Health Consultation

Public Health Evaluation of Environmental Data and the Environmental Protection Agency Remediation Plans

CHASE BRASS AND COPPER

WATERBURY, NEW HAVEN COUNTY, CONNECTICUT

EPA FACILITY ID: CTD000856708

MARCH 7, 2002

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

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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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Prepared by:

Connecticut Department of Public Health
Under a Cooperative Agreement with the
Agency for Toxic Substances and Disease Registry

The conclusions and recommendations in this health consultation are based on the data and information made available to the Connecticut Department of Public Health and the Agency for Toxic Substances and Disease Registry. The Connecticut Department of Public Health and the Agency for Toxic Substances and Disease Registry will review additional information when received. The review of additional data could change the conclusions and recommendations listed in this document.

BACKGROUND AND STATEMENT OF ISSUE

The Connecticut Department of Public Health (CT DPH) was asked by the U.S. Environmental Protection Agency (EPA) to evaluate the public health significance of environmental data collected at the Chase Brass and Copper site in Waterbury. EPA specifically requested that CT DPH evaluate public health implications of the data considering the remedial activities that EPA plans to *complete during the Spring of 2002.*

The Chase Brass and Copper site is a 100-acre vacant lot on the west site of the Naugatuck River, approximately 2 miles northwest of downtown Waterbury. It is bordered on the east by the Naugatuck River and by Route 8 on the west. Attachment A contains a site plan. The Chase Brass and Copper Company operated from a large building complex on the east side of the Naugatuck River from 1868 to its closing in 1976. During this time the company used approximately 5-acres of the vacant lot on the west side of the river to dispose of waste materials including metal turnings and construction debris consisting primarily of refractory brick, concrete and lumber. The primary portion of the 5-acre parcel used by Chase Brass to dispose of its waste is an area along the bank of the River, extending approximately 500 feet north and south of an access bridge and varying in width from approximately 60 to 200 feet (see site diagram in Attachment A). This portion of the site is referred to as the Chase Brass Disposal Area (EPA 1995, EPA 2001). At the disposal area, debris and sludge are visible and vegetation is sparse. Farther to the West, the terrain is wooded and slopes upward to Route 8. A section of paved road passes through the disposal area. The depth of waste in the disposal area varies from two to19 feet below grade. Close to the river, vegetation is sparse and the bank slopes steeply for about 50 ft. Embedded debris and sludge are visible on the bank close to the river.

The only structures currently on the property are an abandoned electrical substation and a small masonry shed/switch house. The substation was used to store transformer oils and supplies and to produce electric power for the Chase Brass and Copper facility and local area. The abandoned substation and shed/switch house are enclosed by locked chain link fences. The remainder of the property can be accessed from Route 8 by a dirt road that is in poor condition. Roughly half of the property is wooded and steeply sloped from Route 8 down to the Naugatuck River. The access bridge across the River is currently fenced and locked.

Several environmental investigations conducted since 1984 have documented the following:

- metals, polycyclic aromatic hydrocarbons (PAHs) and polychlorinated biphenyls (PCBs) in surface and subsurface soils and sediments;

- leaking drums, stained soils and stressed vegetation along the riverbank;
- trichloroethylene (TCE) in soil gas
- asbestos-containing tiles in the waste area along the riverbank.

EPA has developed a cleanup plan for the site which will include:

- consolidation and placement of contaminated soil and debris in the Disposal Area under an engineered soil cover, in a manner to prevent or minimize surface and groundwater from leaching and eroding contaminants into the river;
- removal of the shed/switch house and regrading and placement of contaminated soil and debris under an engineered soil cover;
- controlling surface drainage to and through the Site to the river by drainage channels, culverts and diversion channels;
- relocating contaminated soil and sediments from along the river's edge, river slope and bench area to the upland bench area above the normal high ground water table and including such soils beneath the engineered soil cap; and,
- performing various site restoration activities.

EPA is still discussing final details of site restoration activities with CT DEP, the Waterbury Health Department and other interested parties. Activities being discussed include providing improved public access to the river such as placement of a greenway path through the site. Recently the substation structure was scheduled for demolition. CT DEP has also requested that, should demolition occur, the fence surrounding the site of the former substation be removed and replaced with a barrier that will prevent motorbikes from damaging the soil cap over the switch house site. CT DPH concurs with this plan and recommends that steps also be taken to promote the growth of vegetation over the site of the former substation.

