HEALTH CONSULTATION

LEAD SAMPLING AT NORTH RIDGE ESTATES
(a/k/a FORMER MARINE RECUPERATIONAL BARRACKS)

T38S, SECTION 15, R9EWM
NORTHRIDGE DRIVE, HUNTERS RIDGE ROAD, OLD FORT ROAD
KLAMATH FALLS, KLAMATH COUNTY, OREGON 97603

EPA FACILITY ID: ORN001002476

Prepared by:

Oregon Department of Human Services
Superfund Health Investigation & Education Program
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Health Consultation

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MARCH 22, 2005

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

Lead Sampling at North Ridge Estates
(a.k.a. Former Marine Recuperational Barracks)

T38S, Section 15, R9EWM
Northridge Drive, Hunters Ridge Road, Old Fort Road
Klamath Falls, Klamath County, Oregon 97603
EPA Facility Number: OR001002476

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Purpose and Health Issues

This consultation was developed to address the public health risk of exposure to lead in soils detected in a limited area of the North Ridge Estates residential subdivision. In May 2003, at the request of the Oregon Department of Environmental Quality (ODEQ), the U.S. Environmental Protection Agency (EPA) assumed the lead role for assessment and response to asbestos contamination at the North Ridge Estates residential subdivision in Klamath County, 3 miles north of the city of Klamath Falls. The Oregon Department of Human Services (ODHS) Superfund Health Investigation & Education (SHINE) program completed health consultations in April 2003 and May 2004 that determined the site to be a public health hazard due to the large amount of friable asbestos-containing material (ACM) throughout the surface of the subdivision. The ACM are remnants from the demolition of the Marine Recuperational Barracks, a complex of more than 80 buildings built in 1944 to provide care for soldiers recovering from tropical diseases [1] (Figure 1). More than 56 tons of ACM fragments were removed from the property surface in 2002 and 2003.

Because lead-based paint was used in the now-demolished military buildings, SHINE also recommended in April 2003 that soil be sampled for lead. EPA sampled soil throughout the site and analyzed the soil for lead content. In July 2003, EPA requested that SHINE review the draft lead sampling results and quickly provide a brief summary evaluating the sample results for health effects. SHINE evaluated the samples and provided a memo of the findings (see Appendix A). SHINE concluded that, except for one sample, lead levels throughout the site were low and that sampling indicated that exposure to lead does not present a widespread public health hazard at the subdivision. In July 2004, EPA conducted additional sampling in the area near the one elevated sample. Results of this sampling indicate that an area of about 25 foot in diameter and up to 2 ft deep has elevated lead levels. SHINE concludes that exposure to lead in the Northridge subdivision is no apparent public health hazard because our evaluation indicates that children are not being regularly exposed to soil in the limited area with high lead levels. Children might be at risk of lead-related health effects if they were regularly exposed to this soil.

Background – Site Description and History

North Ridge Estates is located in South Central Oregon in a high desert area (elevation of 4,500 feet). The 422-acre subdivision is three miles north of the City of Klamath Falls (T39 R9 S15) along both sides of Old Fort Road (Figure 2). Vegetation in the area is sparse, with some scattered ponderosa pines and sagebrush. Soil is volcanic and rocky in places. The climate is relatively dry, with an average annual rainfall of 13.2 inches.

There are 77 residents, including 35 children (15 children age 6 years or younger), in the area surveyed for lead in 2003. This section of the subdivision includes 22 homes, nine vacant home sites, and a memorial park, privately owned but open to the public. East of Old Fort Road are several homes, a five-unit apartment building, and additional North Ridge Estates lots. Land to the west, north, and east of the subdivision is zoned for forestry, grazing, and agriculture. According to the 2000 U.S. Census, there are 98 residents, including 14 children age 6 years and younger, within ½ mile of the property.

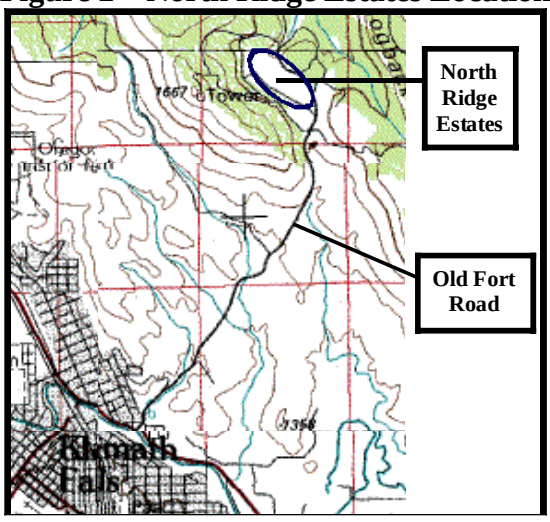
The buildings at the Marine Recuperational Barracks were occupied from 1944–1946 by the military, followed by the Oregon Technology Institute (now called the Oregon Institute of Technology) until 1964. Since 1966, the property has been privately owned, and most of the buildings were demolished in the mid- to late-1970s and 1980s. The property was purchased in 1977 by MBK partnership, the present property developer. Home construction began in the subdivision in 1993.

Figure 1 – Former Marine Recuperational Barracks

(Photo courtesy of the Klamath County Museum)

Regulatory agencies became involved at the site in 1979 and in 2001 [2][3] in response to complaints received of asbestos-containing construction debris on the property surface. EPA sampled soil, air, and dust for asbestos in 2003–2004. Because lead-based paint was commonly used in buildings constructed in the 1940s, EPA sampled soil throughout the subdivision for lead in 2003. Only one sample had an elevated lead level, and additional sampling and site characterization was completed in 2004 to determine the extent of lead contamination at this one hot spot area.

