. Radiation readings were taken at 13 locations in and around the former hazardous waste storage areas including the lagoons and former barrel storage pad. None of the gamma radiation readings from the former hazardous waste storage area exceeded local background levels. In addition to surveys onsite, EHAP staff surveyed the yards of two private residences for gamma radiation levels where fill from the mine site had been used for landscaping. EHAP found no radiological readings above local background at either of the residences during this July 2, 2008 survey. EHAP concluded that ***no apparent public health hazard*** associated with historical radiological waste exists at the Lower Bridge Mine site.

Polychlorinated Biphenyls (PCBs)

EHAP evaluated soil samples taken from two former power substations on the site for PCB concentrations in April and May 2008[3]. Two out of ten samples had PCB concentrations above health-based screening values. The contaminated soil was removed, and thirteen confirmatory samples were taken[4]. Following the soil removal, PCB concentrations did not exceed ATSDR health-based soil screening values[4]. Given the localized nature of and the small area affected by PCB contamination prior to removal, it is unlikely that PCBs could have migrated offsite in sufficient quantities to affect the health of local residents in the past or under current land use conditions. EHAP concluded that soil around the former power substations on the site poses ***no apparent public health hazard*** to nearby residents.

Potential Groundwater Contamination

There is a concern that hazardous wastes could have contaminated groundwater under the site and migrated into domestic wells used by nearby residents. EHAP evaluated groundwater sampling data collected and analyzed by third party, state-certified contractors and laboratories in March 2008 (Appendix A Tables 2 and Table 3). Samples were collected from two aquifers at different depths under the site (one sample from each aquifer). Data in Tables 2 and 3 in Appendix A are from the deeper aquifer, although they are representative of both aquifers which had very similar concentrations. Hydrological data for the area indicates that these are the only two aquifers under the mine site.

Chemicals tested represent a complete suite of contaminants commonly found at hazardous waste sites. The general categories of chemicals in this list include: metals,

nitrates, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polycyclic aromatic hydrocarbons (PAHs), pesticides, radionuclides, and PCBs. None of the contaminants measured exceeded drinking water screening comparison values, and most were not detectable. In the case of a few chemicals that were not detected, the detection limits were slightly higher than comparison values. However, these detection limits are close to comparison values, and comparison values are set 10 to 1000 times lower than levels that have been shown to cause health effects. EHAP concluded that drinking groundwater from the site poses ***no apparent public health hazard***. Because none of the contaminants in the groundwater directly under the mine exceeded safe levels, EHAP also concluded that migration of unsafe levels of contaminants offsite through groundwater was unlikely.

Physical safety hazards

During a site visit to Lower Bridge Mine, EHAP staff observed dilapidated buildings that appeared structurally unsound (Figure 2). EHAP staff noted that this area was frequented by trespassers, as evidenced by graffiti, residual fire pits, and garbage. EHAP staff also observed piles of scrap metal and scrap wood (Figures 3 and 4). There were locked gates on access roads, large rock barriers, partial perimeter fencing, and "No Trespassing" signs posted around the perimeters of the site. These barriers appeared effective in barring entry to motorized vehicles, however no physical barriers existed to effectively restrict access to trespassing pedestrians. People climbing on or around structures or scrap piles would be at risk of injury by falling, getting cut on sharp edges, or puncture wounds. EHAP concluded that these conditions pose a ***public health hazard*** to trespassers.

Airborne dust

The arid, windy conditions surrounding Lower Bridge Mine create a potential for airborne dust to be generated from this open strip mine. The formerly mined areas have no topsoil and sparse vegetative cover, allowing raw DE to easily become airborne and migrate in dust clouds offsite, as illustrated in Figure 5. Dust of any size and from any source, when inhaled, can cause respiratory irritation. Health effects of such exposure can include, sneezing, coughing, difficulty breathing, and eye/nose/throat irritation. These symptoms are usually short-term and resolve on their own once exposure to the airborne dust has stopped. Because DE is very absorbent, it may be especially irritating because of its ability to dry out the moist membranes on the insides of the nose, throat, and eyes. Airborne dust generated from the site or from the valley in general could cause these kinds of short-term respiratory irritation in residents, particularly during dust-storm events.

