Health Consultation

REMEDIATION OF U.S. FORGECRAFT CORPORATION SITE
95 SOUTH 3RD STREET
FORT SMITH, SEBASTIAN COUNTY, ARKANSAS 72478

EPA FACILITY ID: ARD006341747

ARKANSAS FACILITY IDENTIFICATION NUMBER: 66-00145

NOVEMBER 27, 2006

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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Arkansas Department of Health and Human Services
Division of Health
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry
Atlanta, Georgia 30333

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STATEMENT OF ISSUES AND BACKGROUND

Statement of Issues

In response to a request from the Environmental Protection Agency (EPA) Region 6, the Arkansas Division of Health (ADOH) of the Arkansas Department of Health and Human Services has evaluated EPA's proposed action levels (PALs) for the contaminants of concern identified during the removal assessment for U.S. Forgecraft Corporation (USFC) [1,2]. The contaminants of concern at the site are arsenic, lead, cadmium, chromium, and polycyclic aromatic hydrocarbons (PAHs) (see Appendix A, Table 1).

Under cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), ADOH has prepared this document. This written response describes the methods used by ADOH in determining the appropriateness of the PALs as remediation goals for the USFC site while mindful of ATSDR's mission "…to prevent harmful exposures and disease related to toxic substances."

Action Level: a risk-based concentration of a hazardous constituent in groundwater, soil, or sediment that may trigger further investigation into possible contamination at a particular site.

Contaminants of Concern: specific chemicals at a site that are chosen to be evaluated.

Removal Action: typically are simple cleanups using proven technologies, to quickly reduce obvious threats posed by contamination at a site.

Removal Assessment: an analysis of available treatment technologies that may be used to conduct a Removal Action at a site.

Background

USFC is located at 95 South 3rd Street, Fort Smith, Arkansas (see Appendix B, Figure 1). The corporation operated a metal finishing and plating facility at the site from the 1970s until ceasing operations in February 2002. Four months later, USFC filed for Chapter 11 bankruptcy protection [2,3].

During the spring of 2004, the Arkansas Department of Environmental Quality (ADEQ) categorized, segregated, and staged waste in 55-gallon drums at the USFC site. Upon completion of this task, ADEQ requested EPA address the potential threats to human health and the environment associated with the site. EPA Superfund Technical Assessment and Response Team (START-2) contractor Weston Solutions, Inc. was tasked to perform a removal assessment and to provide technical assistance during the removal assessment. START-2 identified contaminants exceeding the EPA Region 6 Human Health Medium-Specific Screening Levels (HHMSSL) for soil at the site (arsenic, lead, cadmium, chromium, and PAHs) [2,4].

On October 21, 2005, EPA's On-Scene Coordinator for the USFC site formally requested ADOH and ATSDR prepare a written review for the site that would address the appropriateness of the PALs for arsenic (24 milligrams per kilogram (mg/kg); or 24 parts per million (ppm)), lead (500 mg/kg; or 500 ppm), cadmium (137 mg/kg; or 137 ppm), total chromium (391 mg/kg; or 391 ppm), and PAHs (3 mg/kg; or 3 ppm). The rationale

for the contaminant-associated PALs was their historical use at various sites and the potential exposures during future recreational use of the property [1,2].

As part of our site evaluation, ADOH Epidemiology Branch members met with a representative of ADEQ designated as the USFC site contact. The purpose of the site visit was to characterize both the physical site as well as the human populations on and near the site.

As for the site's physical characteristics, the property is composed of four areas covering almost 4 acres in an area primarily used for industrial, commercial, and tourism purposes. Area A consists of offices and manufacturing process buildings. Located in Area B are two storage buildings, a tool and die building, and two open gravel parking lots. Area C was used as an open parking lot. Area D, now owned by the Fort Smith Streetcar Restoration Association, consists of two canopy storage areas and a storage building. Two active railroad tracks divide the property separating Area A from the rest of the property. The Fort Smith National Historic Site abuts the northern property line of the site. The Fort Smith Trolley Museum and the Fort Smith National Cemetery define the eastern boundary, while the south is marked by undeveloped land. The Poteau River borders USFC to the west [2].

