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MEMORANDUM REGARDING REMEDIAL ACTION LEVEL FOR LEAD AT SITE 15 SKEET RANGE BASED ON CHILDHOOD ACUTE EXPOSURE TO SOIL NAS CECIL FIELD FL
7/1/2002
U S EPA REGION IV

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION 4

61 Forsyth Street
Atlanta, Georgia 30303-3104

July 1, 2002

4WD-OTS

MEMORANDUM

SUBJECT: Remediation Action Level for Lead at Site 15 Skeet Range based on Childhood Acute Exposure to Soil

FROM: Ted W. Simon, PhD, DABT
Toxicologist
Office of Technical Services

TO: Dawn Taylor
RPM, FFB

CC: Elmer W. Akin,
Chief, OTS

The purpose of this memo is to present a Remediation Action Level (RAL) for lead in soil at Site 15 skeet range. This value will be used as a "not-to-exceed" level for consideration of soil removal.

Summary

Adverse neurodevelopmental effects of lead in children are typically associated with exposures occurring over a long period of time. Lead levels in contaminated media which are protective for these subtle neurological effects may not be appropriate when considering an acute or short term health risk. Hence, the purpose of this memo is to provide a value for a lead concentration in soil that would be protective of a child experiencing acute exposure to lead.

☹ *The Remediation Action Level which represents a protective "not-to-exceed" level for an acute exposure scenario at Site 15 skeet range is* ***3600 mg/kg****.*

Proposed remediation plans for Site 15 should include the consideration of cleanup of all lead concentrations above 3600 mg/kg and ensuring that the average concentration within the recreational exposure unit is below the value previously developed by the Navy considering the adult receptor in a passive recreational scenario. My understanding is that this PRG based on adult recreational exposure is 3281 mg/kg to be applied as an average over the entire 85-90 acres

of Site 15. Per this memo, lead concentrations at any location within Site 15 should not exceed 3600 mg/kg.

The IEUBK Model and the Blood Lead Concentration for Acute Exposure

EPA has developed a sophisticated computer model for assessing risk of exposure to lead in a chronic scenario. The Integrated Exposure Uptake Biokinetic (IEUBK) Model for childhood exposure can be used as a predictor of blood lead levels (PbB) in children.

The Centers for Disease Control and Prevention (CDCP) have issued tiered guidelines on appropriate responses at various PbB values. At blood lead levels between 10 - 20 ug/dl, the CDCP guidelines indicate that a health threat is not immediate, but children should receive nutritional and educational intervention to reduce their blood lead levels. At the next level where blood leads are between 20 - 44 ug/dl, the CDCP recommends evaluation and remediation. Above 44 ug/dl, the CDCP recommends pharmacologic intervention.

Based on the CDCP tiered guidelines, EPA has chosen 10 ug/dl as the "bright line" for lead risk assessment in the chronic exposure scenario.

☹ *For Site 15, **30 ug/dl** is the blood lead level chosen to represent the level of concern in an acute scenario.*

The value of 30 ug/dl is the approximate midpoint of the range over which the CDC recommends action other than education or nutrition, but also lower than the level at which chelation therapy is recommended. In previous conversations with Dr. Steve Roberts, the value of 60 ug/dl was considered as appropriate for assessment of the effects of acute exposure to lead. The value of 30 ug/dl is only half the level previously discussed.

Use of the IEUBK Model as a Surrogate for Acute Exposure

Default values were used with the IEUBK model to calculate a soil concentration of lead that would correspond to a blood lead level of 30 ug/dl. Because of the lack of a risk assessment methodology to obtain an estimate of the threshold for acute effects of lead, the IEUBK model and a increased target blood lead level were used as a surrogate for acute exposure. Children younger than 3 years are not expected to be able to access Site 15. Hence, the IEUBK model was used between the ages of 3 and 6. All model inputs were the default values except for the soil lead concentration between ages 3 and 6. Lead concentration in indoor dust was assumed to be 200 mg/kg. The model was run iteratively changing the soil lead concentration. At 3600 mg/kg, 95% of the hypothetical child population assumed by the model had predicted blood lead levels below 30 ug/dl.

