Health Consultation

Arkansas Plating Company Remediation Review

ARKANSAS PLATING COMPANY
3021 NORTH ALBERT PIKE ROAD
FORT SMITH, SEBASTIAN COUNTY, ARKANSAS 72904

EPA FACILITY ID: ARD046139770

Prepared by the
Arkansas Department of Health

SEPTEMBER 16, 2009

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

Health Consultation: A Note of Explanation

A health consultation is a verbal or written response from ATSDR or ATSDR's Cooperative Agreement Partners 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 or ATSDR's Cooperative Agreement Partner which, in the Agency's opinion, indicates a need to revise or append the conclusions previously issued.

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SUMMARY

INTRODUCTION	In the residential area surrounding the Arkansas Plating Company site, ATSDR's top priority is to ensure that the community has the best information possible to safeguard its health and prevent people from coming in contact with harmful toxic substances.
CONCLUSION	**ATSDR concludes that touching or accidentally eating the soil at the Arkansas Plating Company remediated site is not expected to harm people's health because elevated chromium levels in the topsoil have been removed and are now below levels of health concern.**
BASIS FOR DECISION	Chromium can be found in air, soil, and water after release from the manufacture, use, and disposal of chromium-containing products. It is also a naturally occurring element found in rocks, animals, plants, and soil. When visiting or trespassing on the Arkansas Plating Company remediated site, the amount of chromium that might get into an adult's or child's body by touching or accidentally ingesting a small amount of the surface soil is below a level that would harm their health.
NEXT STEPS	No additional public health actions are needed concerning the Arkansas Plating Company remediated site surface and subsurface soil.
FOR MORE INFORMATION	If you have concerns about your health, you should contact your health care provider. You can also call ATSDR at 1 – 800 – CDC – INFO and ask for information on the Arkansas Plating Company remediated site.

Statement of Issues

In response to a request from the U.S. Environmental Protection Agency (EPA) Region 6, the Arkansas Department of Health (ADH) evaluated EPA's proposed clean-up levels and follow-up soil samples for the contaminants of concern (COCs) identified during the removal assessment for Arkansas Plating Company. Previously, ADH and ATSDR had reviewed and proposed clean-up levels to be used by EPA Region 6 as remediation goals for the Arkansas Plating Company site. The primary COCs identified at this site during the removal assessment were chromium, lead, and cyanide. Under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), ADH has prepared this health consultation to determine if exposures to contaminated soil (before, during, or after the removal process) could result in harm to the people involved in remediation and the surrounding community that had contact with the soil.

Background and History

The Arkansas Plating Company is located at 3021 North Albert Pike Road, Fort Smith, Sebastian County, Arkansas. The site, located in a mostly residential area of town, is an abandoned metal plating facility originating in the 1960's [1]. According to the Arkansas Department of Environmental Quality (ADEQ), hazardous waste permits were held from 1995 to 2000 [2]. Arkansas Plating specialized in the manufacturing of automobile bumpers, and went out of business in 2000. Since then, it has been used by the owners as a storage facility. On May 22, 2008, a fire occurred at the site. Following the fire, EPA Region 6 On-Scene Coordinators (OSCs) arrived to help complete the transfer of all hazardous materials and debris to designated areas on-site, as well as begin the removal process of debris to off-site locations. Soon after fire clean-up, EPA erected a temporary fence around the property and collected soil samples for data evaluation [1].

ADH initially responded to a request from EPA Region 6 offices on January 21, 2009, via ADH's ATSDR Region 6 representative. A subsequent phone call revealed that EPA OSCs were researching health-screening and clean-up values for chromium, lead, and cyanide, as these were the main COCs previously identified at the site. During a separate phone conversation (also on January 21, 2009), it was stated that EPA planned to demolish the fire-damaged office building and slab foundation at the site and remove all remaining hazardous surface [(0 – 6 inches) and some subsurface (6 inches – 3 feet)] soil in order to make the site protective of public health within the area. Although the site is zoned as commercial property, it is located within a one-mile radius to residential areas, schools, and a nursing home. The west side of this property is directly adjacent to residential property. Therefore, ADH proposed that clean-up standards should be as conservative as possible to ensure the health and safety of the residents, children, and immune-compromised individuals living in close proximity to the Arkansas Plating

Company. In collaboration with ATSDR, ADH sent a technical assistance letter with the recommended remediation goal screening values to EPA OSCs on January 27, 2009.

