Health Consultation

CHROMASCO MINING AND SMELTING CORPORATION

MEMPHIS, SHELBY COUNTY, TENNESSEE

JUNE 2004

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
The Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

Health Consultation

Chromasco Mining and Smelting Corporation

Memphis, Shelby County, Tennessee

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Prepared by:
The Tennessee Department of Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry
Atlanta, Georgia, 30333

Background and Statement of Issues

From 1952 to 1980, Chromasco Mining and Smelting Corporation (Chromasco) produced alloys of ferrochrome, ferrosilicon, and ferromanganese. The Chromasco site is on 92 acres at 3328 Fite Road in Woodstock (Millington), Tennessee, 38053, approximately 6 miles north of Memphis (WRS 2001) (Figure 1). Chromasco used coke, gravel, chrome ore, and manganese ore as principal raw materials. Although furnace operations ceased in 1980, from 1981 to 1983 the plant operated as a ferrochrome slag concentrator. Due to metals pollution, the Chromasco site would later become a state Superfund site. After remedial investigation and cleanup action in November 2001, the site was de-listed. Buildings, chromium-contaminated slag, and other materials were allowed to remain on site. A deed restriction prevented the metals contamination from being unearthed and spread (SWM 2004).

A recent inquiry to the Tennessee Department of Environment and Conservation (TDEC) asked if the Chromasco site should be re-listed under Superfund and additional cleanup performed. This led to the Division of Superfund (DSF) asking the Tennessee Department of Health (TDH), Environmental Epidemiology (EEP), to perform an environmental public health investigation. Specifically, TDEC DSF asked EEP whether health hazards existed from the Chromasco site; and asked EEP to assist in determining whether additional Superfund action was necessary.

During the Superfund remediation, six areas of the site required removal action. The areas important to this consultation included slag areas, pond sediment, and ore storage. Premobilization confirmation sampling and analysis allowed for soil and sediment disposal as non-hazardous material (WRS 2001). An on-site process landfill was closed and capped with clean fill.

Industrial neighbors are in close proximity to the site. Approximately, 700 people are employed in eight nearby businesses, including an automobile racetrack that has approximately 500,000 spectators each year. No residential homes were observed near the site. The closest residential areas and two schools are located more than 1 mile away.

On April 16, 2004, EEP staff members, David Borowski and Bonnie Bashor, performed a site visit at Chromasco. Jerrell Moore of DSF and a Chromasco site manager provided access and assistance. The Chromasco site perimeter was well maintained. All fences and gates appeared sturdy. No signs of trespassing, such as litter or tire tracks, were observed. Several old buildings are in various stages of disrepair (Figure 2). Although little vegetation is present at the site, the surface appeared intact. Much of ground surface around the buildings is entirely concrete or asphalt. Several 2–3 foot wide streams and wet weather conveyances appeared to contain surface water.

Indicators of metals pollution were obvious. On the ground, pieces of raw materials and lumps of slag were present. An on-site stream, running in a channel about 2 feet below ground level, contained flowing water that was green in color (Figure 3) – a common characteristic of chromium in water. During the site visit, the wind was blowing strongly; however, no fugitive dust was observed on that cold wet day.

Site characterization was part of the Superfund investigative process (WRS 2001). In November and December 2000, 1,826 tons of metals-contaminated soil were hauled away, as were 847 tons of metals-contaminated sediment. The on-site process landfill was mostly left undisturbed. The process landfill contains high concentrations of metals. It was not a permitted landfill, and it lacks any liner or leachate collection system. During remediation the landfill was determined stable enough to be capped with soil, closed, and listed as a hazardous materials landfill. The property deed restriction and chain-link fences were considered appropriate safety measures.

Discussion

Table 1: Concentration ranges of metals (ppm) measured in soils and sediments (from unspecified depths) post excavation of remedial action at the Chromasco Mining and Smelting Corporation site (WRS 2001).

Location	*chromium(VI) (Cr^{6+})*	*Chromium(III) (Cr^{3+})*	*arsenic (As)*	*Manganese (Mn)*
Slag Area 1	*<0.19* – 0.62	330 – 2,100	3.0 – 7.0	1,800 – 6,000
Slag Area 2	*<0.19* – 0.84	360 – 3,900	4.8 – 18.0	270 – 33,000
Pond sediment	*<0.19* – *<0.19*	730 – 1,200	4.9 – 5.2	4,000 – 5,200
Ore Stockpile Area	*<0.19* – *<0.19*	280 – 1,900	3.9 – 29.0	430 – 74,000
Ditch	*<0.19* – 0.66	690 – 3,800	5.3 – 22.0	3,400 – 29,000

<0.19 = values reported in italics were Below Detection Limit (BDL)

Table 1 presents the concentrations of metals which remain in post-remedial, on-site soils. Chromium, the majority of which is in the form of trivalent chromium(III), is an abundant metal contaminant. Other metals of potential concern are lead, manganese, and arsenic (WRS 2001). The remediation plan did allow for some of the pollution to remain on-site. The old process landfill is believed to be the largest remaining source of metals. Metals pollution from numerous aspects of ore smelting has been documented in soils over much of the site.