In an EPA Pollution Report, dated March 27, 2006, "it was observed that a number of vagrants currently reside in the abandoned buildings." During our site visit, Area's A, B, and D were found to be fenced and gates locked. However, evidence of trespassers (transient/homeless population) on site included recently used fast food items/beverages and clothing items. EPA has since addressed the problem by having the perimeter fence repaired and warning signs hung [4]. No residential areas are close to the USFC site.

DISCUSSION

START-2 collected 353 soil samples from the USFC site to determine the presence of potential site-related contamination. The EPA Field Environmental Decision Support (FIELDS) software program, a decision tool to support sampling and remedial decision-making, was used to establish a sampling grid and to ensure a 95% confidence level of identifying contaminants of concern. The EPA Geoprobe, a vehicle-mounted direct-push soil and groundwater-sampling machine, was utilized to collect surface and subsurface grab soil samples. Soil samples were collected at the following depths: 0 to 6 inches below ground surface (bgs); 6 to 12 inches bgs; 12 to 18 inches bgs; and 18 to 24 inches bgs within vegetative or gravel areas. To collect soil samples below the concrete foundations of buildings in Area A and B, a coring subcontractor was hired. Based on the review of the analytical data and surveying that was conducted at the site, START-2 selected the contaminants of concern for having exceeded their respective environmental guideline comparison value (CV) [2].

> ***Comparison Value (CV):*** calculated concentration of a substance in air, water, food, or soil that is unlikely to cause harmful health effects in exposed people. The CV is used as a screening level. Substances found in amounts greater than their CVs might be selected for further evaluation in the health assessment process.

CVs act as an initial screening tool to more narrowly define the focus of the health consultation. While concentrations at or below the relevant CV may reasonably be considered safe, it does not automatically follow that any environmental concentration that exceeds a CV would be expected to produce adverse health effects. The probability that such effects will actually occur depends, not on environmental concentrations alone, but on unique combinations of site-specific conditions and individual lifestyle and genetic factors that affect the route, magnitude, and duration of actual exposure.

> ***Health Consultation:*** a written document that is a review of available information used to determine potential human health risks posed by site contamination.

The contaminants of concern (arsenic, lead, cadmium, chromium, and PAHs) were examined on the basis of the proposed future recreational use of the site. ATSDR generally considers that for most exposure scenarios, dermal exposure is a minor contributor to the overall exposure dose relative to the contributions of ingestion and inhalation exposures. Furthermore, vegetative cover of the site after remediation will be an effective barrier in limiting dermal exposure to soil. Therefore, an estimated dermal exposure dose was not examined.

Arsenic found in soil either naturally occurring or from anthropogenic releases forms insoluble complexes with iron, aluminum, and magnesium oxides found in soil surfaces. In this form, arsenic is relatively immobile. Likewise, cadmium and chromium are stable compounds that do not undergo significant chemical transformation and are stable in soil. Soil and sediments also appear to be important sinks for lead. Most lead is retained strongly in soil. Environmental partitioning of benzo[a]pyrene (BaP), often selected as a surrogate for other PAH compounds, is mainly between soil (82%) and sediment (17%) with air representing less than 1 percent of the chemicals' fate [5-9]. Taking these factors into account, ADOH evaluated incidental ingestion of soil and excluded inhalation as a likely route of exposure.