Site Visit

On May 17, 2001, CT DPH staff visited the site with the EPA on-scene coordinator. Construction debris, asbestos tiles, partially buried rusted drums, stained soil and slag material were visible across the entire area identified as the Chase Brass Disposal Area. There was also evidence that severe erosion is occurring along the riverbank. It appears that a major cause of erosion is overland runoff coming down the hillside from Route 8, towards the river. The fence around the abandoned substation was observed to be in good condition, as was the fence across the entrance of the access bridge. Portions of the property are reportedly used by dirt bikers and individuals who fish in the River. The presence of empty beer and soda cans in the disposal area, and spent ammunition in the substation area is evidence of recent access by trespassers. Dirt bike paths, though not obvious in the disposal area, may be present in the upland areas closer to Route 8.

DISCUSSION

Exposure Pathways and Environmental Data

Contamination at the Chase Brass site is present primarily in the five-acre parcel designated as the Chase Brass Disposal Area. Contaminants have been detected in surface and subsurface soils, soil gas, sediments, surface water, groundwater and bulk wastes. In addition to the Disposal Area, there is some contamination present in soils within and around the abandoned substation and switch house.

The Chase Brass site provides one of a very few access points to the Naugatuck River in Waterbury. Common eel, brown trout, fall fish, brook trout, dace and clams live in the river and fishing is popular in the area (EPA 2001). According to EPA and the Waterbury Health department, there are individuals who access the riverbank within the Disposal Area in order to fish in the Naugatuck River. During the site visit, CT DPH observed some signs of trespasser activity.

In order for someone to be exposed to contaminants at the site, one must come into direct contact with contaminants by touching soils, sediments or surface water (dermal), ingesting soils that may be adhered to fingers or food items (incidental ingestion), ingesting surface water while wading or playing in the river (incidental ingestion) or breathing soil dust (inhalation). Because access to the site is not restricted, it is possible for people to come into contact with contaminated surface soil, sediment and surface water in the Chase Brass Disposal Area portion of the site. Exposure could occur through incidental ingestion, dermal contact or inhalation. It is unlikely that anyone would come into contact with soil contaminants present at depth within the Disposal Area unless digging occurred. This is an unlikely activity considering that the area is primarily used for fishing.

Since access to the site is not restricted, individuals may walk through the area to get to the river. Exposure to contaminants in surface soils in unrestricted areas is possible through incidental ingestion, dermal contact or inhalation. With regard to contaminants present at and around the abandoned substation and adjacent switch house, it is unlikely that anyone would be exposed to contaminants present on a regular and continuing basis. Therefore, in addition to evaluating the effects of chronic exposure, CT DPH evaluated the potential for toxic effects resulting from acute (i.e.; one time) exposure to contaminants at the disposal area and the substation area.

Exposure to groundwater is not a concern at this site. Groundwater is not being used as a drinking water source, nor is it a planned drinking water source for the future. Environmental data indicate that the waste material onsite is not impacting groundwater to any significant degree.

A large amount of environmental data from surface soils, subsurface soils, soil gas, sediments surface water, bulk waste materials and groundwater has been collected at the Chase Bass site. All of the data evaluated in this health consultation was collected by EPA during 2000 and 2001. Site environmental investigations indicate that most of the contamination is located in the Chase

Brass Disposal Area. EPA's sampling efforts have focused on this portion of the property. However, EPA has also sampled soils at the abandoned substation and switch house as well as a dirt road leading north from the substation that is reportedly used by dirt bikers. In addition, EPA has performed PCB analysis on soil samples from two manholes located within the fenced substation.

Environmental data from the site are summarized below. Contaminants are shown with relevant health-protective comparison values. Comparison values are screening levels, below which, there is little likelihood of adverse health effects from exposure. When contaminant concentrations exceed comparison values, it does not necessarily mean that health effects are likely. Rather, it means that exposures should be evaluated further. For this health consultation, CT DPH used the CT DEP residential criteria for direct exposure to soil (CT RSRs). The CT RSRs are developed to be protective of a child who contacts soil every day into adulthood (30 years total exposure).

Soils within the Chase Brass Disposal Area

Surface Soils:

Surface soil samples were collected from approximately 117 locations in the Chase Brass Disposal Area. A number of locations that were sampled showed high levels of copper, zinc, nickel, lead, chromium and mercury. Table 1 summarizes surface soil data. Maximum concentrations are provided for all contaminants detected above health-based comparison values. The frequency of detection above comparison values is presented as well.

Subsurface Soils:

Approximately 31 subsurface soil samples were collected from depths as great as 47 inches below ground surface within the Disposal Area. Similar contaminants were found in soils at depth as were found in surface soils. Concentrations of metals in subsurface soils were not as high as in surface soils. Concentrations of PAHs were higher at depth than in surface soils. Benzo(a)pyrene was found up to 20 mg/kg (ppm), benzo(a)anthracene up to 15 ppm, benzo(b)fluoranthene up to 25 ppm, indeno(123)pyrene up to 9.5 ppm and dibenzo(ah)anthracene up to 2.4 ppm. Comparison values for these compounds are 1 ppm.