To determine whether persons are, have been, or are likely to be exposed to chemicals, TDH EEP evaluates mechanisms that could lead to human exposure. An exposure pathway contains five elements:

1. a source of contamination,
2. contaminant transport through an environmental medium,
3. a point of exposure,
4. a route of human exposure, and
5. a receptor population.

An exposure pathway is considered complete if there is evidence that all five of these elements are, have been, or will be present at the site. It is considered either a potential or an incomplete

exposure pathway if there is no evidence that at least one of the five elements listed above are, have been, or will be present at the site, or if there is a lower probability of exposure.

When a chemical is released from an area such as an industrial plant or from a container such as a drum, it enters the environment. A chemical release does not, however, always lead to human exposure. Persons can be exposed to a chemical when contact is made by breathing, eating, drinking, or otherwise touching it. During this environmental public health investigation no complete exposure pathways for people living, working, or recreating in proximity to the Chromasco site were identified.

Furthermore, physical contact with a potentially harmful chemical in the environment by itself does not necessarily mean that a person would develop adverse health effects. A chemical's ability to affect public health is also controlled by a number of other factors, including:

- how much chemical a person is exposed to (dose)
- how long a person is exposed to the chemical (duration)
- how often a person is exposed to the chemical (frequency)
- the person's age
- the person's diet and nutritional habits.

Groundwater monitoring data shows that total chromium and lead are present in groundwater (SWM 2004). According to the Memphis-Shelby County Health Department (2004), no one within 1 mile should be drawing groundwater for drinking water. Nearby wells are all annually sampled and permitted for industrial use only.

Child Health Considerations

TDH recognizes that in communities faced with air, water, or food contamination, the many physical differences between children and adults demand special emphasis. Children could be at greater risk than adults from certain kinds of exposure to hazardous substances. Children have lower body weights than adults. Yet because children drink a larger volume of water per mass of body weight than adults, a child's lower body weight and higher intake rate results in a greater dose of chromium per unit of body weight. Additionally, if toxic exposure levels are high enough during critical growth stages, the developing body systems of children can sustain permanent damage. Finally, TDH recognizes that children are dependent on adults for access to housing, for access to medical care, and for risk identification. Thus, adults need as much information as possible to make informed decisions regarding their children's health.

With these concepts in mind, TDH determined that children faced no disproportionate hazards from the Chromasco site in its current state. This conclusion is supported by the following details. The likeliness of children trespassing on the Chromasco site during playtime was considered. The site is at least a mile from residential areas. The fence and locked gate are intact. During the site visit, no signs of trespassing were observed. Since no residential or school areas are within 1 mile, wind blown dust should not be an issue. Since no groundwater is used for residential drinking water, no children should be in danger of drinking contaminated water. No complete exposure pathway was identified for children.

Conclusion

Pollution from metals exists in soil and groundwater at the Chromasco site. The Chromasco site appeared to be well maintained, and trespassing did not seem to be a problem. No exposure pathways were identified which would bring the chemicals into contact with people. Consequently, no apparent public health hazard exists at the Chromasco site. However, for anyone at the site— whether working or trespassing—the many dilapidated buildings of metal and concrete are a physical hazard. If site conditions change or land use alterations are proposed, then the site will need to be re-evaluated for potential exposure pathways.

Recommendations

None.

Public Health Action Plan

Environmental Epidemiology will provide copies of this health consultation to appropriate regulatory, environmental, and public health agencies. EEP is available to investigate the environmental public health issues at Chromasco if site conditions change or land use alterations are proposed. A site visit is encouraged during warm, dry weather to insure that fugitive dust is not an environmental public health concern.

References

[MSCHD] Memphis-Shelby County Health Department. 2004. Water Quality Branch and Septic Tank Program. Emails on Fite Rd Well Survey. Memphis, TN.

[SWM] Tennessee Department of Environment and Conservation. 2004. Division of Solid and Hazardous Waste Management. March 18 Memorandum from Ruth Chen, Ph.D., MPH, to Mr. Norman LaChapelle, Memphis and Shelby County Health Department. Nashville, TN.

[WRS] WRS Infrastructure & Environment, Inc. 2001. Chromasco site, TDSF site #79-522, final remediation summary. Clarkston, GA.