Figure 5. Dust storm at Lower Bridge Mine site (April 4, 2008; David Jenkins)

Cristobalite

Inhaled crystalline silica (cristobalite) can cause a debilitating respiratory disease called silicosis and also increase the risk for lung cancer [5, 6]. Cristobalite is considered a health hazard only under occupational conditions where people are exposed to more than 0.05 mg/m^3 for a full work week over 15-20 years [5, 6]. The community surrounding the mine site has expressed concern about residual cristobalite at the Lower Bridge Mine site related to the DE processing that occurred there for 30 years. Some have expressed concern that the dust may get into the air in sufficient concentrations to cause silicosis and increase the risk for lung cancer in nearby residents.

After evaluating the scientific literature on the subject and visiting the site [5-19], EHAP concluded that an increased incidence of silica-related lung diseases in residents near the mine site is unlikely. This is because the exposure to dust during periodic, even frequent, dust storms is quantitatively very different from sustained exposures averaging 40 hours/week over 15-20 years (conditions under which silicosis and silica-related lung cancer typically develop) [5, 6]. Based on current epidemiological studies of silicosis, EHAP finds it unlikely that sufficient quantities of respirable size crystalline silica particulate could become airborne and reach residents for sufficient periods of time to induce silicosis or silica-related lung cancer.

In May of 2006, DEQ collected a soil sample from the mine site. This sample contained 0.2% cristobalite, a concentration EHAP considers very safe. However, there has been no additional sampling of the exposed surface soils at the site. In October of 2006, DEQ collected six air samples from two downwind residences. Analysis of these samples is forthcoming at the time of this document's release. The results of this sampling will be incorporated into the final version of this report. EHAP concluded that cristobalite exposure poses an ***indeterminate public health hazard*** because the existing sampling data for cristobalite content in the soil and air at and around the mine are insufficient in number. EHAP has made recommendations to fill these data gaps (see recommendations on pages 14 & 15).

Other Respirable Dust

Inhaled airborne dust, regardless of cristobalite content or source, can cause long-term health effects such as asthma, chronic bronchitis, chronic obstructive pulmonary disorder (COPD), and heart problems [20-38]. The ability of airborne dust to cause these long-term health effects depends on whether the dust particles are small enough, concentrations are high enough, and people are exposed for long enough. Generally, most of the dust particles that are visible in the air during high-wind conditions are not small enough to go deep into the lungs and cause these long-term health effects [39]. For healthy individuals, the amount of respirable particles (particles small enough to go deep into the lungs and cause long-term health effects) generated during dust storms is not sufficient to cause long-term health effects. However, people with pre-existing conditions, such as asthma, COPD, heart problems, and other respiratory diseases, may be sensitive to lower concentrations of respirable particles[27]. Children may also be more sensitive to respirable particles because they breathe more air per body size than adults and because their lungs are still developing[27]. Because the concentration and size of dust particles in the air surrounding the site are unknown, EHAP concluded that airborne dust from the mine or other parts of the valley poses an ***indeterminate public health hazard*** for increasing risk for long-term health effects**.**

Children's Health Considerations

EHAP and ATSDR recognize that infants and children may be more vulnerable to exposures than adults in communities faced with contamination of their air, water, soil, or food. This vulnerability is a result of the following factors:

- Children are more likely to play outdoors and bring food into contaminated areas.
- Children are shorter, resulting in a greater likelihood to breathe dust, soil, and heavy vapors close to the ground.
- Children are smaller, resulting in higher doses of chemical exposure per body weight.
- The developing body systems of children can sustain permanent damage if toxic exposures occur during critical growth stages.