Figure 2 – North Ridge Estates Location



Discussion

Lead is a naturally occurring metal in the earth's crust. It is used in a variety of products including automobile batteries, ammunition, and some paints. Its use has been reduced or eliminated in many products including solder, paint, and gasoline as a result of studies that have demonstrated adverse health effects from lead exposure.

Data Used

SHINE and ODHS Childhood Lead Program staff reviewed draft and final lead sampling reports and maps completed for EPA by Ecology and Environment, Inc. At the request of EPA, SHINE completed a memorandum that evaluated the lead sampling (see Appendix A) and prepared a fact sheet (see Appendix B) for the community. SHINE staff gave a presentation on the lead sampling and health effects from exposure to lead at a public meeting in Klamath Falls in January 2004. SHINE and ATSDR staff also visited the site in July 2004 with EPA staff to observe the area where high lead levels had been found.

Standards, Regulations, and Recommendations for Lead

EPA has two risk levels when evaluating lead in residential soil: 400 ppm (or mg/kg) and 1,200 ppm [4]. The 400 ppm level, developed from a composite sample in a play area, applies to areas of bare soil where children age 6 years and younger play. The 1,200 ppm standard for residential yards is an averaged level of non-play areas composite samples. Abatement is required when levels in bare residential soil exceed 5,000 ppm. Interim controls are recommended when soil lead levels average 400–5,000 ppm where children are likely to have contact with the soil and an average 1,200–5,000 ppm on lots where children are unlikely to have contact with the soil.

Site-Wide Lead Sampling

In July 2003, EPA conducted soil sampling for lead throughout the North Ridge Estates subdivision. A total of 149 samples were taken on 36 lots (Figure 3), in addition to one background sample. A total of 163 samples were analyzed using X-ray fluorescence (XRF), including 13 duplicate samples [5]. As XRF is primarily used as a screening analysis, 19 of the samples were analyzed in the laboratory to confirm the quality of the XRF findings. Table 1 shows results of both the XRF sampling and laboratory confirmation findings. Low levels of lead were detected in 71 of the samples (from 31 lots). Elevated levels (above 400 ppm) were detected in only two of the 150 samples. Laboratory confirmation of the two samples indicated an elevated lead level in only one of the samples.

Of the 149 samples:

- 85 samples were less than the detection level
- 73 samples were less than 400 ppm
- 65 of 73 samples were less than 200 ppm
- 36 of 73 samples were less than 55 ppm
- 1 sample was greater than 400 ppm (1,500 ppm)

Figure 3. Locations Of Site-Wide Lead Sampling Using XRF at North Ridge Estates

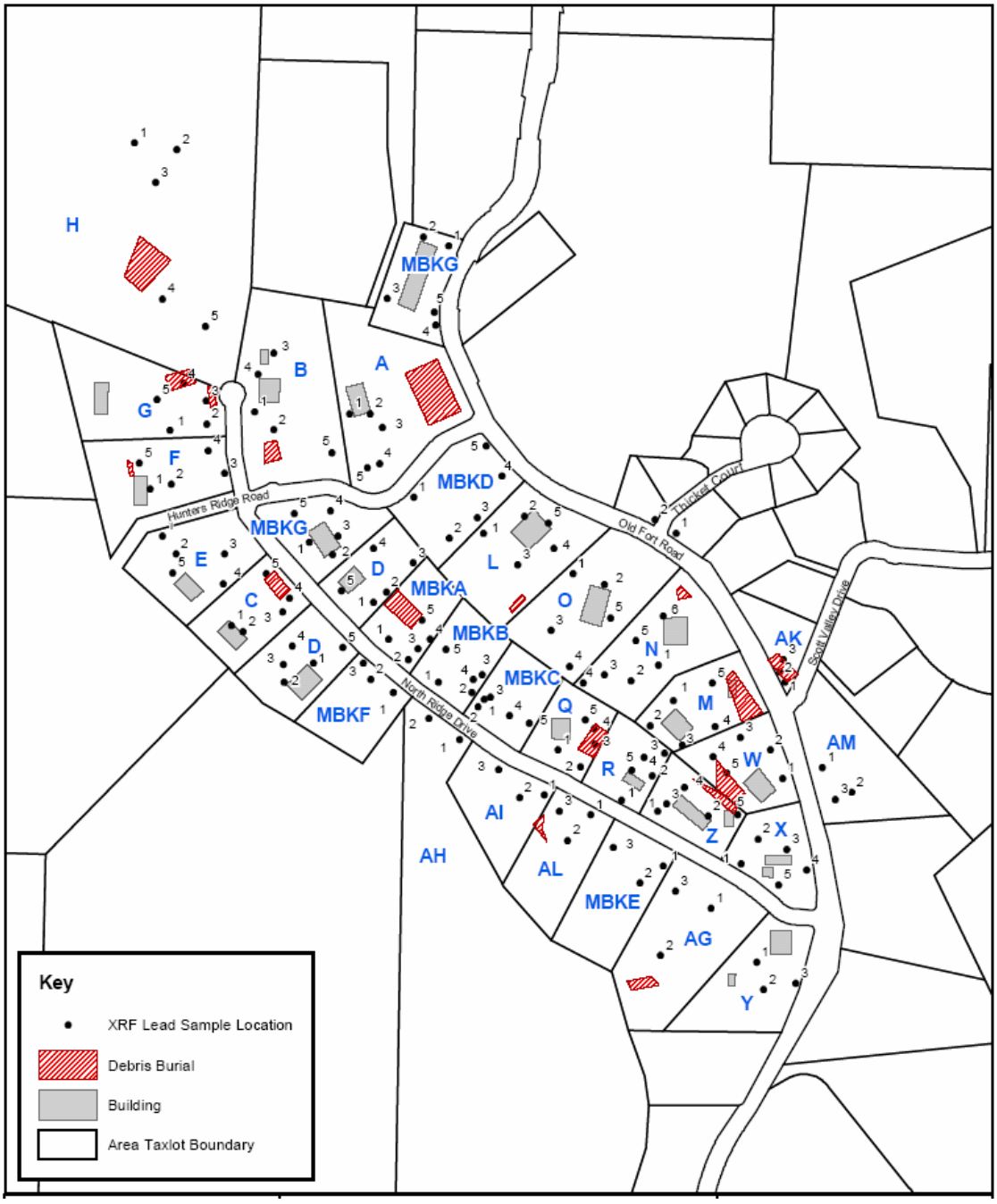


Table 1

Phase I Soil Investigation—Lead
XRF Screening Results (milligrams per kilograms-dry weight)—ppm
& Lab Confirmational Sampling Results