The final steps in the remediation process by EPA OSCs began in early 2009. Since then, the contaminated soil has been removed and shipped to appropriate hazardous waste treatment facilities, further soil sampling has been performed, and excavation and backfill with clean soil was completed during June and July 2009.

Discussion

Exposure to COCs is determined by examining human exposure pathways. An exposure pathway has five parts:

1. A source of contamination (e.g., hazardous compound(s) in the soil as a result of fire),
2. An environmental medium such as soil, water, or air that can hold or move the contamination,
3. A point at which people come in contact with a contaminated medium,
4. An exposure route, such as skin contact or accidental ingestion with the surface soil, and
5. A population who could come in contact with the contaminants.

An exposure pathway is eliminated if at least one of the five parts is missing and will not occur in the future. For a completed pathway, all five parts must exist and exposure to a contaminant must have occurred, is occurring, or will occur. For this evaluation, a complete pathway has been identified, since a source of COCs existed in the surface soil on-site. A resident or trespasser (child or adolescent) could accidently be exposed to the chromium, lead, or cyanide in the on-site surface soil through dermal contact or incidental ingestion while playing on the property of the former Arkansas Plating site. This scenario was considered due to the community complaint that children had been seen entering the property in the past.

As indicated by EPA OSCs, soil samples taken after the immediate clean-up of the fire (in 2008), identified chromium, lead, and cyanide as the COCs remaining on-site. It is understood that during immediate clean-up of the fire in May 2008, EPA Region 6, the Fort Smith Fire Department, and other parties involved safely removed all hazardous materials that traveled off-site. Therefore, off-site contamination is not an issue at Arkansas Plating for the purposes of this evaluation.

While evaluating potential public health effects due to exposures to the COCs in the environmental media (i.e. soil) from the Arkansas Plating site, ADH used ATSDR Health Comparison Values (CVs) for soil, where available. CVs are substance concentrations set well below levels that are known or anticipated to result in adverse health effects; so, concentrations

at or below the relevant CV may reasonably be considered protective. There are no listed soil CVs for chromium or lead. The CVs for cyanide are 1,000 ppm for a child and 10,000 ppm for an adult [3]. These are reference dose media evaluation guide (RMEG) levels for soil evaluation, and are adequately represented values that were used to base clean-up levels on for cyanide-contaminated soil at the Arkansas Plating site. Based on alternate environmental screening sources such as the EPA Region 6 Human Health Medium Specific Screening Levels, the clean-up levels selected for chromium (210 ppm) and lead (500 ppm) represented adequate values that were protective of public health. A clean-up screening value of 1,000 ppm for cyanide was also considered to be a protective public health value.

Contaminants of Concern

ATSDR's Toxicological Profiles for the compounds previously identified at the Arkansas Plating site were used to classify the health relevance for each COC. The carcinogenic properties for chromium, lead, and cyanide were considered when evaluating each human health exposure pathway.

Chromium can be found in air, soil, and water after release from the manufacture, use, and disposal of chromium-containing products. It is also a component of cigarette smoke. Chromium is a naturally occurring element found in rocks, animals, plants, and soil. It can exist in several different forms. Exposure to high levels of chromium (VI) may result in anemia or damage to the nose, stomach, or intestines. The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have determined that chromium (VI) compounds are known human carcinogens. Studies involving chromium have shown evidence of oral, gastrointestinal, and lung cancers in humans and animals [4].

Exposure to lead can happen from breathing workplace air or dust, eating contaminated foods, drinking contaminated water, or exposure to cigarette smoke. The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in the body, and may cause damage to the nervous system, kidneys, or reproductive system. There is no conclusive proof that lead causes cancer in humans. DHHS has determined that lead and lead compounds are reasonably anticipated to be human carcinogens, and the EPA has determined that lead is a probable human carcinogen. IARC has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans [5].

Cyanide is usually found joined with other chemicals to form compounds. Cyanides are fairly mobile in soil. Once in soil, cyanide can be removed through several processes. Some cyanide compounds in soil can form hydrogen cyanide and evaporate, whereas some cyanide compounds will be transformed into other chemical forms by microorganisms in soil [6].

