ATSDR Record of Activity (AROA)
AROA - Health Consultation

UID #: _ ___ _ Date: 12 / 02 / 2005 Time: 7:30am
Site Name: Mt. Cristo Rey Area City:Sunland Park Cnty:Dona Ana State:NM
CERCLIS #: _____ Cost Recovery #: 60LN Region:VI

Site Status (1) __NPL X Non-NPL _ RCRA _ Non-Site specific _ Federal
(2) _ Emergency Response X Removal _ Other

Activities

_ Incoming Call _ Public Meeting* _ Health Consult* _ Site Visit*
_ Outgoing Call _ Other Meeting _ Health Referral _ Info Provided
_ Conference Call X Data Review X Written Response _ Training
_ Incoming Mail _ Other

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1-EPA	2-USCG	3-OTHER FED	4-STATE ENV	5-STATE HLT
6-COUNTY HLTH	7-CITY HLTH	8-HOSPITAL	9-LAW ENFORCE	10-FIRE DEPT
11-POISON CTR	12-PRIV CITZ	13-OTHER	14-UNKNOWN	15-DOD
16-DOE	17-NOAA	18-OTHR STATE	19-OTHR COUNTY	20-OTHR CITY
21-INTL	22-CITZ GROUP	23-ELECT. OFF	24-PRIV. CO	25-NEWS MEDIA
26-ARMY	27-NAVY	28-AIR FORCE	29-DEF LOG AGCY	30-NRC
31-ATSDR				

Program Areas

_ Health Assessment _ Health Studies _ Tox Info-profile _ Worker Health
_ Petition Assessment _ Health Surveillnc _ Tox Info-Nonprofile _ Admin
_ Emergency Response _ Disease Regstry _ Subst-Spec Resch _ Other
X Health Consultation _ Exposr Regstry _ Health Education

Narrative Summary: The EPA Region 6 asked ATSDR to determine the public health significance of arsenic and lead found in surface soil samples from the Mt. Cristo Rey Area, Sunland Park, NM to adults and children. The Mt. Cristo Rey area is used predominately by people for religious pilgrimages and recreational hiking by children and adults (Figures 1 & 2). In 1940, a forty foot limestone cross with a statue was placed on the summit (Figure 3). During the annual October pilgrimage, about 20,000 to 30,000 people walk the 2 1/2 -mile trail to the base of the statue. Some of the people make the 2½ mile trek on their knees or barefoot. For this report, ATSDR reviewed two EPA and one New Mexico Border Health Office surface soil data sets.

Soil samples have been collected in the Mt. Cristo Rey area by federal and state agencies. Soil samples were collected from non-vegetated, natural areas. Soil samples were collected by EPA contractors in July 2001 and February 2002 and analyzed for inorganic compounds, including arsenic and lead. Arsenic and lead concentrations from 0-1 inch ranged from >7 to 480 ppm and <34 to 3,000 ppm, respectively. The New Mexico Office of Border Health collected 5-point composite soil samples (0-1 inch) in July 2005 that were only analyzed for lead. The lead concentrations ranged from 310 to

1,500 ppm in these composite samples. To determine the public health significance of arsenic and lead in surface soil from the Mt. Cristo Rey area, we used the highest reported arsenic and lead concentration to estimate exposure.

The naturally occurring levels of arsenic and lead in soil from the area are approximately 7 and 34 ppm, respectively. A relative bioavailability study of arsenic in soil from El Paso County was prepared for EPA in May 2003 [EPA 2003]. Based on the results of this study, the relative bioavailability was derived for arsenic (40%) and estimated for lead (22%). It is believed that the arsenic and lead detected in the surface soil from the Mt. Cristo Rey area originated from the same industrial source (historical aerial deposition from the ASARCO smelter). As such, ATSDR used the bioavailability values in the dose estimates to determine the public health significance of arsenic and lead in the surface soils from the Mt. Cristo Rey area.