Sample Location	XRF Results	Lab Results		Sample Location	XRF Results	Lab Results
Q-1	<LOD*			Z-4	81.1	
Q-2	<LOD			Z-5	78.5	
Q-5	43.6			X-1	36.3	
Q-4	24.6			X-2	52.6	58
Q-3	<LOD			X-3	<LOD	
L-1	<LOD			X-4	<LOD	
L-2	<LOD			X-5	28.5	
L-3	25.4			Y-1	18.1	
L-4	<LOD			Y-1 (DUP)	<LOD	
L-5	<LOD			Y-2	39.9	
L-5 (DUP)**	<LOD			Y-3	45.7	
MBKA-1	163.8	270		Y-3 (DUP)	23.3	
MBKA-2	<LOD			S-1	33.2	
MBKA-3	<LOD			S-2	126.2	130
MBKA-4	61.6			S-3	<LOD	
MBKA-5	74.5			S-5	22.9	
MBKB-1	<LOD			S-4	<LOD	
MBKB-2	27.2			AG-1	<LOD	
MBKB-3	69.4			AG-2	<LOD	
MBKB-3 (DUP)	70.5			AG-3	34.6	
MBKB-4	68			R-3	104.8	
MBKB-5	68.4			R-1	<LOD	
MBKC-1	<LOD			R-2	<LOD	
MBKC-2	36.1			R-4	50.9	
MBKC-3	46.2			R-5	46%	
MBKC-4	<LOD			O-1	64.4	
MBKC-5	856.8			O-5	<LOD	
MBKC-5 (DUP)	1029.6	1,500		O-4	31.5	
MBKD-1	<LOD			O-3	<LOD	
MBKD-2	<LOD			O-2	<LOD	
MBKD-3	43.4			BACKGROUND	<LOD	<LOD
MBKD-4	<LOD			AH-1	<LOD	
MBKD-5	<LOD			AH-2	<LOD	
P-1	444	320		MBKE-1	<LOD	

Table 1 – Phase I Soil Screening (Continued)

Sample Location	XRF Results	Lab Results		Sample Location	XRF Results	Lab Results
N-6	49.4			E-4	<LOD	
N -2 (Dup)	165.2			E-5	<LOD	
W-1	<LOD			AK-1	<LOD	
W-3	<LOD			AK-3	<LOD	
W-2	295.8	310		AK-2	91.6	
W-4	41.9			AL-1	<LOD	
W-5	50.5			AL-2	<LOD	
AI-1	<LOD			AL-3	30.5	<LOD
AI-2	179.1			MBKF-1	<LOD	
AI-3	<LOD			MBKF-2	182.6	250
AI-3 (DUP)	<LOD			MBKF-3	<LOD	
M-1	<LOD			D-1	24.4	
M-2	145	230		D-2	<LOD	
M-3	<LOD			D-3	<LOD	
M-4	99.4			D-3 (DUP)	<LOD	
M-5	<LOD			D-4	38.5	
C-1	<LOD			D-5	<LOD	
C-2	<LOD			AM-1	<LOD	
C-2 (DUP)	<LOD			AM-2	24.6	<LOD
C-3	<LOD			AM-3	<LOD	
C-3 (DUP)	<LOD			F-1	<LOD	
C-4	<LOD			F-2	54.9	
C-5 DUP	<LOD			F-3	32.9	
C-5	<LOD			F-4	39.5	
A-1	<LOD			F-4 (DUP)	33.2	
A-2	<LOD			F-5	<LOD	
A-3	<LOD			H-1	<LOD	
A-3 (DUP)	<LOD			H-2	<LOD	<LOD
A-4	93.9	89		H-3	<LOD	
A-5	<LOD			H-4	54.2	
AJ-1	<LOD			H-5	<LOD	
AJ-2	<LOD			G-1	27.4	
B-1	27.2	<LOD		G-2	55	
B-2	<LOD			G-3	85.5	280
B-3	52.8			G-4	53.6	
B-4	<LOD			G-5	<LOD	
B-5	46.8			MBKG-1	164.9	
E-1	<LOD			MBKG-2	39.8	
E-2	66.3	88		MBKG-3	24.6	
E-3	172.3	170		MBKG-4	27.1	
				MBKG-5	35.4	43

*** < LOD = Less than Level of Detection ** DUP = Duplicate Sample**

Phase II Lead Sampling

In May 2004, EPA conducted Phase II of the lead sampling in the area where the one elevated sample was taken. Forty-eight XRF screening samples were taken at 15-foot intervals in a grid approximately 90-feet x 90-feet on lots MBK-C and adjacent lot Q (Figures 3 and 4). Laboratory

confirmation sampling was completed on seven of the 48 samples (Table 2). Of the 48 samples, 35 were below the level of detection and 11 were below 400 ppm lead. Three of the samples had levels higher than 400 ppm (8,200 ppm, 1,500 ppm, and 610 ppm).