The severity of the harmful effects following cyanide exposure depends in part on the form of cyanide, such as hydrogen cyanide gas or cyanide salts. Breathing air, drinking water, touching soil, or eating foods that contain cyanide can increase exposure; however, smoking cigarettes and breathing smoke-filled air during fires are the major sources of cyanide exposure. Exposure to lower levels of cyanide may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, or enlargement of the thyroid gland. There are no reports that cyanide can cause cancer in people or animals. EPA has determined that cyanide is not classifiable as to its human carcinogenicity [6].

Surface Soil Samples

The Arkansas Plating site was divided into approximately 65 sample grids, and follow-up soil samples were taken in June 2009 to determine where the COC exceedences were located. Samples were taken at a depth of: 0 – 6 inches, 6 – 12 inches, 12 – 18 inches, or 18 – 24 inches. See the "Sample Location Results Map" (provided by EPA Region 6 OSC) in Appendix A for the specific location and sample depth of each grid. There were 18 soil samples that had a concentration of chromium higher than the screening level of 210 ppm. The highest concentration was 6,810 ppm found in grid F5. Chromium exceedences above 210 ppm were found in the following grids: one sample in E4, one sample in E5, one sample in E6, one sample in F4, four samples in F5, one sample in F6, five samples in G5, three samples in G6, and one sample in H5. There was one lead concentration level found over the screening level of 500 ppm, which was 21,500 ppm lead taken from grid F5. The other samples tested for lead were lower, which indicates that there may have been a historical leak or spill in that one area of grid F5. See below for further explanations on lead evaluation.

There were no cyanide levels over the screening level of 1,000 ppm. The highest cyanide concentration was 428 ppm, found in grid G6. Because cyanide levels did not exceed screening concentrations, no further evaluation of this COC was done. See the tables in Appendix B for all reported analytical results of all COCs.

All grids containing a sample concentration that exceeded screening levels were excavated a half foot to 3 feet, depending on the COC levels. Grids E4, E5, E6, F4, and H5 were excavated to one half (½) foot. Grid G6 was excavated down to 1 ½ feet. Grid F6 was excavated down to 2 feet, and grids F5 and G5 were excavated down to 3 feet. These grids were located where the old process area and storage area were found on-site, which may account for the higher COC concentration levels around these grids.

There was only one sample that exceeded the screening-level concentration for lead. Lead has no risk assessment reference dose (RfD, *defined as a reference point from which to gauge the potential effects of the chemical at other dose concentrations and not likely to be associated with adverse health risks*). Instead of using a RfD to measure exposure, lead evaluation uses an

Integrated Exposure Uptake Biokinetic (IEUBK) model to measure exposure. Since other variables for the model were unknown and/or unavailable at the Arkansas Plating site, such as soil characteristics and other potential lead sources, it was not feasible to run the model for this sample. Additionally, the one sample point that did have the elevated lead level was excavated down to 3 feet. As this property is still zoned for commercial use, it is not likely that a child at play or trespasser will dig greater than 3 feet in this sample location on the Arkansas Plating property, and harmful exposure is therefore unlikely.

Evaluation of the highest four chromium-containing samples was performed using the ATSDR Toxicological Profile and Health Assessment Toolkit (TopHat). TopHat is a software program that provides the health assessor a means by which one can take site-specific chemical levels and estimate a theoretical excess health risk expressed as the proportion of a population that may be affected by a carcinogen during a lifetime of exposure [7]. Exposure pathway scenarios involving dermal (skin) contact or accidental ingestion of soil particulates were measured.

For the dermal pathway evaluation, the assumptions used in the calculations include: a contaminant concentration based on the laboratory reports; an exposure factor of one hour per day for 14 days per year over a one year period; a conversion factor (unitless); a body weight of 16 kilograms [(kg) or 35 pounds] for a child or 70 kg [154 pounds] for an adult; and a total soil adherence of 1750 milligrams (mg) for a child or 1358 mg for an adult. For the accidental ingestion pathway evaluation, the assumptions used in the calculations include: a contaminant concentration based on the laboratory reports; an ingestion rate of half (0.5) mg per day; an exposure factor (unitless); and a body weight of 16 kg for a child or 70 kg for an adult. These factors resulted in a calculated exposure dose (ED) in units of milligram per kilogram per day (mg/kg/day), which was then used to calculate a potential hazard quotient (HQ) and lifetime cancer risk (LCR) value for each concentration of chromium and each exposure pathway and receptor.