Soils beyond the Chase Brass Disposal Area

EPA collected 20 surface soil samples within the fenced area at the abandoned substation. PCBs were detected at three locations at levels as high as 4 ppm. Lead was found at five locations at concentrations exceeding the CT RSR of 500 ppm. The maximum lead concentration was 1520 ppm. No other contaminants were detected above comparison values. PCBs were not detected in either of the manholes within the fenced substation that EPA sampled. Soils along the dirt road leading north from the substation were clean.

EPA also collected a number of samples near the switch house, located just beyond the substation fence. Contaminant concentrations in this area were a bit higher. Lead was found up to 7650 ppm, PCBs up to 2.7 ppm, mercury up to 86 ppm and arsenic up to 71 ppm.

Soil Gas

EPA conducted a soil gas survey within the Disposal Area portion of the site. Twenty-six locations were selected and soil gas was collected from depths ranging from approximately two to four feet below ground surface. Samples were analyzed for volatile organic compounds (VOCs) and mercury. At two locations, trichloroethylene (TCE) was detected at concentration slightly exceeding the CT residential volatilization criteria for soil vapor of 7 ppm. Mercury was not detected in any sample.

Table 1. Summary of Surface Soil Data within the Chase Brass Disposal Area.

Contaminant	Median Concentration (ppm)	Maximum Concentration (ppm)	Comparison Value (ppm)	Comparison Value Source	Frequency of Detection above Comparison Value
Copper	884.5	465,000	2500	CT RSR^	24/76
Nickel	110	94,000	1400	CT RSR^	5/76
Zinc	820.4	53,400	20,000	CT RSR^	5/76
Lead	73.5	3160	500	CT RSR^	11/76
Total Chromium	1220	53,400	3900*	CT RSR^	3/12
Mercury	37	215	20	CT RSR^	6/11
PCBs @					
Aroclor 1242	NA	10	1	CT RSR^	5/9
Aroclor 1254	NA	5	1	CT RSR^	5/9
Aroclor 1260	NA	5	1	CT RSR^	5/9
Benzo(a)anthracene	NA	4	1	CT RSR^	#
Benzo(b)fluoranthene	NA	6.7	1	CT RSR^	#
Indeno(123)pyrene	NA	3.2	1	CT RSR^	#
Benzo(a)pyrene	NA	4.8	1	CT RSR^	#

CT RSR^ - The CT RSRs are developed to be protective of a child who contacts soil every day into adulthood (30 years total exposure).

- Analysis for individual PAH's was performed only if total PAH concentration exceeded 10 ppm. Twenty three soil samples were analyzed for total PAH, six of these were above 10 ppm

* The comparison value for hexavalent chromium is 100 ppm

@ For PCBs, all samples were non-detect with detection limits in 5 of 9 samples above the comparison value

Groundwater

Groundwater data was collected from ten locations (five shallow wells and five deep wells) within the Disposal Area. Contaminants were not detected above drinking water standards and guidelines.

Surface Water

Surface water was collected from four locations in the Naugatuck River adjacent to the Disposal Area and at a location upstream and downstream of the site. Surface water data indicate that the site is not presently leaching significant quantities of contaminants to the surface water of the Naugatuck River. Contaminants were not detected above drinking water standards and guidelines.

Sediments

Sediment samples were collected from six locations along the bank of the Naugatuck River adjacent to the Disposal Area and one upstream reference location. Copper was detected above the CT RSRs for soil at one location. No other metals were found above CT RSRs. Five PAH compounds were detected in one location at levels above CT RSRs. PAH concentrations ranged from three to six times above CT RSRs. One PCB (Aroclor 1260) was found in one sediment sample, indicating that PCB contamination may have migrated from the site.

Bulk Waste

Eight bulk samples of waste from the Disposal Area were collected for asbestos analysis. Chrysotile asbestos in the samples ranged from 5% to 80%. Several rock-like debris samples were analyzed for metals. Copper was found as high as 566,000 ppm, zinc as high as 84,800 ppm, nickel as high as 18,800 ppm and lead up to 2000 ppm.

Evaluation of public health implications to adults and children

When determining the public health implications of exposure to hazardous contaminants, CT DPH considers how people might come into contact with contaminants and compares contaminant concentrations with health protective comparison values. When contaminant levels are below comparison values, we can say with relative certainty that health impacts from exposure to those levels are unlikely. When contaminant levels exceed comparison values, it does not mean that health impacts are likely. Rather, it means that exposures should be evaluated further.