The sample with 1,500 ppm lead was found on the MBK-C lot (Figure 4) near a disposal site on the lot. In September 2003, SHINE recommended that additional sampling and site characterization be completed at this location to determine whether the sample was a small isolated "hot spot" or was large enough to warrant remediation. SHINE was also concerned that neighborhood children, and especially children in the adjacent residence (on lot Q), could be playing in that area. SHINE also recommended that dust samples be taken in the adjacent residence (as permitted by the residents), particularly if the contaminated area was found to be larger than a small, isolated hot spot.

After reviewing sampling results and soil discoloration at the hot spot area, Ecology and Environment, Inc. (E&E) estimated the area of high lead concentration to be, conservatively, a 25-foot diameter circle that encompasses grid points E3, E4, and D4 (Figure 4) **Error! Reference source not found.**. Surface concentrations within the hot spot circle area ranged from 250 ppm to 4,550 ppm. Using a pick, E&E staff dug approximately 18 inches to 2 feet through discolored soil to a rock layer. E&E concluded that contamination appeared to diminish with depth to less than 300 ppm, and that the highest concentrations were likely in the first foot of soil **Error! Reference source not found.**. E&E was unable to record the values at depth due to dry material caving into the hole during the excavation with the pick. E&E determined that the discoloration in the soil was not natural, that it resulted from some material that had been discarded at that location in the past.

Figure 4. Locations of Phase II Soil Sampling. The Area Delineated by Hatch-Marks is the Estimated Footprint of Elevated Lead Levels

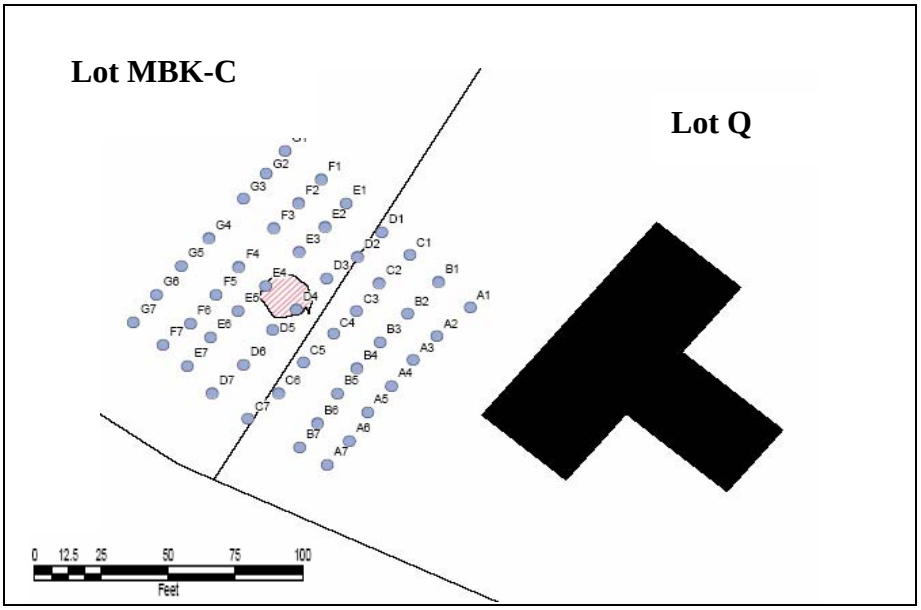


Table 2

Soil Investigation—Phase II–Lead (Pb)
XRF Screening Results (milligrams per kilograms-dry weight)—ppm
& Lab Confirmational Sampling Results

Sample Location	XRF Results	Lab Results		Sample Location	XRF Results	Lab Results
A1	<LOD			**D4**	**4,710**	**8,200**
A2	<LOD			D5	130	
A3	<LOD	<LOD		D6	<LOD	
A4	<LOD			D7	<LOD	
A5	<LOD			E1	<LOD	
A6	<LOD			E2	34.7	
A7	<LOD			**E3**	367	**1,500**
B1	<LOD			**E4**	306	**610**
B2	<LOD			E5	<LOD	
B3	<LOD			E6	<LOD	
B4	<LOD			E7	<LOD	
B5	<LOD			F1	105.5	
B6	<LOD			F2	41.9	
B7	<LOD			F3	144	
C1	<LOD			F4	55.6	
C2	<LOD			F5	<LOD	
C3	<LOD			F6	<LOD	<LOD
C4	56.5			F7	<LOD	
C5	<LOD	<LOD		G1	<LOD	
C6	<LOD			G2	73.8	93
C7	<LOD			G3	142	
D1	<LOD			G4	96.2	
D2	<LOD			G5	70.7	
D3	<LOD			G6	<LOD	
				G7	<LOD	

Key: <LOD = Less than Level of Detection

Evaluation

Exposure Pathways

Discussion of specific human exposure pathways in this section does not imply that adverse health effects will develop. ATSDR categorizes an exposure pathway as a completed or a potential exposure pathway if the exposure pathway cannot be eliminated. Five factors are required to qualify a pathway as completed:

1) a source of contamination;
2) a media such as air or soil through which the contaminant is transported;
3) a point of exposure where people can contact the contaminant;
4) a route of exposure by which the contaminant enters or contacts the body; and
5) a receptor population.

A pathway is considered complete if all five elements are present and connected. Potential pathways require that at least one of these five factors is missing, but could be present. An exposure pathway can be eliminated if at least one of the five factors will always be absent.

Lead-based paint was used in the military buildings demolished at the site, however site-wide sampling indicates that soil lead levels are not elevated throughout the subdivision. Of the 154 samples taken in July 2003, only one sample was elevated to a level that required further investigation. Only three of the 48 samples taken in the area around this location (Figure 4) were elevated and these three were adjacent to each other.