To put the calculated exposure doses into a meaningful context for non-cancer, acute effects [*meaning a rapid onset of an illness, or an illness that happens in less than a year (short duration)*] the HQ was calculated for each potentially exposed child or adult. An HQ is the average daily intake divided by a chemical specific RfD set by the EPA. If the HQ for a chemical is equal to or less than one, it is believed that there is no appreciable risk that non-cancer health effects will occur. If the HQ exceeds one, there is some possibility that non-cancer effects may occur, although an HQ above one does not indicate an effect will definitely occur. This is because of the margin of safety inherent in the derivation of all RfD values. The larger the HQ value, the more likely it is that an adverse effect may possibly occur. The cumulative HQ for dermal contact with chromium in the surface soil is 0.01. The cumulative HQ for accidental ingestion of chromium in the surface soil is 0.03. Therefore, the calculated HQ is less than one, and dermal contact with the surface soil is not expected to harm people's health. For

all individual HQ values of each exposure pathway and potentially exposed persons (child or adult), refer to Table 2 and Table 3 in Appendix B.

For LCR ranges, potential risks greater than one in 1,000,000 (or 1×10^{-6}), which likely represents no risk of cancer, but less than one in 10,000 (or 1×10^{-4}) are within the EPA's target risk range and considered an adequate level of health safety. If the additional lifetime cancer risk is greater than one in 10,000 (or 1×10^{-4}), it is generally considered an indicator that further evaluation may be warranted if the source of contamination is not removed.

The estimated cancer risks for a child (age 1 – 11) and an adult (age 18 – 70) were calculated for elevated chromium in soil for the dermal and accidental ingestion pathways. The cumulative LCR for dermal contact with chromium in the surface soil for a child and adult is 1.9×10^{-4} and 6.3×10^{-5}, respectively. The cumulative LCR for accidental ingestion of chromium in the surface soil for a child and adult is 6.3×10^{-4} and 1.5×10^{-4}, respectively. Refer to Table 2 and Table 3 in Appendix B for the theoretical potential risk values of each exposure pathway and potentially exposed persons (child or adult). Since the LCR calculations for chromium at this site are above the 1×10^{-4} guideline, a health hazard in the past was possible but information about past exposures is limited. However, all contaminated surface soil has been removed from this site by the EPA Region 6 coordinators, indicating that currently and in the future the surface soil is not expected to harm people's health.

Once the hazardous soil was removed off-site, all excavated grids were filled with clean backfill soil. Grass seed was applied to the entire property as a final step after all debris removal and excavation were complete, and the temporary fence was removed. The wooden privacy fence was left up at the back (western) side of the site between Arkansas Plating and the residence on Armour Street. According to the EPA Region 6 OSC, a misting operation was used on a few occasions during the demolition and soil excavation work to mitigate dust emissions to residents; however, this was infrequent given the fact there was a good deal of rain during this phase of the work.

Community Health Concerns

ADH/ATSDR attended a public meeting held by EPA Region 6 OSCs on May 7, 2009. Several area residents were in attendance and expressed an interest in the possible health effects of contaminated soil at the Arkansas Plating site and subsequent clean-up efforts. During the meeting, it was stated that ADEQ received a residential complaint of children entering under the fence line of the property. The general concern of the community centered on what adverse health effects could occur to the area residents, should the contaminated property not be properly cleaned-up. The citizens attending the meeting also expressed interest in obtaining some type of public document explaining an assessment of the clean-up and removal process. This health consultation document addresses those concerns.

Child Health Considerations

In communities faced with soil contamination, the many physical differences between children and adults may require special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children play outdoors and sometimes engage in hand-to-mouth behaviors that increase their exposure potential. Children are shorter than are adults; this means they breathe dust, soil, and vapors close to the ground. A child's lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. If toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Additionally, children are dependent on adults for access to housing, for access to medical care, and for risk identification. Therefore, adults need as much information as possible to make informed decisions regarding their children's health.