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Certification

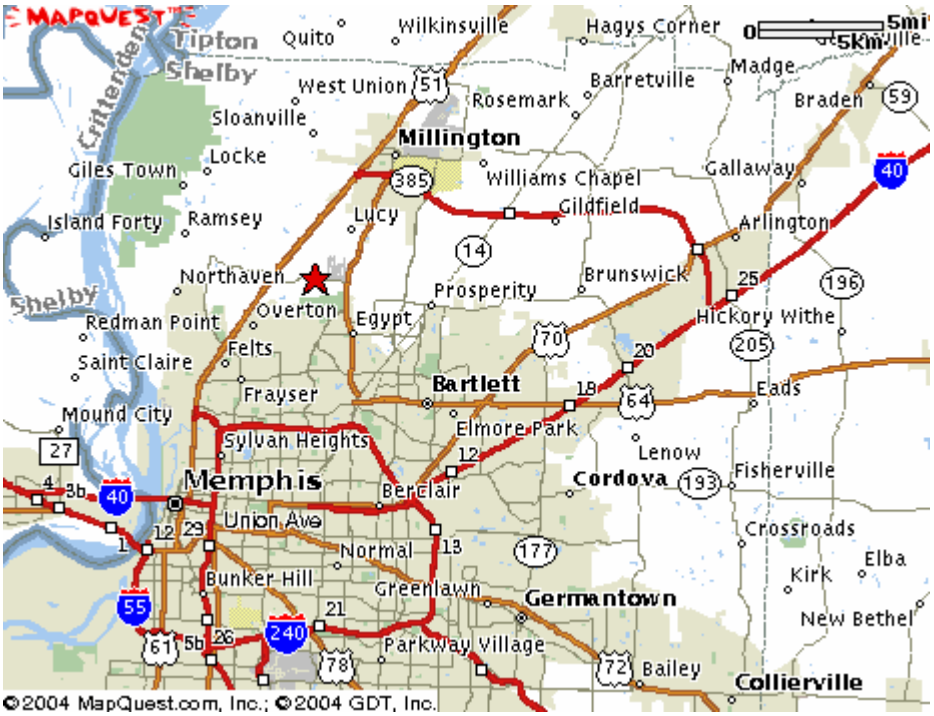
This Health Consultation: Chromasco Site, Memphis, Shelby County, Tennessee, was prepared by the Tennessee Department of Health Environmental Epidemiology under a Cooperative Agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It was prepared in accordance with the approved methodology and procedures that existed at the time the health consultation was begun.

Technical Project Officer, SPS, SSAB, DHAC, ATSDR

The Division of Health Assessment and Consultation, ATSDR, has reviewed this public health consultation and concurs with the findings.

Chief, State Program Section, SSAB, DHAC, ATSDR

Figure 1. Area maps for 3328 Fite Rd. Date: May 10, 2004
Chromasco, Memphis, Shelby County, TN Map Credits: www.mapquest.com



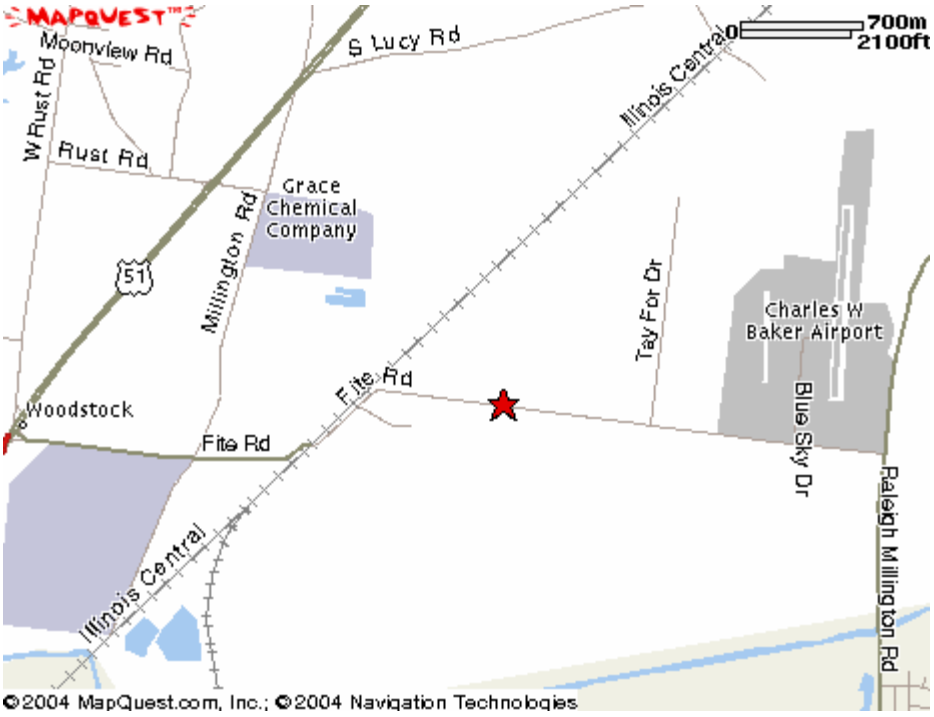


Figure 2. Photo of abandoned building and nearby paved areas. Date: April 16, 2004
Chromasco, Memphis, Shelby County, TN Photo Credit: David Borowski, TDH

Figure 3. Photo of stream water with a green tint. Date: April 16, 2004
Chromasco, Memphis, Shelby County, TN Photo Credit: David Borowski, TDH