Because children depend on adults for risk identification and management decisions, ATSDR is committed to evaluating their special interests at sites such as Lower Bridge Mine where their behaviors or sensitivity to contaminants could put them at greater risk. Because children's lungs are still developing and because they inhale a larger volume of air per body size than adults, children could potentially be more sensitive to contaminants in the air.

Older children and teenagers are attracted to dilapidated buildings and piles of scrap metal and scrap wood as places to play and congregate. Old structures on the mine property could be dangerous if children play on, in, or around them. Children and teenagers are the population most susceptible to physical injury and harm from the dilapidated structures on the site. Also, teens and children entering the site will have

much greater exposure to dust. Parents and mine owners should take special care to prevent teens and unsupervised children from entering the site.

Conclusions

Soil and groundwater from Lower Bridge Mine currently pose ***no apparent public health hazard*** to nearby residents under current land use conditions. This is because none of the contaminants measured in areas where hazardous waste was stored or where PCB contamination occurred exceed ATSDR comparison values for soil or groundwater. Radiological surveys found no readings above local background levels.

Dilapidated buildings and piles of scrap metal and scrap wood pose a ***public health hazard (physical hazard)*** to trespassers. While "No Trespassing" signs are posted around the perimeter and barriers block access to motorized vehicles onto the site, limited physical barriers are in place restrict pedestrian access. People could access these dangerous areas and become injured.

Airborne ***dust from any source may cause short-term respiratory irritation*** such as sneezing, coughing, eye/nose/throat irritation, bloody noses, and difficulty breathing. Raw DE may be especially irritating because it is extremely absorbent, and larger particles trapped in the nose and throat could dry out membranes.

EHAP does not expect inhaled dust from Lower Bridge Mine to cause silicosis or lung cancer because the concentration of crystalline silica in the air is likely too low to cause these health effects in nearby residents. However, because existing data is insufficient, EHAP is unable to conclude whether inhalation of dust from Lower Bridge Mine could cause silicosis or lung cancer (***indeterminate public health hazard***).

EHAP is unable to determine whether other long-term health effects of airborne dust from the site and other sources are likely (***indeterminate public health hazard***). This is because data about the size and concentration of dust particles in the air that residents breathe is insufficient.

Recommendations

In order to ensure the public health and safety of current, nearby residents, EHAP recommends that site owners take the following actions:

- Remove dilapidated structures from site or take measures to ensure that they are structurally sound
- Remove scrap metal and scrap wood from site
- As an alternative to the previous two recommendations, enhance existing physical controls to restrict public access, including pedestrian access, to the site
- Continue dust suppression efforts, and include dust suppression in planning any future activity at the site

- Sample surface soil on site for crystalline silica content using a sampling plan approved by EHAP
- Monitor air for respirable particulate ($PM_{2.5}$) using a sampling plan approved by EHAP. This sampling plan should provide for:
    - Air monitoring stations near some affected homes
    - Analysis appropriate to determine the percentage of respirable crystalline silica (cristobalite)

If future land-use zoning for the Lower Bridge Mine site changes to residential, EHAP recommends that site owners take additional steps:

- Join DEQ's voluntary cleanup program
- Consult with EHAP in developing a comprehensive site sampling plan
- Take measures to suppress dust emissions generated during any potential disturbance of on-site soils
- Develop and implement a plan for long-term dust suppression with approval from EHAP

Nearby residents can take steps to protect themselves and their families from potential health impacts. Specifically:

- Stay off of mine property and away from dilapidated structures and scrap metal piles
- Keep children and teenagers off of the mine site and away from dilapidated structures and scrap metal piles
- Take care to close doors and windows when visible dust clouds approach homes
- Remove shoes before entering homes to reduce the amount of dust brought into the house from outdoors
- Remove outer-wear such as coats and jackets or outdoor work clothes to avoid carrying additional dust into the house
- Clean with wet methods or vacuum with HEPA filtered units

Public Health Action Plan

The Public Health Action Plan ensures that the public health consultation identifies public health risks along with providing a plan of action designed to reduce and prevent adverse health effects from exposure to hazardous substances in the environment. This plan includes a description of actions that will be taken by EHAP in collaboration with other agencies to pursue the implementation of the recommendations outlined in this document.