Exposures at the disposal area under current and past conditions

With regard to past and current exposures to surface soils, there are locations within the Disposal Area where levels of metals, PAHs and PCBs exceed health-based comparison values (see Table 1). Relative to the health-based comparison values (CT RSRs), metals are present at much higher concentrations than PAHs or PCBs. There are 10 locations in the Disposal Area where copper concentrations are greater than 10 times the CT RSR of 2500 ppm. The maximum copper concentration is almost 200 times greater than the CT RSR. For other metals, exceedances of CT RSRs are not as large, but are still significant exceedances. In addition, debris containing asbestos (up to 80%) and percent levels of metals are present in the Disposal

Area. Maximum concentrations of PAHs and PCBs in surface soils range from three to ten times higher than CT RSRs.

Environmental data also showed that site debris (mostly floor tiles found in the disposal area) contain asbestos. CT DPH did not quantitatively evaluate the health threat from exposure to asbestos at the site because the asbestos is bound in the matrix of the tiles, and because testing by EPA did not detect asbestos in the air. However, the maximum asbestos content found in the debris (80%) greatly exceeds the cleanup guideline of one percent in soils and sediments that EPA typically uses at Superfund sites. One percent is the National Emission Standard for Hazardous Air Pollutants (NESHAPs) definition of asbestos-containing material that may present a human health risk if inhaled (40 CFR Part 61). In this instance however, the potential for inhalation exposure to asbestos is low because the asbestos is bound within the tiles, and because the disposal area has been capped. Surface soils in the Disposal Area present the primary pathway for past and current exposure to contamination from the Chase Brass Company. Although contaminants have been detected in other media (subsurface soil, sediment, groundwater, surface water and soil gas), CT DPH has concluded, for the following reasons, that exposure to contaminants in these other media is not expected to pose a public health threat.

- Exposure to subsurface soils would only occur if soils were disturbed through digging. This is unlikely considering that the area is primarily used for fishing.

- Based on existing data, there does not appear to be widespread contamination in sediments. Copper and several PAHs were detected at one location above health-based comparison values. Exceedances were only three to six times greater than comparison values. Comparison values assume that exposure occurs every day (365 days per year) for the long term (30 years). Exposures to sediments at the site are likely to be much less than 365 days per year.

- Exposure to groundwater is not occurring; it is not being used as a source of drinking water.

- Contaminants were not detected in surface water at levels above drinking water standards.

- In two locations sampled for soil gas, concentrations of TCE in soil gas exceeded CT residential volatilization criteria. The volatilization criteria were developed to be protective of indoor air environments, in which infiltrating soil gas would accumulate within the enclosed spaces in a home. However, there are no buildings on this site. Outside of the indoor air environment, concentrations of TCE will be greatly diluted (probably to nondetectable levels) as the TCE moves through the soil and into ambient air.

- While there may be some inhalation exposure at the site, CT DPH believes that doses from inhalation of soil derived dust are not likely to be large relative to ingestion or dermal exposures.

To evaluate public health implications from past and current exposures to soils in the Disposal Area portion of the site, CT DPH evaluated the risks of one-time (acute) and longer-term (chronic) exposures to soils. CT DPH thought it was important to evaluate acute risks because of the presence of very elevated levels of metals in soil and the fact that a single exposure to some metals can result in *adverse* health effects. Metals were the focus of CT DPH's risk evaluation because they were found at the highest concentrations (relative to comparison values) and were more widespread than other contaminants. PCBs and PAHs were not evaluated because their average concentrations were well below levels of concern. Median concentrations (rather than maximum concentrations) are more relevant for evaluating PCBs and PAHs because they present a greater public health concern when exposure occurs over a long period of time, rather than a single event.

To evaluate exposure to metals in soils, CT DPH focused on noncancer risks rather than cancer risks because none of the metals detected at this site (copper, nickel, zinc, chromium, mercury and lead) are believed to cause cancer via oral or dermal exposure pathways (ATSDR 1990, 1994, 1997, 2000, 1999, 1999a). When evaluating noncancer risks, young children have the potential to receive greater doses than adults from exposure to contaminants in soil because of their low body weight and more intense contact with soil.

Acute Exposures

To evaluate acute exposures to metals in surface soil in the Disposal Area portion of the site, CT DPH calculated the ingestion and dermal dose a young child and an adult would receive from one visit to the Disposal Area. The maximum contaminant concentration was used rather than the average. Estimated doses were compared with lowest observable adverse effect levels (LOAELs) from the literature. LOAELs are the lowest exposure level used in a toxicological study that caused a harmful effect. CTDPH used LOAELs because there are no EPA-derived acute reference doses or ATSDR-derived minimal risk levels for any of the metals found at the site. LOAELs rather than no observable adverse effect levels (NOAELs) were used because CT DPH wanted an acute dose where actual effects were observed.