Based on observations of enzymatic abnormalities in the red blood cells at blood lead levels below 25 µg/dL and observations of neurologic and cognitive dysfunction in children with blood lead levels from 10-15 µg/dL, the CDC has determined that a blood lead level >10 µg/dL in children indicates excessive lead absorption and constitutes the grounds for intervention. The relationship between soil lead levels and blood lead levels is affected by factors such as the age of the population exposed to the contaminated soil, the physical availability of the contaminated soil, the bioavailability of the lead in the soil, and differences in individual behavioral patterns. While there is no clear relationship applicable to all sites, a number of models have been developed to estimate the potential impact that soil lead could have on the blood lead levels in different populations. In general, soil lead will have the greatest impact on the blood lead levels of preschool-age children. These children are more likely to play in dirt and to place their hands and other contaminated objects in their mouths. They are better at absorbing lead through the gastrointestinal tract than adults, and they are more likely to exhibit the types of nutritional deficiencies that facilitate the absorption of lead [ATSDR 2005].

For ATSDR's exposure evaluation, we assumed that a child (16 kg) and adult (70 kg) incidentally ingest 100 mg of soil; twelve times per year at the maximum reported concentrations for arsenic (480 ppm) and lead (3,000 ppm) using their respective bioavailability factors. The estimated exposure doses (acute and chronic) are below levels of concern for both arsenic and lead.

It is expected that typical exposure to soil in the Mt. Cristo Rey area will be episodic and short-term (acute) for children and adults. Due to the arid, undeveloped, and remote conditions, infants and small children are not expected to be unaccompanied by an adult and/or play in the area. Using the maximum reported concentrations, the bioavailability factors (arsenic (40%) and lead (22%)), and a recreational exposure scenario (one day/month), we do not expect cancer or non-cancer health effects in children or adults.

ATSDR does not believe that pica behavior is likely in the Mt. Cristo Rey area and was not evaluated. Pica behavior typically occurs in children less

than 3 years of age. In five separate studies on pica behavior, only one child, out of more than 600 children, ingested an amount of soil significantly greater than the range in other children. Although these studies did not include data for all populations and represented short-term ingestion only, it can be assumed that the incidence rate of children pica behavior in the general population is low.

Action Required/Conclusions/Recommendations/Info Provided: Based on ATSDR's public health conclusion categories, we have categorized this area as a "No Apparent Public Health Hazard", which means that exposure (past, current, and/or future) to lead and arsenic in soil is not expected to result in adverse health effects.

Epidemiologic studies [Lanphear et al. 1998] have found that children's blood lead levels (BLLs) increase by about 3.8 micrograms per deciliter for every 1,000 ppm increase in soil lead levels following residential exposure patterns (chronic exposure on a routine basis). Given this relationship and reported exposure patterns in the Mt. Cristo Rey Area, it is expected that the BLLs from exposure to lead in the Mt. Cristo Rey Area soil would be less than 10 ug/dL.

ATSDR's conclusions and recommendations are based upon the available information. If additional or new information becomes available, ATSDR is available to review the information and provide a determination as to the public health significance.

Signature: _____ Date: January 24, 2006

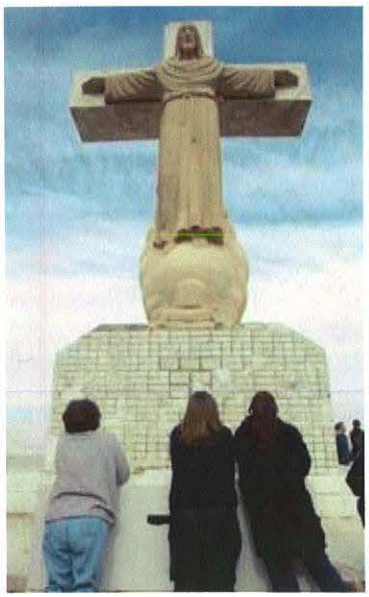

Figure 1, 2, & 3.

References:

Agency for Toxic Substances and Disease Registry (ATSDR). 2005. Toxicological Profile for Lead. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. September 2005.

Environmental Protection Agency (EPA). 2003. Relative Bioavailablity of Arsenic in Soils from El Paso County. May 2003.
http://www.epa.gov/earth1r6/6sf/el_paso_index.htm

Lanphear BP, Matte TD, Rogers J, et al. The contribution of lead-contaminated house dust and residential soil to children's blood lead levels: A pooled analysis of 12 epidemiologic studies. Environmental Research 1998;79:51-68.