Potential Exposure Pathways

Ingestion

Children who play in soil at the one area of elevated contamination at the MBK-C lot could potentially be exposed to lead by incidental ingestion. However, this appears unlikely as the 25-foot diameter contaminated area identified on Figure 4 is found on the adjacent lot next to lot Q. The highest soil lead level found at the 24 sampling locations between the dwelling and the contaminated area was 56.5 ppm. The other 23 samples were below the level of detection. Thus, children most at risk, those under the age of 6 years, would have to travel to this specific location each day to play at this 25-foot diameter area. As indicated on Figure 3, the rest of the dwellings in the subdivision are significantly further away from lot MBK-C than the one on lot Q. Therefore, we consider this scenario to be unlikely.

Inhalation

Lead dust in the soil may present an inhalation hazard. Lead dust can be tracked into homes through shoes, clothing, pets, wind, and other factors. Children would probably have the greatest exposure through this pathway as a result of playing in and around the contaminated area and having a lower breathing zone (i.e., closer to ground level) compared with adults.

Toxicological Profile

The description below comes mostly from the ATSDR *Toxicological Profile for Lead* [6]. The effects of lead are the same whether it enters the body through breathing or swallowing. Most of the health effects associated with lead result from chronic, low-level exposures.

The main target for lead toxicity is the nervous system, both in adults and in children. Long-term exposure of adults to lead at work has resulted in decreased performance in some tests that measure functions of the nervous system. Lead exposure may also cause weakness in fingers, wrists, or ankles. Lead exposure may also cause anemia (a low number of red blood cells). At high levels of exposure, lead can severely damage the brain and kidneys in adults or children. Some studies have shown that elevated blood lead levels in middle-aged males may increase their risk of developing hypertension. Studies also suggest that lead may aggravate osteoporosis in postmenopausal women when bone lead stores are released by demineralization processes.

Children are more vulnerable to lead poisoning than adults. Babies and children can swallow and breathe lead in dirt, dust, or sand while they play on the floor or ground. Lead affects children in different ways, depending on how much lead a child swallows. A child who swallows large amounts of lead may develop anemia, kidney damage, colic, muscle weakness, and brain damage that can kill the child. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. At still lower levels of exposure, lead can affect a child's mental and physical growth. Nutritionally deficient diets low in calcium may increase child susceptibility to lead toxicity as well.

The greatest concern for lead is based on its effects on the nervous system, particularly in young children. The acceptable level of lead in children's blood has dropped from 60 µg/dL in the 1950s to the current Centers for Disease Control and Prevention (CDC) level of 10 µg/dL. This does not imply that a safe level of blood lead has been identified. In the last few years, several studies have been conducted and are still ongoing that suggest children may suffer neurological and developmental deficits at blood lead levels below the current standard.

Children's Health Considerations

ATSDR recognizes that infants and children might be more vulnerable to exposures than adults in communities faced with environmental contamination. Because children depend completely on adults for risk identification and management decisions, ATSDR is committed to evaluating their special interests at the site as part of the ATSDR Child Health Initiative.

The differences that increase a child's exposure versus an adult's exposure to lead include:

- An increase in lead toxicity based on a lower body weight for children.
- Greater absorption of lead into the body by the digestive system and more difficulty eliminating lead from the body.
- Increased mobility of lead in a child's body.
- A more frequent occurrence of nutrient deficiencies that lead to increased absorption from the digestive system into the body.
- Differences in behavior that increase lead exposure, including
    - Crawling and playing on the floor or ground,
    - Placing nonfood items into the mouth,
    - More hand to mouth activities,
    - Lack of hand washing before eating.

The children most at risk, those under the age of 6 years, would have to travel more to a specific spot (25-feet in diameter) on a frequent basis to play. As indicated on Figure 3, the rest of the dwellings in the subdivision are significantly further away from lot MBK-C than the one on lot Q. Therefore, we consider exposure to be unlikely.

Conclusions

1. Lead sampling indicates that, except for a 25-foot diameter area on one vacant lot, soil at residences west of Old Fort Road in the North Ridge Estates subdivision does not contain lead at levels that might cause adverse health effects.

2. SHINE concludes that exposure to lead in the Northridge subdivision is **no apparent public health hazard** because our evaluation indicates that children are not being regularly exposed to soil in the limited area with high lead levels. Children might be at risk of lead-related health effects if they were regularly exposed to this soil.

Recommendations

1. SHINE recommends remediation of the soil on lot MBK-C where high levels of lead have been identified as a health-protective measure.

Public Health Action Plan

The Public Health Action Plan for the site contains a description of actions that have been or will be taken by ODHS and other government agencies at the site. The purpose of the Public Health Action Plan is to ensure that this public health consultation not only identify public health hazards, but also provide a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of ODHS to follow up on this plan to ensure that it is implemented.

The following public health actions have been taken:

- EPA completed soil sampling for lead throughout the subdivision.
- At the request of EPA, SHINE and staff from the ODHS Childhood Lead program reviewed the 2003 lead sampling reports and maps. SHINE provided EPA a memo evaluating the draft lead sampling results. (See Appendix A.)
- SHINE developed a fact sheet (see Appendix B) on the site-wide lead sampling which was distributed at the January 2004 public meeting, along with copies of the memo provided to EPA in September 2003. The fact sheet and memo are available on the SHINE website (www.healthoregon.org/superfund).
- SHINE gave a presentation to residents at the January 2004 EPA public meeting on lead sampling, sampling results at the site, and health effects from exposure to lead. (See SHINE website: www.healthoregon.org/superfund.)
- SHINE and ATSDR staff visited the site with EPA staff to inspect the area where high lead levels were found.
- EPA completed a second round of sampling in the area where high lead levels were found.

The public health actions to be implemented include the following:

- EPA will continue to work with the site developer and oversee remediation of the area where high lead levels were detected.