Table 2 shows estimated doses to a child from acute exposure. Acute doses to an adult are not shown in Table 2 but are approximately ten times lower than the child's dose. Table 2 also includes LOAELs from the literature that CT DPH used to evaluate the public health implications from acute exposures at the site.

Table 2. Estimated Doses to Children from Acute Exposure to Contaminants in the Disposal Area, Chase Brass and Copper Site.

Chemical	Acute Dose to a Child from Dermal and Ingestion Exposure (mg/kg/day)*	Comparison Dose (mg/kg/day)	Comparison Dose Source
Copper	3.15	0.07 - 6 35 - 100	LOAELs for acute oral exposure to humans via drinking water. Effects: vomiting and diarrhea. Range of LOAELs for acute oral exposure in animals. Effects: hepatic, renal and gastrointestinal. (ATSDR 1990)
Nickel^	0.64	0.01 - 0.097	Range of LOAELs in humans for acute oral exposure. Effects: allergic dermatitis in individuals sensitized to nickel. (ATSDR 1997)
Zinc	0.36	0.5 6.7 86	LOAEL for acute exposure to humans via drinking water. Effects: transient decrease in serum cortisol levels. LOAEL for acute exposure to humans via drinking water. Effects: gastrointestinal distress, diarrhea. LOAEL for acute oral exposure to humans. Effects: increased serum amylase, lipase. (ATSDR 1994)

Table 2 (Continued).

Chemical	Acute Dose to a Child from Dermal and Ingestion Exposure (mg/kg/day)*	Comparison Dose (mg/kg/day)	Comparison Dose Source
Total Chromium[#]	0.36	0.04 7.5	LOAEL for acute oral exposure to humans via ingestion (Cr VI[@]). Effects: exacerbate chromium-dermatitis in chromium industry workers LOAEL for acute oral exposure to humans via ingestion (Cr VI). Effects abdominal pain, vomiting. (ATSDR 2000)
Mercury	0.0015	30 1.9 - 10	LOAEL for acute oral exposure in humans. Effects gastrointestinal, renal. Range of LOAELs in animals for acute oral exposure. Effects: renal (ATSDR 1999)
Lead	0.021	0.02, 0.03	LOAELs for acute oral exposure in humans. Effects: transient change in hemoglobin forming enzymes. (ATSDR 1999a)

* Dose is based on 200 mg of soil ingestion for a 30.75 kg child

^A range of acute LOAELs of 0.03% - 0.1% for contact dermitis in sensitive humans is also provided for nickel (ATSDR 1997). The maximum nickel concentration at the site is 94,000 ppm (9.4%).

[#]A range of acute LOAELs of 0.09% - 0.175% are provided for allergic responses in the skin to chromium VI in humans. The maximum chromium (total chromium) concentration at the site is 53,400 ppm (5.3%).

[@]LOAELs are for chromium VI. Chromium at the site was not speciated. It is likely that only a very small portion of the total chromium at the site is chromium VI. Chromium VI is known to be more toxic than other forms of chromium should contact be via dermal or inhalation exposure routes (ATSDR 2000).

Estimated acute doses to a child exceed some of the LOAELs shown above for copper, nickel, zinc and lead. Estimated adult doses (approximately ten times lower than the child's dose) exceed LOAELs only for copper. While the health effects associated with these LOAELs are designated as "less serious effects," (ATSDR 1990, 1994, 1997, 2000, 1999, 1999a) this evaluation does indicate that acute exposures to maximum concentrations of copper, nickel and lead in soils in the Disposal Area portion of the site could potentially result in health impacts to adults and children.

Chronic Exposures
For chronic exposures, CT DPH calculated the ingestion and dermal dose over a six-year period for a child (aged 1 to 6 years). Six-years is the typical period of time used to evaluate noncancer risks. Average contaminant concentrations were used. The chronic evaluation was limited to copper, nickel and zinc because average concentrations of the other metals found at the site were below health-based comparison values. When available, estimated doses from chronic exposure were compared with chronic ATSDR Minimal Risk Levels (MRLs) or EPA Reference Doses (RfDs). If such benchmarks were not available, chronic LOAELs were used.

Table 3. Estimated Doses to Children from Chronic Exposure to Contaminants in the Disposal Area, Chase Brass and Copper Site.

Chemical	Chronic Dose to a Child from Dermal and Ingestion Exposure@ (mg/kg/day)	Comparison Dose (mg/kg/day)	Comparison Dose Source
Copper	8.9E-4	0.056	LOAEL for chronic human exposure via drinking water. Effects: abdominal pain, vomiting.
		4.2	LOAEL for chronic exposure in animals via drinking water. Effects: decreased weight gain. (ATSDR 1990)
Nickel	1.1E-4	0.02	Chronic oral RfD* (EPA IRIS)
Zinc	8.26E-4	0.3	Chronic oral RfD, Intermediate oral MRL^, Chronic oral MRL (EPA IRIS)

@Dose is based on 100 mg of soil ingestion per day for a 30.75 kg child.