Public health actions that have been implemented to date:

- EHAP conducted a site visit on July 2, 2008 which included a walk-through of the site itself and a meeting with local residents to collect community concerns.
- July 2, 2008, EHAP took gamma radiation readings in homeowners' yards where landscaping fill originated on the mine site
- EHAP hosted a public meeting on August 13, 2008 to collect additional community concerns and share initial ideas about existing data.
- EHAP released this Public Health Consultation on October 15, 2008.

Public health actions that will be implemented in the future:

- EHAP will host a second public meeting to present the findings of this report and answer the public's questions regarding the findings.
- EHAP will be available to provide input on future air monitoring and sampling plans generated by mine owners, and potential developers to ensure that data collected from such sampling will be useful in making public health determinations.
- EHAP will be available to evaluate the public health implications of any new environmental sampling data as it becomes available.
- The "indeterminate public health hazard" designation for air particulate will be revised based on the new sampling data (mentioned above) as it becomes available.
- After the public comment period for this report has ended, EHAP will address those comments in the final version of the report.
- EHAP will be available to write additional health consultations based on future data as the need arises.

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Appendix A. Soil sampling data

Legend for Table 1
ppm = Parts per million
COPC = Contaminant of potential concern
EMEG = Environmental Media Evaluation Guide (ATSDR)
RMEG = Reference dose Media environmental Guide (ATSDR)
SSL = soil screening level (EPA)
CREG = Cancer risk evaluation guide (ATSDR)
PRG = Preliminary remediation goal (EPA)
'<' = Indicates contaminant was not detected. Number indicates lower detection limit.
'---' = Indicates that no comparison value has been established for contaminant

Table 1. Soil sampling from under hazardous waste storage lagoon (1984)

Chemical	Concentration (ppm)	Comparison Value (ppm)	Comparison Value Source	COPC?	Explanation
Chromium	67	200	RMEG	No	Concentration is below CV
Lead	160	400	SSL	No	Concentration is below CV
Total PCB	0.68	1	EMEG	No	Concentration is below CV
Chloromethane	<0.01	1.7	PRG	No	Concentration is below CV
Bromomethane	<0.01	70	RMEG	No	Concentration is below CV
Vinyl Chloride	<0.01	0.5	CREG	No	Concentration is below CV
Chloroethane	<0.01	220	PRG	No	Concentration is below CV
Methylene Chloride	<0.01	90	CREG	No	Concentration is below CV
Trichlorofluoromethane	<0.01	20000	RMEG	No	Concentration is below CV
1,1-Dichloroethylene	<0.01	500	EMEG	No	Concentration is below CV
1,1-Dichloroethane	<0.01	16000	PRG	No	Concentration is below CV
Trans-Dichloroethylene	<0.01	1000	RMEG	No	Concentration is below CV
Chloroform	<0.01	500	EMEG	No	Concentration is below CV
1,2-Dichloroethane	<0.01	8	CREG	No	Concentration is below CV