The IEUBK Model has been used in a similar fashion to develop surrogate values for acute exposure at other sites. 3200 mg/kg was the level developed for the Walkerville Site in Butte, Montana and 3000 mg/kg was the level developed for the Eureka Mills Site in Eureka, Utah. The value of 3600 developed here is quite similar to those used at the western sites. The higher surrogate acute level for Site 15 is most likely due to the low levels of lead in indoor dust in residences in north Florida by contrast to the sites where soil/dust lead is ubiquitous due to the long history of mining activities.

Memoranda presenting the values for the Walkerville and Eureka sites are attached in electronic format.

Other Efforts to Develop a Threshold Value for Acute Exposure to Lead

Dr. Steve Roberts should be commended for his efforts to develop a scientifically defensible threshold value for acute exposure to lead in soil. Dr. Roberts, Dr. Joel Pounds, Dr. Gary Diamond and myself have spent considerable time discussing the issues and possible tools to use for this evaluation. An attempt has been made using the Leggett model.[1] However, the Leggett model in its current form may not be an appropriate tool. If a reasonable value for soil lead based on acute exposure can be developed by Dr. Roberts within the schedule for a remedial decision at Site 15, then this value should be strongly considered. Otherwise, the surrogate value of 3600 mg/kg proposed above should be used for a not-to-exceed level for lead in soil at Site 15.

Please let me know if you need further help.

T.W. Simon/tws:4WD-OTS:28642/07/19/02/A:\DISK14\JUL02\ACUTE_15.WPD

[1]Pounds JG, Leggett RW (1998) The ICRP Age-Specific Biokinetic Model for Lead: Validations, Empirical Comparisons and Explorations. Env Hlth Perspec 106(6), 1505-1512.

ATTACHMENT 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 500
DENVER, CO 80202-2466

13 February 2001

Ref: 8EPR-PS

MEMORANDUM

SUBJECT: Short Term and Acute Risks to Health of Residents Exposed to Lead Contamination at the Walkerville site in Butte, Montana

FROM: Susan Griffin, PhD, DABT
Regional Toxicologist
Program Support Group

TO: Joyce Ackerman
On-Scene Coordinator
Emergency Response Team

This memorandum is in response to your request for an assessment of potential acute or short term health risks to residents in the Walkerville area of the Butte Montana NPL site, and appropriate action levels to address those risks. The Silver Bow Creek/ Butte Area NPL site is located in southwestern Montana and includes the towns of Butte and Walkerville. Butte has been an important mining, milling, and smelting district for copper since the 1890's, and has been the site of gold and silver mining and smelting also. The Walkerville neighborhood, located within Butte, is a residential area with over 300 homes. Elevated levels of lead have been detected in outdoor soil and indoor dust at Walkerville. Elevated levels of lead have been detected in interior and exterior paint. Residents at the site could be expected to come into direct contact with contaminated soil and indoor dust via incidental ingestion, inhalation of particulates, and dermal contact. Residents could also be exposed to lead in house paint via direct ingestion of paint chips or via disintegration of paint chips into housedust.

Based on the concentrations of lead found in the soil and indoor dust samples, and our knowledge of the adverse short term and lifetime effects associated with lead exposure, the contaminated soils/dust at this site may pose an acute or short term health risk to the residents. Long term risks from lead and arsenic have been evaluated previously, and are being addressed under other removal actions in Butte. A final resolution of all human health risks for the Butte and Walkerville area are planned for the upcoming Record of Decision. I would suggest that immediate steps be taken to minimize direct exposure to individuals who may come into contact with surficial soils containing lead concentrations

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greater than approximately 3200 ppm and indoor dust with levels greater than 1200 ppm. The lead-based paint may currently be, or could be in the future, a source of contamination to the indoor house dust.