Health Effects Evaluation

Exposure variable values used in the health consultation process were determined/selected based on future land use (recreational), EPA default exposure factors, PALs for contaminants of concern, and characterization of exposure setting. These values were used to calculate an estimated exposure dose for each of the contaminants using the following equation:

Exhibit 1. Soil Ingestion Exposure Dose Equation

$$D = \frac{CS \times IR \times EF \times ED \times ET \times [1\ day/24\ hours]}{BW \times AT}$$

Where,

D = exposure dose
CS = concentration in soil
IR = ingestion rate
EF = exposure frequency
ED = exposure duration
ET = exposure time
BW = body weight
AT = averaging time

Environmental Protection Agency - Default Soil Ingestion Rates

100 mg/day - adult, average soil ingestion rate
200 mg/day - child, average soil ingestion rate

Note:
mg/day - milligrams per day

Source: Guidance for Conducting Risk Assessments and Related Risk Activities for the DOE-RO Environmental Management Program [10].

The estimated exposure doses were compared to health guideline values. Reference doses (RfDs) and hazard quotients (HQs) are examples of health guidelines used for noncarcinogenic effects. The RfD is a numerical estimate of a daily oral exposure to the human population, including sensitive subgroups such as children, that is not likely to cause harmful effects during a lifetime. A HQ is the ratios of an estimated site-specific exposure to a single chemical from a site over a specified period to the estimated daily exposure level, at which no adverse health effects are likely to occur. Cancer slope factors (CSFs) are health guidelines used to measure the relative potency of various carcinogens.

Recreational land use addresses exposure to people engaged in outdoor activities who spend a limited amount of time at or near the site. Under this land use, exposure to visitors was limited to 8 hours a day, 75 days per year. The exposure duration assumed the exposure to occur for 30 years for noncarcinogenic compounds and 70 years for carcinogenic compounds. Exposure duration was divided into two parts for evaluation of noncarcinogenic compounds. The first was 6 years exposure duration for young children with an average ingestion rate of 200 milligrams per day (mg/day) and body weight of 15 kilograms (kg; or 33 pounds). The second was 24 years exposure duration for older children and adults with an average ingestion rate of 100 mg/day and body weight of 70 kg (154 pounds).

Non-carcinogenic health risks for arsenic, cadmium, total chromium, and the PAH BaP were estimated using HQs. HQ values greater than 1 exceed EPA's risk-based target and indicate that exposure to the contaminants are likely to result in harmful effects. As seen in Appendix A, Table 1, HQs do not exceed the risk-based target for arsenic (child: 0.074; adult 0.0077), cadmium (child: 0.14; adult 0.013), total chromium (child: 0.026; adult 0.013), or BaP (child: 0.0003; adult 0.00003) at the PAL. Therefore, the PALs for these contaminants are considered protective of human health.

Because elemental lead does not have a reference dose, the Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children was used to assess the appropriateness of its respective PAL. The IEUBK program calculates a lognormal probability distribution of blood lead concentration in children exposed to various environmental media (air, soil, dust, and diet). The IEUBK model maximum result (7 micrograms per deciliter (µg/dL)), using the PAL of 500 mg/kg for lead, did not exceed the threshold for a blood lead level of 10 µg/dL. Since no adverse health effects are expected to occur as a result of exposure to lead at a concentration of 500 mg/kg, the PAL for lead is considered protective of human health.

The additional or excess lifetime (70 years) cancer risk of developing cancer due to exposure at the USFC site to a toxic substance was estimated using the linear low-dose cancer risk equation. Risks greater than one in one million (1×10^{-6}) but less than one in ten thousand (one additional case of cancer per 10,000 people; or 1×10^{-4}) are within EPA's target risk range. If the additional lifetime cancer risk is greater than one in ten thousand, it is generally considered *unacceptable* [11]. EPA has derived CSFs for arsenic and BaP. The baseline carcinogenic risk assessment for both arsenic (child: 1.0×10^{-4}; adult 6.0×10^{-5}) and BaP (child: 2.0×10^{-5}; adult 2.0×10^{-6}) were found to be within the target risk range.

Linear Low-Dose Cancer Risk Equation

Risk = CDI x CSF

where:

Risk = a unitless probability of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years (mg/kg-day); and

CSF = cancer slope factor, expressed in $(mg/kg\text{-}day)^{-1}$.