- SHINE and ATSDR will continue to provide assistance to regulatory agencies during planning for site and dust wipe sampling and cleanup.
- SHINE, EPA, ODEQ, ATSDR, and local public health agencies will continue to respond to the community's concerns and questions.

Site Team

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[2] US Environmental Protection Agency. Compliance Order #X79-08-14-113. September 17, 1979.

[3] Mutual Agreement and Order #AQ/AB-ER-01-250A, between Oregon Department of Environmental Quality and Melvin L. Stewart and Kenneth L. Tuttle, MD, PC, dba MBK Partnership; May 7, 2002.

[4] Code of Federal Regulations. Part VII. Environmental Protection Agency. 40 CFR 745. Lead; fees for accreditation of training programs and certification of lead-based paint activities contractors (final rule) (1999).

[5] Ecology and Environment, Inc. (E & E). XRF Data Summary, prepared for the US Environmental Protection Agency under Contract 68-SO-01-01, TDD 03-07-0011. Lancaster, New York. 2004.

[6] Agency for Toxic Substances and Disease Registry. Toxicological profile for lead (update). Atlanta: US Department of Health and Human Services; 1999.

.

Appendix A

Memorandum

To: Dan Heister

From: Janice Panichello

CC: Dave Stone
Amanda Guay
Karen Larson
Julie Wroble
Cliff Walkey

Date: September 8, 2003

Re: Lead Samples at North Ridge Estates

Thanks, Dan, for the opportunity to review the initial sampling results for lead and other metals from the North Ridge Estates Subdivision site. We are looking forward to receiving the sampling results after EPA has completed the QA/QC review.

In the health consultation we completed in April 2003, we (DHS Superfund Health Investigation & Education program) recommended that sampling for lead be conducted at the site to determine whether soil at the site has elevated lead levels due to the lead-based paint that was used on the military buildings demolished at the site. We were encouraged to see such low lead levels throughout the subdivision in the soil samples taken in July 2003. Five samples were taken on each of 24 lots, and two to three samples were taken on each of ten lots. Elevated levels of lead were found through XRF screening in only two of the 150 samples. Laboratory confirmation of the two samples (as well as ten percent of the samples throughout the site) indicated an elevated lead level in only one of the samples.

As you know, EPA has two risk levels when evaluating lead in residential soil – 400ppm and 1200ppm. The 400ppm level applies to areas of bare soil where children age 6 and under play. It is an “averaged” level, i.e. it is not based on one individual sample in a play area; it is the average of several individual samples in the play area. The 1200ppm

level applies to other areas of bare soil on the lot. Again, the 1200ppm threshold is not based on one individual sample, but is an average of several samples of the bare soil on the lot.

Sampling using XRF indicated elevated levels in two of the samples – one sample on Lot 2900 (444ppm) and one sample on Lot 3200 (1030ppm). Confirmational laboratory analyses (EPA Method 7000B, atomic absorption) on these two samples found the Lot 2900 sample to be 320ppm, and the Lot 3200 sample to be 1500ppm. Sampling results for the four other samples on Lot 2900 were 134.2ppm; 155.4ppm; 93ppm; and <LOD (below the detection level for the sampling methodology), and for Lot 3200 were 36ppm; 46ppm; and two samples <LOD. The 1500ppm level on Lot 3200 was from a sample taken near the eastern boundary of a vacant lot adjacent to the western boundary of Lot 3300. Lead sampling results on Lot 3300 were 44ppm, 25ppm, and two samples <LOD. Samples on Lot 3300, according to the sampling map by Ecology and Environment, Inc., were taken primarily in the eastern area of the property in the vicinity of a debris burial site.

It is unknown at this time whether this sampling result is an isolated elevated spot. Additional sampling on the eastern area of Lot 3200 and the western area of Lot 3300 is recommended to determine whether the averaged area of bare soil in this area of the two lots exceeds 1200ppm, and to further define the area of high lead levels. Based on the phone conversation I had last week with Cliff Walkey, it is my understanding that when determining cleanup requirements at a site, DEQ takes into consideration whether children and adults are, or are likely to, access the lead-contaminated soil. This information is important, as well, for DHS evaluation of health risks from exposure to lead in the soil.

As there are children in the residence on Lot 3300, we also recommend that dust wipe samples for lead be taken in the home (as permitted), particularly if it is determined that the area of contamination is larger than one small isolated area of Lot 3200.
There is not enough evidence at this time to indicate an elevated health risk from exposure to lead at the North Ridge Estates site. If parents are greatly concerned, however, testing for blood lead levels may be requested from their family physicians. The testing is simple and inexpensive, and evaluates blood lead levels from recent (last few months) exposures. (Someone could potentially have been exposed to lead for years, but if he/she hasn't been exposed to the lead recently, his/her lead exposure won't necessarily be indicated in the test results, as the blood lead level test results reflect exposures over the last few months.)

Appendix B

What do the lead sampling results at North Ridge Estates mean for my family and me?

January, 2004 Fact sheet 1

Overall, what do the lead sampling results tell us?

- **Samples show there is not an elevated health risk from exposure to lead in soil at North Ridge Estates.**
- **Sampling indicates that the soil at residences does not contain lead at levels that would cause adverse health effects.**
- **Exposure to soil from North Ridge Estates is unlikely to result in elevated blood lead levels in residents.**

SHINE is on the Web!
www.healthoregon.org/superfund

Was there any lead contamination found in the soil at North Ridge Estates?