*RfDs are estimates of the daily exposure of the human population to a chemical that is likely to be without risk of adverse effects during a lifetime. RfDs are developed by EPA.

^MRLs are developed by ATSDR as an exposure level at which adverse health effects are not expected to occur in humans. Intermediate MRLs consider an exposure period of 15-384 days. Chronic MRLs consider an exposure period one year and greater.

Table 3 shows estimated doses to a child from chronic exposure. Chronic doses to an adult are not shown in Table 3 but are approximately ten times lower than the child's dose. Table 3 also includes comparison doses from the literature that CT DPH used to evaluate the public health implications from chronic exposures at the site. Table 3 indicates that estimated doses from chronic exposures to metals at the site do not exceed levels that may cause adverse health effects.

Future exposures at the disposal area and switch house

Although EPA has plans to conduct cleanup activities at the site in the very near future, there is currently nothing in place to deter people from accessing the site and coming into contact with contaminants. In the past, there were no access restrictions as well. Based on observations made during CT DPH's site visit and information from EPA and the Waterbury Health Department, the site has been and continues to be used primarily for fishing. Until EPA completes its cleanup activities, exposures to contaminants at the site could continue.

EPA's remediation plans for the site call for consolidation and placement of contaminated soil and debris in the Disposal Area and the switch house area under an engineered cover. The cover will provide a barrier to prevent people from coming into contact with the contamination. In addition, EPA will improve water drainage at the site to ensure that the cap's integrity is maintained into the future. Provided that EPA implements its stated cleanup plan, exposure pathways to contamination in these areas should be eliminated and will not present a public health threat in the future.

Past, current and future exposures at the substation site

Based on existing data, the only area at the site with contamination above comparison values that EPA is not planning to address as part of its remediation plan is soils at the site of the former substation. Within the substation area, lead and PCBs were detected at levels three to four times higher than comparison values. Comparison values are developed to protect individuals who are exposed 365 days per year for many years. Even if trespassers did access the area, exposure would not be frequent enough to present a public health threat. Nevertheless, in order to keep exposure to a minimum, CT DPH recommends that steps be taken to encourage the growth of vegetation that will serve as a barrier for exposure and help prevent erosion from weathering.

Supplemental information

Acute and chronic dose calculations are provided in Attachment B.

CONCLUSIONS

Existing environmental data for the Chase Brass and Copper Company site indicate that contaminants are present at the site at levels significantly exceeding health-based comparison values. Under current and past conditions, dermal contact and incidental ingestion are expected to be the predominant pathways of exposure to soils in the Disposal Area. The population most likely to be exposed are trespassers; e.g., school-age children playing and people fishing. Accordingly, CT DPH evaluated the potential for acute and chronic health effects to occur via these exposure pathways to the population most at risk. To address the potential for acute health effects from incidental ingestion and dermal contact, CT DPH used maximum contaminant levels.

This evaluation indicates that one-time exposures to maximum concentrations of copper, nickel, and lead in soils in the Disposal Area could potentially have adverse health impacts on adults and children. It is possible that vomiting or diarrhea could result from exposure to copper, while contact dermatitis (in persons already sensitized) could occur from nickel or chromium exposure. However, CT DPH believes that the potential for any adverse effect from past exposure is low because contamination levels vary widely across the site, meaning that a person is not likely to come in contact with the maximum concentration. Furthermore, the effects possible from acute exposure are transient and they are not expected to cause permanent damage. Effects of chronic exposure to copper, nickel, and zinc, on children, were evaluated against mean concentrations because chronic exposure involves repeated trips to the area. CT DPH believes that the potential for health effects due to chronic exposure are low because the exposures are below comparison values (Table 3).

EPA has developed a remediation plan for the site which would minimize exposures to contaminants in the Disposal Area and in soils near the abandoned electrical substation. Provided that EPA implements its stated cleanup plan, such exposure pathways should be eliminated and will not present a public health threat for as long as the protective cap is intact.

ATSDR has a categorization scheme whereby the level of public health hazard at a site is assigned to one of five conclusion categories. ATSDR conclusion categories are included as Attachment C to this report. CT DPH has concluded that based on future conditions (i.e., completion of EPA cleanup work), the site will pose No Public Health Hazard. Based on current and past site conditions, CT DPH concludes that the site poses a Public Health Hazard.

RECOMMENDATIONS

1. Signs should be posted on site to discourage members of the public from accessing the site until EPA has completed its cleanup work.