Chemical	Concentration (ppm)	Comparison Value (ppm)	Comparison Value Source	COPC?	Explanation
1,1,1-Trichlorethane	<0.01	100000	RMEG	No	Concentration is below CV
Carbon Tetrachloride	<0.01	5	CREG	No	Concentration is below CV
Bromodichloromethane	<0.01	10	CREG	No	Concentration is below CV
1,2-dichloropropane	<0.01	5000	EMEG	No	Concentration is below CV
cis-1,3-Dichloropropene	<0.01	7	CREG	No	Concentration is below CV
Trichloroethylene	<0.01	1.6	PRG	No	Concentration is below CV
Benzene	<0.01	10	CREG	No	Concentration is below CV
Dibromochloromethane	<0.01	8	CREG	No	Concentration is below CV
1,1,2-Trichloroethane	<0.01	10	CREG	No	Concentration is below CV
trans-1,3-Dichloropropene	<0.01	7	CREG	No	Concentration is below CV
2-Chloroethyl Vinyl Ether	<0.01	---	---	No	Not detected
Bromoform	<0.01	90	CREG	No	Concentration is below CV
1,1,2,2-Tetrachloroethane	<0.01	4	CREG	No	Concentration is below CV
1,1,2,2-Tetrachloroethylene	<0.01	500	RMEG	No	Concentration is below CV
Toluene	<0.01	1000	EMEG	No	Concentration is below CV
Chorobenzene	<0.01	1000	RMEG	No	Concentration is below CV
Ethyl Benzene	<0.01	5000	RMEG	No	Concentration is below CV
1,3-Dichlorobenzene	<0.01	1000	EMEG	No	Concentration is below CV
1,2-Dichlorobenzene/1,4-Dichlorobenzene	<0.01	4000	EMEG	No	Concentration is below CV

Appendix B. Groundwater sampling

Legend for Table 2

ppb = Parts per billion
COPC = Contaminant of potential concern
EMEG = Environmental Media Evaluation Guide (ATSDR)
RMEG = Reference Dose Media Evaluation Guide (ATSDR)
CREG = Cancer Risk Evaluation Guide (ATSDR)
PRG = Preliminary Remediation Goal (EPA)
LTHA = Lifetime Health Advisory for drinking water (EPA)
MCL = Maximum Contaminant Level for drinking water (EPA)
'<' = Indicates that contaminant was not detected. Number is the lower detection limit.
'---' = No comparison value exists for contaminant

Table 2. Groundwater sampling from well at Lower Bridge Mine (2008)

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
Nitrate	630	20,000	RMEG	No	Concentration is below CV
Sulfate	3710	250000	MCL	No	Concentration is below CV
Cyanide	<20	200	RMEG	No	Concentration is below CV
Mercury	<1	2	MCL	No	Concentration is below CV
Iron	70	26000	PRG	No	Concentration is below CV
Silver	<10	50	RMEG	No	Concentration is below CV
Sodium	12600	---		No	Non-toxic
Zinc	<20	3000	EMEG	No	Concentration is below CV
Aluminum	<200	10,000	EMEG	No	Concentration is below CV
Calcium	9790	---		No	Non-toxic
Antimony	<3	4	EMEG	No	Concentration is below CV
Arsenic	<5	3	EMEG	No	Concentration within margin of safety with CV
Barium	<100	2000	EMEG	No	Concentration is below CV
Beryllium	<0.2	20	EMEG	No	Concentration is below CV

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
Cadmium	<1	2	EMEG	No	Concentration is below CV
Chromium	<20	100	MCL	No	Concentration is below CV
Copper	<10	100	RMEG	No	Concentration is below CV
Lead	<2	15	MCL	No	Concentration is below CV
Manganese	<10	500	RMEG	No	Concentration is below CV
Nickel	<20	200	RMEG	No	Concentration is below CV
Selenium	<3	50	EMEG	No	Concentration is below CV
Thallium	<1	2	MCL	No	Concentration is below CV
Uranium	<1	30	MCL	No	Concentration is below CV
Dibromochloropropane	<0.02	0.2	MCL	No	Concentration is below CV
Ethylene dibromide	<0.01	0.02	CREG	No	Concentration is below CV
Chlordane	<0.04	0.1	CREG	No	Concentration is below CV
Toxaphene	<0.1	10	EMEG	No	Concentration is below CV
Aroclor-1016 (PCB)	<0.02	0.7	RMEG	No	Concentration is below CV
Aroclor-1221 (PCB)	<0.02	0.2	EMEG	No	Concentration is below CV
Aroclor-1232 (PCB)	<0.02	0.2	EMEG	No	Concentration is below CV
Aroclor-1242 (PCB)	<0.02	0.2	EMEG	No	Concentration is below CV
Aroclor-1248 (PCB)	<0.02	0.2	EMEG	No	Concentration is below CV
Aroclor-1254 (PCB)	<0.02	0.2	EMEG	No	Concentration is below CV
Aroclor-1260 (PCB)	<0.02	0.2	EMEG	No	Concentration is below CV