The EPA took 150 soil samples in July 2003. Sampling results indicate that lead levels in soil at residences do not pose an elevated health risk to North Ridge Estates residents. One isolated soil sample at a vacant property was elevated. *

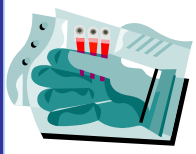
Lead is a naturally occurring metal that has been mined, processed, and used in commercial and household products for thousands of years. In the past, lead was used in paint, gasoline, pottery, water pipes, and other products. Once lead enters the environment, there is no way to destroy it or make it harmless.

In April 2003, the Oregon Department of Human Service's Superfund Health Investigation and Education (SHINE) Program recommended that the Environmental Protection Agency (EPA) sample for lead in the soil at North Ridge Estates to determine whether lead-based paint used in the demolished military buildings on the site resulted in elevated lead levels.

Should I be concerned about any health effects from lead in the soil?

SHINE and the Agency for Toxic Substances and Disease Registry (ATSDR) do not consider the soil at residences at North Ridge Estates to contain lead at levels that would cause adverse health effects. Likewise, exposure to soil is not expected to be the source of elevated blood lead levels for children or adults living at North Ridge Estates.

Does SHINE Recommend Blood Lead Screening at North Ridge Estates?



SHINE and ATSDR are not recommending a blood lead screening for residents of North Ridge Estates. Both adults and children are unlikely to have elevated levels from exposure to soils at North Ridge. However, there may be other sources of lead, especially if your house or apartment building was built before 1978. The older the home, the greater the chance that lead-based paint is present, and the more important it is to test your home for lead.

If you suspect that your home has lead based paint, a blood test is available to screen children for lead exposure and should be readlily available at your health care providers office for a small fee.

Who can I contact for

How can my family be exposed to lead?

Most childhood lead exposures result from exposure to household dust containing lead from lead-based paint. Lead-based paint can also be a major

more information?

For more information about health effects of lead and testing information, please call the Oregon Leadline at 1-800-368-5060.

The Environmental Protection Agency is working to identify and implement cleanup at North Ridge Estates. Contact Judy Smith, 503-326-6994 with questions.

The DHS Superfund Health Investigation and Education Program (SHINE) is investigating the public health significance of sampling results at this site. For more information contact Janice Panichello at 503-872-5359.

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source of lead-contaminated soil around the home as a result of peeling or chipping paint and remodeling activities. Lead can also be found in lead pipes or solder, imported or older ceramics and pottery, certain hobbies and folk medicines. If children are exposed to hobbies such as using or making fish sinkers, welding, making bullets, stained glass, ceramics, or jewelry, or refinishing furniture or painting, they may also come into contact with lead dusts.

Adult exposure commonly occurs from exposure to lead used in the workplace. Workers may inhale lead dust and fumes directly, or swallow lead dust while eating, drinking, or smoking on the job. Adults can be exposed during certain hobbies and activities where lead is used.

What are the health effects from exposure to lead?

Lead can affect almost every system and organ in your body. The most sensitive is the central nervous system, particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed.

At high levels, lead may decrease reaction time, cause weakness in the fingers, wrists, or ankles, and possibly affect the memory. Lead may cause anemia, a disorder of the blood. It can also damage the male reproductive system. The connection between exposure to low levels of lead and these effects is uncertain.

*What are the next steps for cleanup and assessment of lead in the soil?

As part of the ongoing assessment and cleanup actions at the site, EPA will conduct further testing to determine the size and accessibility of the one area where lead levels were high and, if determined to be necessary, develop a cleanup plan to remove or remediate contaminated soil in that area. No additional site-wide characterization for lead in the soil is planned or indicated.

Where can I find additional information?

- At the request of EPA, SHINE reviewed initial lead sampling results. The “Lead Samples at North Ridge Estates” memo is available on the SHINE website at http://www.dhs.state.or.us/publichealth/superfund/consult.cfm.
- ATSDR Tox Faqs - Lead http://www.atsdr.cdc.gov/tfacts13.html
- ATSDR Public Health Statement - Lead http://www.atsdr.cdc.gov/toxprofiles/phs13.html

DHS oregon department of human services

Appendix C Glossary of Environmental Health Terms

ACM	**A**sbestos-**c**ontaining **m**aterial. ACM is any material, including particulate matter, that contains more than 1% asbestos as determined using polarized light microscopy (PLM).
Acute Exposure	Contact with a chemical that happens once or only for a limited period. ATSDR defines acute exposures as those that might last up to 14 days.
Adverse Health Effect	A change in body function or the structures of cells that can lead to disease or health problems.
Asbestos	A group of highly fibrous minerals with separable, long, thin fibers often arranged in parallel in a column or in matted masses. Separated asbestos fibers are generally strong enough and flexible enough to be spun and woven, are heat resistant, and are chemically inert. Currently, U.S. regulatory agencies recognize six asbestos minerals: the serpentine mineral, chrysotile; and five asbestiform amphibole minerals, actinolite asbestos, tremolite asbestos, anthophyllite asbestos, amosite asbestos (also known as asbestiform cummingtonite-grunerite), and crocidolite asbestos(also known as asbestiform riebeckite).
ATSDR	The **A**gency for **T**oxic **S**ubstances and **D**isease **R**egistry. ATSDR is a federal health agency in Atlanta, Georgia, that deals with hazardous substance and waste site issues. ATSDR gives people information about harmful chemicals in their environment and tells people how to protect themselves from coming into contact with chemicals.
Background Level	An average or expected amount of a chemical in a specific environment, or amounts of chemicals that occur naturally in a specific environment.
Cancer	Any one of a group of diseases that occur when cells in the body become abnormal and grow or multiply out of control.
Carcinogen	Any substance shown to cause tumors or cancer.
Chronic Exposure	Contact with a substance or chemical that happens over a long period. ATSDR considers exposures of more than 1 year to be *chronic*.
Completed Exposure Pathway	See **Exposure Pathway**.
Concentration	How much or the amount of a substance present in a certain amount of soil, water, air, or food.