Environmental Data Evaluation

During the summer of 2000, EPA's Emergency Response Team sampled approximately 240 homes in the Walkerville area for outdoor soil, indoor dust, attic dust, basement soils, and lead-based paint. The samples were analyzed for lead, arsenic, and mercury. Indoor air samples were also analyzed for mercury. The mercury and arsenic data will be not be discussed here, but will be discussed in detail in the Human Health Risk Assessment which looks at long term health risks. A summary of the lead results are provided below.

TABLE 1

	Soil (ppm)	Indoor dust (ppm)	Attic dust (ppm)	Basement soil (ppm)
Lead	Average 1284 Range (33-6230)	Average 645 Range (31-4900)	Average 3290 Range (51-15,200)	Average 1590 Range (30-19,000)

Exposure to Lead

Lead exposure to children is known to cause central nervous system effects resulting in learning disabilities, hearing impairment, and behavioral difficulties. Children are particularly susceptible to the effects of lead due to: 1) the tendency for children less than the age of 7 to absorb lead much more efficiently than adults; 2) the particular susceptibility of the developing brain to the toxicological effects of lead, and 3) the tendency for children to be more highly exposed to sources of lead such as dust, soil and paint due to exploratory behavior. Subtle signs of lead-induced effects begin to be apparent at blood lead levels of 10 ug/dl or even lower, with effects becoming clearer by 30 to 40 ug/dl. The USEPA recommends a blood lead level of 10 ug/dl as the level of concern for these neurological effects. Furthermore, the USEPA Superfund program recommends that exposures to soil lead levels should be limited such that a child would have an estimated risk of no more than 5% of exceeding a 10 ug/dl blood lead level. This estimate is developed using the EPA's computer model, the Integrated Exposure Uptake Biokinetic (IEUBK) model.

These adverse effects of lead are typically associated with exposures which occur over a long period of time and lead levels in contaminated media which are protective for these subtle neurological effects may not be indicative of an acute or short term health risk. The Centers for Disease Control and Prevention (CDCP) have issued tiered guidelines on appropriate environmental and medical responses to take for given blood lead levels within a population. At blood lead levels between 10 - 20 ug/dl, the CDCP guidelines indicate that

a health threat is not immediate, but children should receive nutritional and educational intervention to reduce their blood lead levels. At the next level where blood leads are between 20 - 44 ug/dl, the CDCP recommends environmental evaluation and remediation, and pharmacologic treatment if necessary. Health concerns within this category could be interpreted as requiring immediate action to reduce children's blood lead levels. For the Walkerville area, an action level for addressing acute or short term health risks from exposure to contaminated soil and dust was developed based on the IEUBK model's predicted level at which there is no more than a 5% probability that an individual child's blood lead level will exceed 20 ug/dl.

The site-specific exposure assumptions for bioavailability, soil to dust relationship, and geometric standard deviation described in EPA's 1993 Baseline Risk Assessment for the Priority Soils Operable Unit, were used in the IEUBK model to calculate an action level of 3200 ppm for an acute or short term health risk from lead in soil and housedust. All other exposure inputs were model default values. Since the lead concentrations in some homes at the Walkerville site exceed 3200 ppm, it is plausible that unacceptable short term exposures could occur and immediate action may be required to mitigate those exposures. Keep in mind that this action level was developed based on children less than 7 years of age who are the most sensitive members of the population to adverse effects of lead. This level in soil should be adequately protective for adults and older children.