During this health consultation evaluation of the Arkansas Plating contaminated soil samples, the individual child exposure was examined due to the factors listed above. Scenarios of a child accidentally ingesting a small amount of some soil and/or making skin contact with the pre-remediation soil on the property were examined. Lifetime cancer risk calculations indicated there could have been elevated health risks from exposure to the existing contaminated soil had it not been remediated. Because the soil containing high concentrations of COCs was removed from the site and filled with clean soil, it was determined that post-remediated soil would not be a likely health risk. Since the remediated lot was seeded and the temporary fence was removed, parents and guardians of children in the area around the Arkansas Plating site should, as a prudent public health practice, make a concerted effort to keep all children from digging in the soil or playing on the property.

Conclusions

EPA OSC contractors have demolished remaining buildings, removed scrap metal, and removed and disposed of all hazardous and non-hazardous debris left on the Arkansas Plating site after the occurrence of the fire. The goal of the EPA OSC Removal Program was to resample and remove any contaminated surface (and some subsurface) soil in order to restore this property.

ADH/ATSDR concludes that touching or accidentally eating the soil at the Arkansas Plating Company remediated site is not expected to harm people's health because elevated chromium levels in the topsoil have been removed and are now below levels of health concern.

After evaluation of the elevated levels of chromium and a review of all subsequent EPA procedures, ADH/ATSDR has determined that any likely remaining concentrations of contaminants in the soil after the removal action at the Arkansas Plating site will not likely

adversely affect public health, both now and in the future. Although the potential LCR calculations illustrate values over the EPA's recommended risk range of greater than one in 10,000, all contaminated soil in the grids where these elevated concentrations were taken have been removed down to a depth of 3 feet. The potential of past exposure (including exposure during the removal process) to contaminated soil through skin contact or accidental ingestion may have occurred. However, it is based on theoretical calculations, and information will never be available as to exactly who had contact with the Arkansas Plating site during the past.

While this site is zoned as commercial property, it is reasonable to presume that no children will be playing on this site and no area residents will garden or excavate this site for private purposes. The exposure pathway has been eliminated since the topsoil (0 – 3 feet) is free of any residual contaminated soil, and therefore should not cause any adverse health effect if anyone accidentally ingests or makes skin contact with the soil at the Arkansas Plating site.

Recommendations

Since all debris and contaminated topsoil has been removed from the property (up to 2 or 3 feet), backfilled with clean soil, seeded, and the wooden fence remains between the property and adjacent residence, there are no further recommendations at this time.

Public Health Action Plan

The purpose of the Public Health Action Plan (PHAP) is to ensure that this health consultation not only identifies any public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. The PHAP implemented by ADH/ATSDR with regards to the Arkansas Plating Company site is as follows:

Completed Actions

- Responded to a request from EPA Region 6 to identify clean-up levels in soil samples for the COCs at the Arkansas Plating site.
- Evaluated reasonable screening levels and clean-up levels of COCs to be protective of public health, and sent corresponding letter of technical assistance to EPA OSC on January 27, 2009.
- Attended the public meeting held by EPA (May 7, 2007) and answered citizen questions regarding potential adverse health effects of contaminated soils on-site.
- Assessed surface and subsurface soil data via this health consultation and supported the remediation process followed by EPA.

Future Activities

- Continue to provide education to the public and address citizen requests in regards to this site, as requested.

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Certification

The Arkansas Department of Health prepared this health consultation for Arkansas Plating Company at 3021 North Albert Pike Road, Fort Smith, Sebastian County, Arkansas, under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was completed in accordance with approved methodology and procedure existing at the time the health consultation was initiated. Editorial review was completed by the cooperative agreement partner.