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
2,4-D	<0.2	100	RMEG	No	Concentration is below CV
2,4,5-TP	<0.4	80	RMEG	No	Concentration is below CV
Dinoseb	<0.4	10	RMEG	No	Concentration is below CV
Pentachlorophenol	<0.08	0.3	CREG	No	Concentration is below CV
Picloram	<0.2	2600	PRG	No	Concentration is below CV
Dalapon	<2	1100	PRG	No	Concentration is below CV
Alachlor	<0.4	100	RMEG	No	Concentration is below CV
Atrazine	<0.2	30	EMEG	No	Concentration is below CV
Benzo(a)pyrene	<0.04	0.2	MCL	No	Concentration is below CV
gamma-BHC (Lindane)	<0.02	0.1	EMEG	No	Concentration is below CV
Bis-(2-ethylexyl) adipate	<1	30	CREG	No	Concentration is below CV
Bis(2-ethylhexyl) pthalate	<1	4.8	PRG	No	Concentration is below CV
Endrin	<0.02	3	EMEG	No	Concentration is below CV
Heptachlor	<0.04	1	EMEG	No	Concentration is below CV
Heptachlor epoxide	<0.02	0.1	RMEG	No	Concentration is below CV
Hexachlorobenzene	<0.1	0.5	EMEG	No	Concentration is below CV
Hexachlorocyclopentadiene	<0.2	60	RMEG	No	Concentration is below CV
Methoxychlor	<0.2	50	RMEG	No	Concentration is below CV
Simazine	<0.1	50	RMEG	No	Concentration is below CV
Carbofuran	<1	50	RMEG	No	Concentration is below CV

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
Oxamyl	<2	300	RMEG	No	Concentration is below CV
Glyphosate	<10	1000	RMEG	No	Concentration is below CV
Endothall	<10	200	RMEG	No	Concentration is below CV
Diquat Dibromide	<0.4	20	MCL	No	Concentration is below CV
Dicamba	<0.5	300	RMEG	No	Concentration is below CV
Aldrin	<0.1	0.3	EMEG	No	Concentration is below CV
Butachlor	<0.1	---		No	Not detected
Dieldrin	<0.1	0.5	EMEG	No	Concentration is below CV
Metolachlor	<0.2	2000	RMEG	No	Concentration is below CV
Metribuzin	<0.1	300	RMEG	No	Concentration is below CV
Propachlor	<0.1	100	RMEG	No	Concentration is below CV
Aldicarb	<2	10	RMEG	No	Concentration is below CV
Aldicarb sulfone	<1	10	RMEG	No	Concentration is below CV
Aldicarb sulfoxide	<3	4	MCL	No	Concentration is below CV
Carbaryl	<4	1000	RMEG	No	Concentration is below CV
3-Hydroxycarbofuran	<4	---		No	Not detected
Methomyl	<4	300	RMEG	No	Concentration is below CV
1,1,1-Trichloroethane	<0.5	20000	RMEG	No	Concentration is below CV
1,1,2-Trichloroethane	<0.5	0.6	CREG	No	Concentration is below CV
1,1-Dichloroethylene	<0.5	90	EMEG	No	Concentration is below CV