A separate but potentially more troubling issue is exposure of young children to lead in indoor house dust. The action level for soil discussed above was estimated based on the assumption that the lead concentration in indoor dust is only 1/4 of the lead concentration in outdoor soil. In the 1993 EPA Baseline Risk Assessment for the Priority Soils Operable Unit, soil and dust concentrations of lead were measured in the Butte community. On average, the lead in indoor dust was only 1/4 the concentration of the lead in outdoor soil. However, this may not be the case in every individual home. Some homes may have much higher levels of lead in indoor dust as a result of increased transport of soil into the home, atmospheric deposition of lead, or the presence of other lead sources such as lead-based paint. So even if yards soils surrounding a home have lead levels below the 3200 ppm level, the amount of lead in indoor dust may be elevated enough to present a health risk. Since younger children spend much more time indoors than outside (especially in colder climates), and since lead in house dust is typically more bioavailable than lead in soil, it would not be inappropriate to remediate indoor dust as a health protective measure. My suggestion would be to cleanup interior dust where lead levels exceed 1200 ppm.

Biological Data Evaluation

Biomonitoring data is also available from two sources. In 1999, the Butte Silver Bow Health Department conducted blood lead testing which included 35 children in the Walkerville/Centerville area of Butte. Eleven of those children were 1-5 years of age and had blood lead levels which ranged from 2-13 ug/dl. Twenty four of those children were over 5 years of age and had blood lead levels ranging from 1 - 9 ug/dl. The USEPA recommends a blood lead level of 10 ug/dl as a level of concern for subtle neurological effects. Small exceedences of the 10 ug/dl level, however, should not be considered a cause

for immediate alarm. The Centers for Disease Control and Prevention (CDCP) have issued tiered guidelines on appropriate environmental and medical responses to take for given blood lead levels within a population. At blood lead levels between 10-14 ug/dl, the CDCP guidelines indicate that the health threat is not immediate, but that community wide prevention activities, such as education, outreach, and prevention planning, should begin.

In the summer of 2000, EPA worked with St. James Hospital to offer screening for lead, arsenic, and mercury to residents of Walkerville. To date, seven adults volunteered for the testing. None of the adults exceeded levels of concern for any of these metals.

The biological data indicates that some children in the Walkerville area have slightly elevated levels of lead which should be addressed at some point in the future, however the levels are not consistent with a child requiring immediate environmental or medical evaluation. It is important to note that the sample size of 35 children and 7 adults is small and caution is urged when extrapolating to the entire area of Walkerville.

Arsenic

Risks associated with arsenic exposure were evaluated in the Human Health Baseline Risk Assessment for the Butte Priority Soils Operable Unit (BPSOU), and other removal actions and/or the final BPSOU ROD will address long term arsenic risks. There was one home, however, where soil arsenic levels were approximately 3100 ppm. At previous Emergency Response removal actions in Fairfield (Manning Canyon) and Stockton (Jacob's Smelter), Utah the removal program has used an action level of 500 ppm to be protective of short term health risks. Remediation of the home in Walkerville with 3100 ppm arsenic would be consistent with previous removal actions conducted by EPA Region 8.

Mercury

Risks associated with mercury exposure will be evaluated in the Human Health Risk Assessment for the Walkerville area. According to EPA's IRIS database, neurological effects such as hand tremors and memory disturbances have been observed in workers in occupational settings at average mercury vapor concentrations of 9 ug/m^3. Indoor air sampling was conducted in Walkerville and one of the homes had an indoor air concentration of 1.2 ug/m^3. It is conceivable that this level of mercury vapor may pose a short term health concern for more sensitive members of the population who may be limited in their ability to metabolically biotransform or excrete the xenobiotic.