Contaminant	See **Environmental Contaminant**.
Dermal Contact	Touching the skin (see **Route of Exposure**).
Dose	The amount of a substance to which a person might be exposed, usually on a daily basis. Dose is often explained as "amount of substance(s) per body weight per day."
Dose / Response	The relationship between the amount of exposure (dose) and the resultant change in body function or health.
Duration	The amount of time (days, months, years) that a person is exposed to a chemical.
Environmental Contaminant	A substance (chemical) that gets into a system (person, animal, or the environment) in amounts higher than the **Background Level**, or what would be expected.
Environmental Media	Usually refers to the air, water, and soil in which chemicals of interest are found. Sometimes refers to the plants and animals eaten by humans. **Environmental Media** is the second part of an **Exposure Pathway**.
US Environmental Protection Agency (EPA)	The federal agency that develops and enforces environmental laws to protect the environment and the public's health.
Epidemiology	The study of the different factors that determine health status and how often, in how many people, and in which people disease will occur.
Exposure	Contact with a substance (chemical). (For the three ways people can come in contact with substances, see **Route of Exposure**.)
Exposure Assessment	The process of finding the ways people come in contact with chemicals, how often and how long they come in contact with chemicals, and the amounts of chemicals with which they come in contact.
Exposure Pathway	The way a chemical moves from its source (where it began) to where and how people can come into contact with (or get exposed to) the chemical. ATSDR defines an exposure pathway as having five parts: 1. Source of Contamination, 2. Environmental Media and Transport Mechanism, 3. Point of Exposure, 4. Route of Exposure, and 5. Receptor Population.

	When all five parts of an exposure pathway are present, it is called a **Completed Exposure Pathway**. Each of these five terms is defined in this Glossary.
Frequency	How often a person is exposed to a chemical over time; for example, every day, once a week, twice a month.
Hazardous Waste	Substances that have been released or thrown away into the environment and, under certain conditions, could be harmful to people who come into contact with them.
Health Effect	ATSDR deals only with **Adverse Health Effects** (see definition in this Glossary).
Indeterminate Public Health Hazard	The category used in public health assessment documents for sites where important information is lacking (missing or has not yet been gathered) about site-related chemical exposures.
Ingestion	Swallowing something, as in eating or drinking. It is a way a chemical can enter your body (see **Route of Exposure**).
Inhalation	Breathing. It is a way a chemical can enter your body (see **Route of Exposure**).
MRL	**M**inimal **R**isk **L**evel. An estimate of daily human exposure—by a specified route and length of time—to a dose of chemical that is likely to be without a measurable risk of adverse, noncancerous effects. An MRL should not be used as a predictor of adverse health effects.
No Apparent Public Health Hazard	The category is used in ATSDR's public health assessment documents for sites where exposure to site-related chemicals could have occurred in the past or is still occurring, but the exposures are not at levels expected to cause adverse health effects.
No Public Health Hazard	The category used in ATSDR's public health assessment documents for sites where people have never or will never come into contact with harmful amounts of site-related substances (chemicals).
NPL	The **N**ational **P**riorities **L**ist is a list kept by EPA of the most serious uncontrolled or abandoned hazardous waste sites in the country. An NPL site needs to be cleaned up or at least looked at to see if people can be exposed to chemicals from the site.

Oregon Department of Environmental Quality (ODEQ)	The state agency that develops and enforces environmental laws to protect the environment and public health.
Oregon Department of Human Services (ODHS)	The state public health agency; ODHS has a cooperative agreement with ATSDR to conduct health assessments and consultations at Superfund/NPL and other hazardous waste sites in Oregon.
Point of Exposure	The place where someone can come into contact with a contaminated environmental medium (air, water, food, or soil). Some examples include an area of contaminated dirt at a playground, a contaminated spring used for drinking water, or a backyard area where someone might breathe contaminated air.
Public Health Hazard	The category is used in PHAs for sites with certain physical features or evidence of chronic, site-related chemical exposure that could result in adverse health effects.
Public Health Hazard Catergories	PHA categories given to a site which tell whether people could be harmed by conditions at the site. Each are defined in this Glossary. The categories are: ▪ Urgent Public Health Hazard ▪ Public Health Hazard ▪ Indeterminate Public Health Hazard ▪ No Apparent Public Health Hazard ▪ No Public Health Hazard
Route of Exposure	The way a chemical can get into a person's body. The three exposure routes are: ▪ breathing (also called inhalation), ▪ eating or drinking (also called ingestion), and ▪ getting something on the skin (also called dermal contact).
Source of Contamination	The place where a hazardous substance comes from, such as a landfill, pond, creek, incinerator, tank, or drum. Contaminant source is the first part of an **Exposure Pathway**.
Superfund	See **NPL**.
Toxic	Harmful. Any substance or chemical can be toxic at a certain dose (amount). The dose is what determines the potential harm of a chemical and whether it would cause someone to get sick.
Toxicology	The study of the harmful effects of chemicals on humans or animals.
Urgent Public	A category used in ATSDR's public health assessments for sites

Health Hazard that have certain physical features or evidence of short-term (less than 1 year), site-related chemical exposure that could result in adverse health effects. [This category requires quick intervention to stop people from being exposed.]

Certification

The Superfund Health Investigation and Education Program of the Oregon Department of Human Services prepared the North Ridge Health Consultation under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. This document is in accordance with approved methodology and procedures.

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John R. Crellin, Ph.D.
Technical Project Officer for Oregon, SPAB, DHAC

I have reviewed this health consultation, as the designated representative of the Agency for Toxic Substances and Disease Registry and concur with its findings.

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Roberta Erlwein
Leader, Cooperative Agreement Team, SPAB, DHAC