2. After EPA implements its cleanup plan, there should be periodic inspection of EPA's engineered cap to ensure that it continues to provide a barrier to contamination present beneath.

3. During EPA's remedial work, air monitoring should be conducted to ensure that contaminants present in soil are not becoming airborne at levels that could present a public health threat to cleanup workers or other nearby individuals.

4. Steps should be taken to promote the growth of vegetation at the site of the former substation.

5. If the substation and surrounding fence are removed, a barrier should be installed to prevent damage to the soil cap by motorbikes. Otherwise, there should be periodic inspection and maintenance of the fence to insure that access to that area continues to be restricted

REFERENCES

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ATSDR 1994. Toxicological Profile for Zinc, May 1994

ATSDR 1997. Toxicological Profile for Nickel, September 1997

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EPA IRIS. U.S. Environmental Protection Agency Integrated Risk Information System. http//www.epa.gov/iris/

CERTIFICATION

The Health Consultation for **EVALUATION OF ENVIRONMENTAL DATA AND EPA REMEDIATION PLANS, CHASE BRASS AND COPPER SITE** in Waterbury Connecticut was prepared by the Connecticut Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

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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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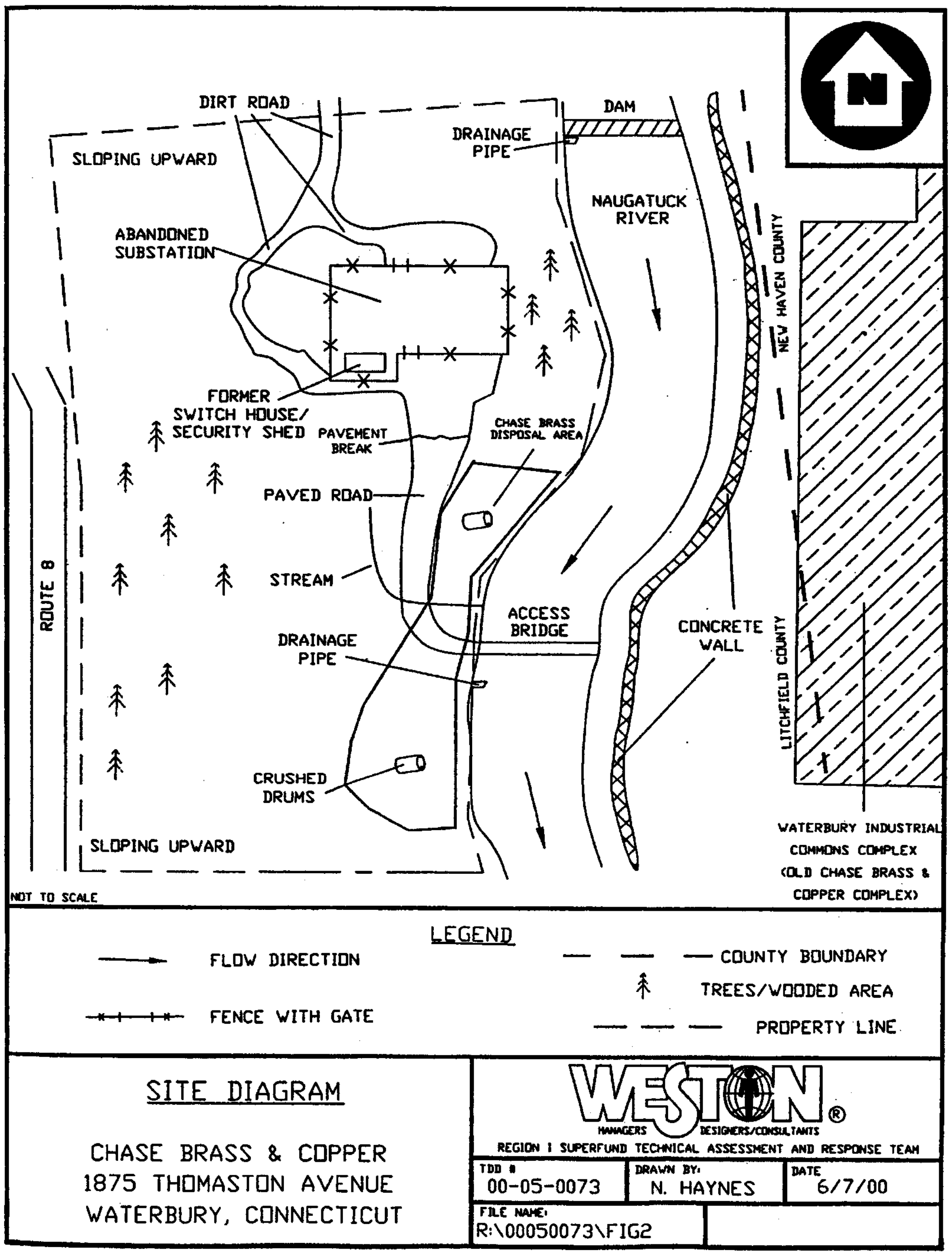
ATTACHMENT A