ATTACHMENT 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 8
999 18TH STREET - SUITE 500
DENVER, CO 80202-2466

27 February 2001

Ref: 8EPR-PS

MEMORANDUM

SUBJECT: Short Term and Acute Health Risks of Residents Exposed to Lead and Arsenic Contamination at the Eureka Mills site

FROM: Susan Griffin, PhD, DABT
Regional Toxicologist
Program Support Group

TO: Al Lange
On-Scene Coordinator
Emergency Response Team

This memorandum is in response to your request for an assessment of potential acute or short term health risks to residents in Eureka, Utah and appropriate action levels to address those risks. The town of Eureka is located approximately 84 miles south of Salt Lake City, Utah and has an estimated population of 691. Between 1870 and 1965, mining and milling took place at the Eureka Mills site. As a result of this past activity abandoned mill tailings and other mine-related wastes containing lead, arsenic, cadmium, and other metals are situated in and adjacent to the town. Elevated levels of lead and arsenic have been detected in outdoor soil and indoor dust at Eureka. Residents at the site could be expected to come into direct contact with contaminated soil and indoor dust via incidental ingestion, inhalation of particulates, and dermal contact. Based on the concentrations of lead found in the soil and indoor dust samples, and our knowledge of the adverse short term and lifetime effects associated with lead exposure, the contaminated soils/dust at this site may pose an acute or short term health risk to the residents. I would suggest that immediate steps be taken to minimize direct exposure to individuals who may come into contact with surficial soils and indoor dust containing lead concentrations greater than 3000 ppm and arsenic concentration greater than 2300 ppm. A soil removal action level of 3000 ppm for lead is consistent with the Emergency Response removal actions conducted at Walkerville, Montana and Jacob's Smelter, Utah.

Environmental Data Evaluation

During the summer of 2000, EPA's Emergency Response Team sampled homes at the

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Eureka Mills site for outdoor soil, indoor dust, drinking water, groundwater/springs, and lead-based paint. The samples were analyzed for metals typically associated with mining/milling activities. The Utah Department of Health (UDOH) and Central Utah Health Department conducted blood lead sampling for the residents and administered a survey on behaviors which may impact lead exposures. A summary of the environmental lead and arsenic results are provided below.

TABLE 1

	Soil (ppm)	Indoor dust (ppm)	Drinking Water (ppb)	Paint (mg/cm^2)
Lead	Average 1472 Range (35-22,000)	Average 739 Range (122-5330)	Average 2.8 Range (1.6-13.8)	Average 0.25 Range (0.01-1.7)
Arsenic	Average 98 Range (15-2200)	Average 39 Range (7-131)	Average 4 Range (2.6-16.6)	N/A

Exposure to Lead

Lead exposure to children is known to cause central nervous system effects resulting in learning disabilities, hearing impairment, and behavioral difficulties. Children are particularly susceptible to the effects of lead due to: 1) the tendency for children less than the age of 7 to absorb lead much more efficiently than adults; 2) the particular susceptibility of the developing brain to the toxicological effects of lead, and 3) the tendency for children to be more highly exposed to sources of lead such as dust, soil and paint due to exploratory behavior. Subtle signs of lead-induced effects begin to be apparent at blood lead levels of 10 ug/dl or even lower, with effects becoming clearer by 30 to 40 ug/dl. The USEPA recommends a blood lead level of 10 ug/dl as the level of concern for these neurological effects. Furthermore, the USEPA Superfund program recommends that exposures to soil lead levels should be limited such that a child would have an estimated risk of no more than 5% of exceeding a 10 ug/dl blood lead level. This estimate is developed using the EPA's computer model, the Integrated Exposure Uptake Biokinetic (IEUBK) model.

These adverse effects of lead are typically associated with exposures which occur over a long period of time and lead levels in contaminated media which are protective for these subtle neurological effects may not be indicative of an acute or short term health risk. The Centers for Disease Control and Prevention (CDCP) have issued tiered guidelines on appropriate environmental and medical responses to take for given blood lead levels within a population. At blood lead levels between 10 - 20 ug/dl, the CDCP guidelines indicate that a health threat is not immediate, but children should receive nutritional and educational intervention to reduce their blood lead levels. At the next level where blood leads are between 20 - 44 ug/dl, the CDCP recommends environmental evaluation and remediation, and pharmacologic treatment if necessary. Health concerns within this category could be

interpreted as requiring immediate action to reduce children's blood lead levels. For the Eureka Mills site, an action level for addressing acute or short term health risks from exposure to contaminated soil and dust was developed based on EPA's IEUBK model and the probability of blood lead levels exceeding 20 ug/dl.