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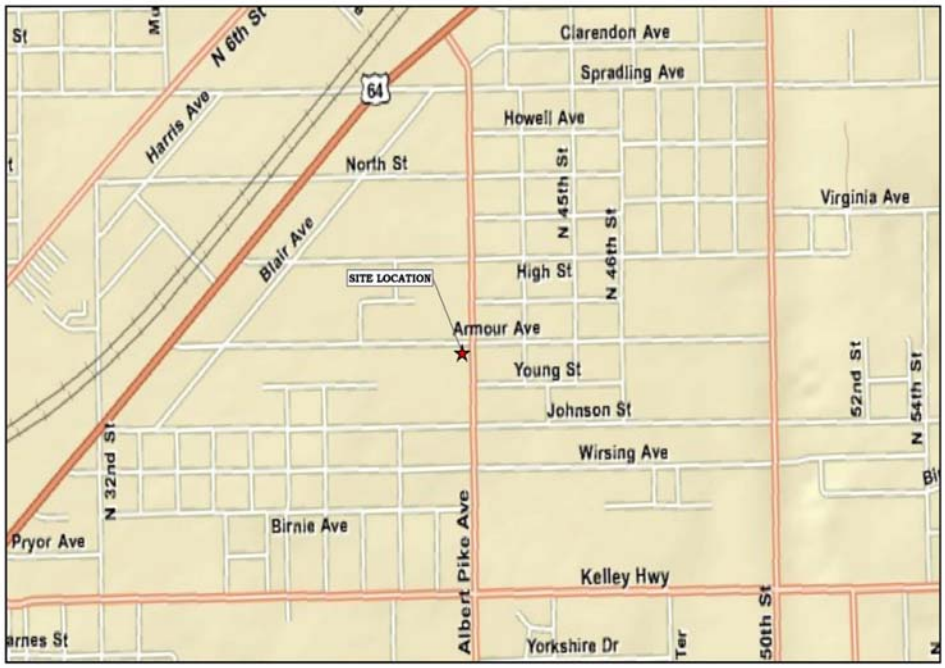
The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.

Alan W. Yarbrough
Cooperative Agreement Team Leader, DHAC, ATSDR

References

1. U.S. Environmental Protection Agency, Arkansas Plating Company Site Fact Sheet; July 2008.
2. Arkansas Department of Environmental Quality, Arkansas Hazardous Waste Generators Facility Summary Database: http://www.adeq.state.ar.us/hazwaste/rcra2/facil_sum.asp#Display; accessed January 22, 2009.
3. Agency for Toxic Substances and Disease Registry, Health Guideline Comparison Values: Soil Comparison Values; SEQUOIA; January 22, 2009.
4. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Chromium *(Draft for Public Comment)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. 2008.
5. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Lead *(Update)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. 2007.
6. Agency for Toxic Substances and Disease Registry (ATSDR). Toxicological profile for Cyanide *(Update)*. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service. 2006.
7. Agency for Toxic Substances and Disease Registry (ATSDR) *TopHat Tool*. Exposure Dose Calculator.

Appendix A: Site Maps



Street map: Site location is 3021 North Albert Pike Avenue, Fort Smith, Sebastian County, AR.

Aerial photo: Arkansas Plating Company building descriptions.
All maps provided by EPA Region 6 OSC.

ARMOUR STREET
NORTH ALBERT PIKE ROAD
0
50
100
SCALE IN FEET
LEGEND
PROPOSED EXCAVATION DEPTH (FEET)
0 - 5.5
0 - 10
0 - 15
0 - 20
EXCEEDED CHROMIUM CONCENTRATIONS
NO
YES
Arkansas
NOTE: SHOWN EXCEEDENCE LOCATIONS ARE BASED ON PRELIMINARY, NON-VALIDATED DATA
US EPA REGION 6
START- 3
SAMPLE LOCATION RESULTS MAP
ARKANSAS PLATING
3021 N. ALBERT PIKE ROAD
FORT SMITH
SEBASTIAN COUNTY, ARKANSAS

Appendix B: Tables

Table 1*:

Analytical Results
Process Area and Associated Structures
Arkansas Plating
Fort Smith, Arkansas