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
1,2,4-Trichlorobenzene	<0.5	100	RMEG	No	Concentration is below CV
1,2-Dichlorobenzene	<0.5	3000	EMEG	No	Concentration is below CV
1,2-Dichloroethane	<0.5	0.4	CREG	No	Concentration within margin of safety with CV
1,2-Dichloropropane	<0.5	900	EMEG	No	Concentration is below CV
1,4-Dichlorobenzene	<0.5	700	RMEG	No	Concentration is below CV
Benzene	<0.5	0.6	CREG	No	Concentration is below CV
Carbon Tetrachloride	<0.5	0.3	CREG	No	Concentration within margin of safety with CV
Chlorobenzene	<0.5	200	RMEG	No	Concentration is below CV
cis-1,2-Dichloroethylene	<0.5	3000	EMEG	No	Concentration is below CV
Ethyl Benzene	<0.5	1000	RMEG	No	Concentration is below CV
Methylene Chloride	<0.5	5	CREG	No	Concentration is below CV
Styrene	<0.5	2000	RMEG	No	Concentration is below CV
Tetrachloroethylene	<0.5	100	RMEG	No	Concentration is below CV
Toluene	<0.5	200	EMEG	No	Concentration is below CV
trans-1,2-Dichloroethylene	<0.5	200	RMEG	No	Concentration is below CV
Trichloroethylene	<0.5	1.7	PRG	No	Concentration is below CV
Vinyl Chloride	<0.5	30	EMEG	No	Concentration is below CV
Xylenes	<1.5	2000	EMEG	No	Concentration is below CV

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
1,1,1,2-Tetrachloroethane	<0.5	1	CREG	No	Concentration is below CV
1,1,2,2-Tetrachloroethane	<0.5	0.2	CREG	No	Concentration within margin of safety with CV
1,1-Dichloroethane	<0.5	2.4	PRG	No	Concentration is below CV
1,2,3-Trichloropropane	<0.5	60	RMEG	No	Concentration is below CV
1,3-Dichlorobenzene	<0.5	200	EMEG	No	Concentration is below CV
1,3-Dichloropropane	<0.5	730	PRG	No	Concentration is below CV
2,2-Dichloropropane	<0.5	900	EMEG-for 1,2-Dichloropropane	No	Concentration is below CV
2-Chlorotoluene	<0.5	200	RMEG	No	Concentration is below CV
4-Chlorotoluene	<0.5	100	LTHA	No	Concentration is below CV
Bromobenzene	<0.5	23	PRG	No	Concentration is below CV
Bromodichloromethane	<0.5	0.6	CREG	No	Concentration is below CV
Bromoform	<0.5	4	CREG	No	Concentration is below CV
Bromomethane	<0.5	10	RMEG	No	Concentration is below CV
Chloroethane	<0.5	21000	PRG	No	Concentration is below CV
Chloroform	<0.5	100	EMEG	No	Concentration is below CV
Chloromethane	<0.5	30	LTHA	No	Concentration is below CV
cis-1,3-Dichloropropene	<0.5	0.4	CREG	No	Concentration within margin of safety with CV
Dibromochloromethane	<0.5	0.4	CREG	No	Concentration within margin of safety with CV

Chemical	Concentration (ppb)	Comparison Value (ppb)	Comparison Value Source	COPC?	Explanation
Dibromomethane	<0.5	370	PRG	No	Concentration is below CV
trans-1,3-Dichloropropene	<0.5	0.4	CREG	No	Concentration within margin of safety with CV

Table 3. Groundwater sampling radionuclide results (2008)

Radionuclides	Radiation (pCi/L)	MCL pCi/L
Gross Alpha	2.4	15
Gross Beta	0.54	50
Radium 226	<0.07	---
Radium 228	1.3	---
Radium 226+228	1.2	5
Uranium activity	<0.7	20

MCL = Maximum contaminant level (EPA standard)
pCi/L = Pico Curies per liter
'<' = Indicates that no activity was detected. Number indicates detection limit.
'---' = No MCL exists for the two Radium isotopes alone