Site-specific exposure assumptions for soil to dust relationship (0.26) and geometric standard deviation (1.4) were used in the IEUBK model to calculate an action level of 3000 ppm for an acute or short term health risk from lead in soil and housedust. All other exposure inputs were model default values. Since the lead concentrations in some homes at the Eureka site exceed 3000 ppm, it is plausible that unacceptable short term exposures could occur and immediate action may be required to mitigate those exposures. Keep in mind that this action level was developed based on children less than 7 years of age who are the most sensitive members of the population to adverse effects of lead. This level in soil should be adequately protective for adults and older children.

Biological Data Evaluation

In the summer of 2000 the UDOH and the Central Utah Health Department conducted blood lead testing for all the residents in Eureka. Two hundred thirty seven children and adults were tested. Of the 237 individuals tested, 32 showed elevated blood lead levels above 10 ug/dl. Of the 55 children between the ages of 6-72 months, 13 had blood lead levels > 10 ug/dl. The blood lead levels for children 6-72 months of age ranged from 1.6-34.2 ug/dl with an average of 6.9 ug/dl. The USEPA recommends a blood lead level of 10 ug/dl as a level of concern for subtle neurological effects. Small exceedences of the 10 ug/dl level should not be considered a cause for immediate alarm. The Centers for Disease Control and Prevention (CDCP) have issued tiered guidelines on appropriate environmental and medical responses to take for given blood lead levels within a population. At blood lead levels between 10-14 ug/dl, the CDCP guidelines indicate that the health threat is not immediate, but that community wide prevention activities, such as education, outreach, and prevention planning, should begin. However, blood lead levels which exceed 20 ug/dl are considered a more urgent threat and the CDCP recommends environmental evaluation and remediation as soon as possible, and pharmacologic treatment if necessary. Several of the residents in Eureka have blood lead levels which fall into this category.

Toxicity of Arsenic

Excess exposure to arsenic is known to cause a variety of adverse health effects in humans. Exposure via inhalation is associated with increased lung cancer. There is strong evidence from a number of human studies that oral exposure to arsenic increases the risk of skin cancer. The most common type of cancer is squamous cell carcinoma, although basal cell carcinoma may also occur. Chronic oral arsenic exposure may also increase the risk of internal cancers, including cancer of the liver, bladder and lung. Long-term oral exposure to arsenic is also associated with non-cancer effects such as skin abnormalities which include dark and white spots

and a pattern of small corns, especially on the palms and soles. Oral exposures to very high doses of arsenic may produce acute irritation of the gastrointestinal tract, leading to nausea, vomiting and weakness.

These adverse effects of arsenic are typically associated with exposures which occur over a long period of time (e.g., 30 - 70 years), and levels in contaminated media which are protective for these effects may not be indicative of an imminent and substantial health threat. There are, however, several studies which address the question of short-term exposure to arsenic (e.g., from 6 months to 15 years). These studies were reviewed and discussed in detail by Region VIII toxicologist, Dr. Robert Benson in his 1995 memorandum, "Subchronic Reference Dose for Arsenic". In that memo, Dr. Benson described skin lesions associated with short term exposures to arsenic in drinking water or medications, and developed a safe dose level of 0.006 mg/kg-day, at which no short term adverse effects would be expected to occur. This safe dose level or subchronic reference dose was used to evaluate the arsenic levels observed in the town of Fairfield and develop preliminary remediation goals for arsenic in soil which would be protective of short term exposures.