COMMUNITY HEALTH CONCERNS

During the assessment of the site, ADOH received a comment by a concerned citizen in December 2005 that a transient/homeless population was trespassing onto the USFC property. No further comments have been received since EPA secured the site and hung warning signs around the parameter of the fence.

CHILD HEALTH INITIATIVE

In communities faced with air, water, or food contamination, children could be at greater risk than adults from certain kinds of exposures to hazardous substances. Children have lower body weights than adults. If toxic exposure levels are high enough during critical growth stages, then the developing body systems of children can sustain permanent damage. We recognize that children are dependent on adults for access to housing and medical care and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children's health.

In the preparation of this health consultation, the health and wellbeing of children was considered. Risk to child health was calculated using an ingestion rate for dust/soil more sensitive than that of an adult. This is a conservative approach that is recommended by

EPA [12]. None of the PALs were exceeded; therefore, no health risk to children would be expected.

CONCLUSIONS

ADOH determined that exposure to the contaminants of concern at the EPA PALs pose *No Apparent Public Health Hazard* (assuming that the USFC property is used for recreational purposes as proposed by EPA Region 6). This category (*No Apparent Public Health Hazard)* is applied to sites where exposure to site-related chemicals might have occurred in the past or is still occurring, but the exposures are not at levels likely to cause adverse health effects.

RECOMMENDATIONS

ADOH recommends that EPA or its designee affirm site remediation goals have been met.

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 ADOH for USFC is as follows:

Completed Actions

- ADOH /ATSDR cooperative agreement staff were accompanied by the designated site contact (ADEQ) on a site visit of USFC in December 2005.
- ADOH completed a community needs assessment in January 2006.
- ADOH sent to EPA Region 6 (and other stakeholders), in May 2006, an initial evaluation of the action levels proposed by EPA for the contaminants of concern identified at the USFC site.
- ADOH /ATSDR cooperative agreement staff conducted a follow-up site visit in June 2006.

Future Activities

- ADOH will conduct health education in the community as needed, and/or requested.

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CERTIFICATION

This health consultation for U.S. Forgecraft was prepared by the Arkansas Department of Health and Human Services 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.

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APPENDICES

Appendix A - Table

Table 1. The proposed action levels for the contaminants of concern at the U.S. Forgecraft site

Contaminant	PAL *	RfD † (mg/kg/day)	Cancer Slope Factor (mg/kg/day)	Estimated Daily Exposure Dose from Ingestion (mg/kg/day)		Recreational - Hazard Quotient		Cancer Risk	
				Adult	Child	Adult	Child	Adult	Child
Arsenic	24	3.0×10^{-4}	1.5	2.3×10^{-6}	1.4×10^{-5}	0.0077	0.047	6.0×10^{-5}	1.0×10^{-4}
Lead	500	NA ‡	NA	4.9×10^{-5}	5.1×10^{-4}	NA	NA	NA	NA
Cadmium	137	1.0×10^{-3}	NA	1.3×10^{-5}	1.4×10^{-4}	0.013	0.14	NA	NA
Chromium (Total)	391	3.0×10^{-3}	NA	3.8×10^{-5}	7.7×10^{-5}	0.013	0.026	NA	NA
Benzo (a)pyrene §	3	1.0×10^{-2}	7.3	2.9×10^{-7}	3.0×10^{-6}	0.0003	0.00003	2.0×10^{-6}	2.0×10^{-5}

(mg/kg/day) = milligram per kilogram per day
* PAL (Proposed Action Level) units are in milligram per kilogram (mg/kg)
† RfD = Reference Dose = an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of harmful effects during a lifetime (70 years)
‡ NA = Not Available
§ Benzo (a)pyrene is a surrogate for other PAH compounds.

Appendix B - Figure

Figure 1. Site Areas - U.S. Forgecraft, Fort Smith, Sebastian County, Arkansas [from EPA, Region 6]