Grid	Depth	Chromium (mg/kg)	Lead (mg/kg)	Cyanide (mg/kg)	Total PCBs (mg/kg)
E4	0 - 6	353	70	29.9	242
E4	6 - 12	43.2	35.9	1.4 J	99.2
E4	12 - 18	35	43.3	0.42	ND
E4	18 - 24	24.2	12.1	0.36 J	ND
E5	0 - 6	213	48.6	31.2	0.126
E5	6 - 12	108	43.3	9	0.0459
E5	12 - 18	52.4	46.8	2.3 J	ND
E5	18 - 24	181	29.8	3.1	ND
E6	0 - 6	211	48.2	30.9	171.7
E6	6 - 12	109	43.6	9.1	ND
E6	12 - 18	52.1	46.5	2.3 J	ND
E6	18 - 24	67.4	15.7	0.88 J	ND
E6 - Dup	18 - 24	66.2	14.1	1.1 J	ND
F4	0 - 6	237	97.5	13.1	0.2488
F4	6 - 12	73.9	35	3 J	0.0718
F4	12 - 18	35.5	10	1.3 J	ND
F4	18 - 24	36	13.9	0.29 J	ND
F5	0 - 6	1230	142	333	113
F5	6 - 12	942	22.3	10.8	95
F5	12 - 18	873	47.9	7.1	ND
F5	18 - 24	6810	21500	72.1	ND
F6	0 - 6	49.5	33.1	3.2	ND
F6	6 - 12	65.7	22.9	1.2 J	ND
F6	12 - 18	48.3	15.2	1 J	ND
F6 - Dup	12 - 18	58.4	25.2	1.7 J	ND
F6	18 - 24	355	1.5 J	1.5 J	ND
G5	0 - 6	3390	85.4	22.7	ND
G5 - Dup	0 - 6	4050	55.7	8.5	ND
G5	6 - 12	3660	19.9	4	ND
G5	12 - 18	4160	20.6	5	ND
G5	18 - 24	4380	14.6	6.4	ND
G6	0 - 6	928	37	428	ND
G6	6 - 12	882	23.9	121	ND
G6	12 - 18	439	44.5	9.5	ND
G6	18 - 24	206	24.6	14	ND
H5	0 - 6	284	38.3	2.5 U	ND
H5 - Dup	0 - 6	93.8	36	2.5 U	ND
H5	6 - 12	189	18	2.5 U	ND
H5	12 - 18	204	10.5	2.5	ND
H5	18 - 24	96.6	8	2.5 U	ND

Notes:

Shaded - Reported Concentration Exceeds the Action Level.
U - Indicates the analyte was analyzed for but not detected.
J - Result is less than the reporting limit but greater or equal to the method detection level and the concentration is an approximate value.
ND - Not Detected

Action Levels:

Chromium - 210 mg/kg
Lead - 500 mg/kg
Cyanide - 1000 mg/kg

*As collected and reported by EPA OSC contractors, June 2009.

Table 2. Theoretical Risks of Potential *Dermal Contact* with Chromium Contaminated Soil

Sample Grid	Depth (inches)	Chromium Concentration (ppm)	Child HQ	Adult HQ	Child LCR	Adult LCR
F5	18 - 24	6810	0.02	0.007	**2.7E -04**	8.7E -05
G5	18 - 24	4380	0.014	0.005	**1.70E-04**	5.80E-05
G5	12 - 18	4160	0.013	0.004	**1.60E-04**	5.40E-05
G5	0 - 6	4050	0.013	0.004	**1.60E-04**	5.40E-05

ppm = parts per million; HQ = hazard quotient; LCR = lifetime cancer risk

Table 3. Theoretical Risks of Potential *Accidental Ingestion* with Chromium Contaminated Soil

Sample Grid	Depth (inches)	Chromium Concentration (ppm)	Child HQ	Adult HQ	Child LCR	Adult LCR
F5	18 - 24	6810	0.07	0.02	**8.7E -04**	**2.3E -04**
G5	18 - 24	4380	0.05	0.01	**5.80E-04**	**1.30E-04**
G5	12 - 18	4160	0.04	0.01	**5.40E-04**	**1.20E-04**
G5	0 - 6	4050	0.04	0.01	**5.40E-04**	**1.20E-04**

ppm = parts per million; HQ = hazard quotient; LCR = lifetime cancer risk

Appendix C: Site Pictures

All pictures provided by EPA Region 6 OSC.

View of damage after fire of one of the buildings on Arkansas Plating site.

Old Process Area at Arkansas Plating site.

All pictures provided by EPA Region 6 OSC.

View of Arkansas Plating site after the fire from North Albert Pike Ave.

Temporary fence built by EPA during remediation process at Arkansas Plating site.