Exposure to Arsenic in Soil

In order for exposure and risk to occur a complete exposure pathway must exist. For a complete exposure pathway to exist, there must be; 1) a source of contamination, 2) a release mechanism, 3) a transport of the soil contamination to a receptor, and 4) an exposure route (ingestion, inhalation, or dermal absorption). In the town of Eureka it appears that the exposure pathway between the contaminated soils and the residents is complete and exposure could occur via incidental ingestion, inhalation of particulates, and dermal contact. In most cases where residential soil is contaminated with metals, the significant exposure route is through incidental ingestion of soil and dust. Due to their atomic charge, metals are not well absorbed by the skin and the dermal route of exposure is usually insignificant in areas of soil contamination. And while exposure to metals in soil by inhalation can pose a significant threat in areas which are extremely dusty and human activity level are high (i.e., construction activities or moto-crossing), this route of exposure is also far less significant in most residential exposure settings. Therefore, only the incidental ingestion of soil will be quantitated for this assessment.

Because, short term exposures could occur at any age, I used the conservative assumption that exposure would occur to a child 0-6 years of age. The equations and assumptions outlined in EPA's *Risk Assessment Guidance for Superfund* were used in conjunction with the subchronic toxicity value discussed above. Site-specific studies for bioaccessability and geochemical speciation were conducted on soils at the Eureka Mills site. From these studies it appears that the bioavailability of arsenic from soil may be low at this site, approximately 20%. This site-specific value was used in the calculation.
The calculations are as follows:

$$PRG = \frac{\text{Hazard Index X Averaging Time X 365 days/yr}}{\text{1/RfD X 10E-06 kg/mg X Exposure Frequency X Ingestion Factor X Absorption Factor}}$$

Hazard Index = 1
Averaging Time = 6 years
Subchronic Reference Dose - 0.006 mg/kg-day
Exposure frequency = 350 days/year
Age Adjusted Ingestion Factor = 80 mg-yr/kg-day (200 mg/day X 6 years/15 kg)
Absorption Factor - 0.2

Given these assumptions the PRG in soil which would be protective for short term effects would be 2345 ppm. Exposures to soil levels of arsenic greater than 2345 ppm may pose unacceptable short term or acute health risks to residents in the town.

Drinking water and Lead-based Paint

The current action level for lead in drinking water is 15 ppb. All of the homes tested in Eureka had lead concentrations less than 15 ppb in their drinking water. The current MCL for arsenic in drinking water is 50 ppb. All of the homes tested had arsenic concentrations less than 50 ppb in the drinking water. Therefore, exposure to lead and arsenic via drinking water does not appear to be a significant pathway of exposure. A concern arose from the residents of Eureka regarding the thallium levels in the drinking water. Thallium was not detected in any of the drinking water samples, however, the laboratory assigned the method detection limit as the estimated quantity. The method detection limit (e.g., 5-6 ppb) was above the thallium MCL of 2ppb. Thallium has not been a contaminant of concern at mining or smelting sites in Region 8 in the past, and the standard EPA analytical methodology was considered appropriately sensitive to detect the metals which are typically a concern (e.g., lead, arsenic, cadmium, mercury, etc). In my opinion, thallium in drinking water is not something to be concerned about at this site. However, if the residents of Eureka continue to express concerns, I would suggest re-sampling and analyzing the tap water using a more sensitive analytical methodology for thallium.

Currently HUD guidelines recommend that paint which contains lead greater than 1.0 mg/cm^2 be considered a lead hazard. The homes in Eureka had surface concentrations of lead in paint ranging from 0.01 - 1.7 ug/cm^2. This should not be considered a significant problem. A more problematic issue is the concentration of lead in the layers below the surface. These range from 0.01 - 30 mg/cm^2 with an average of 3.12. Because these concentrations are in layers below the surface layer of paint, they most likely don't pose an immediate health concern. However, in the future, it is conceivable that the painted surfaces will not be maintained and the deeper layers could come to the surface and start to peel or chip. If that were to occur the paint could become a health hazard.