Site Diagram for Chase Brass and Copper Company Site, Waterbury, CT



ATTACHMENT B

Acute and Chronic Dose Calculations

Acute Dose
Child aged 6-12 years

ADD_i = IR * [ ] * EF * Conv. * ED * 1/BW * 1/AT
= 200 mg/day * [ ] * (1 ev/day * 1day/ev) * 10-6 kg/mg * 1 day * 1/30.75 kg * 1/1day

ADD_i = 6.5E-6 day * [ ]

ADD_d = [ ] * AF * ABS * SA * EF * Conv. * ED * 1/BW * 1/AT
= [ ] * 0.2 mg/cm2/d * 0.01 * 4395 cm2 * 1 ev/day * 1 day/ev * 10-6 kg/mg * 1 day * 1/30.75 kg * 1/1 day

ADD_d = 2.87E-7 day * [ ]

ADD_{d+i} = (6.5E-6 day * [ ]) + (2.87E-7 day * [ ])

Copper = 3.15 mg/kg/day
Nickel = 0.64 mg/kg/day
Zinc = 0.36 mg/kg/day
Chromium = 0.36 mg/kg/day
Mercury = 0.0015 mg/kg/day
Lead = 0.021 mg/kg/day

Where:
ADD_i = Average daily dose from ingestion, mg/kg/day
ADD_{d+i} = Average daily dose from ingestion and dermal, mg/kg/day
ADD_d = Average daily dose from dermal contact, mg/kg/day
IR = soil ingestion rate; 200 mg/day (EPA conservative estimate of average rate for children (EPA 1997).
EF = exposure frequency; one day
Conv. = conversion factor, 10-6 kg/mg
ED = exposure duration, one day
BW = body weight for child age 1-6 years
AT = averaging time; one day
[ ] = chemical-specific maximum concentration in soil; mg/kg
AF = skin to soil adherence factor; 0.2 mg/cm2/d (EPA default for RME residential child) (EPA 2000)
ABS = dermal absorption fraction from soil for inorganics; 1% (based on EPA 2000)
SA = skin surface area, 4395 cm^2; head, hands, arms, lower legs

Chemical-specific maximum Soil Concentrations:
Copper = 465,000 mg/kg
Nickel = 94,000 mg/kg
Zinc = 53,400 mg/kg
Chromium = 53,400 mg/kg
Mercury = 215 mg/kg
Lead = 3160 mg/kg

Chronic Dose
Child aged 6-12 years

ADD_i = IR * [ ] * EF * Conv. * ED * 1/BW * 1/AT
= 100 mg/day * [ ] * (104 ev/year * 1day/ev * 1 year/365 day) * 10-6 kg/mg * 6 years * 1/30.75 kg * 1/6 years

ADD_i = 9.27E-7 day * [ ]

ADD_d = [ ] * AF * ABS * SA * EF * Conv. * ED * 1/BW * 1/AT

= [ ] * 0.2 mg/cm2/d * 0.01 * 4395 cm^2 * (104 ev/y * 1 d/ev * 1 y/365 d) * 10^{-6} kg/mg * 6 yr * 1/30.75 kg * 1/6 yrs

ADD_d = 8.13E-8 day * [ ]

ADD_{d+i} = (9.27E-7 day * [ ]) + (8.13E-8 day * [ ])

Copper = 8.9E-4 mg/kg/day
Nickel = 1.1E-4 mg/kg/day
Zinc = 8.26E-4 mg/kg/day

Where:
ADD_i = Average daily dose from ingestion, mg/kg/day
ADD_{d+i} = Average daily dose from ingestion and dermal, mg/kg/day
ADD_d = Average daily dose from dermal contact, mg/kg/day
IR = soil ingestion rate; 100 mg/day (EPA default rate for children (EPA 1997).
EF = exposure frequency; 2 days/week for 52 weeks/year
Conv. = conversion factor, 10-6 kg/mg
ED = exposure duration, 6 years
BW = body weight for child age 1-6 years
AT = averaging time; 6 years
[ ] = chemical-specific average concentration in soil; mg/kg
AF = skin to soil adherence factor; 0.2 mg/cm2/d (EPA default for RME residential child) (EPA 2000)
ABS = dermal absorption fraction from soil for inorganics; 1% (based on EPA 2000)
SA = skin surface area, 4395 cm^2; head, hands, arms, lower legs.

Chemical-specific median soil concentrations:
Copper = 884.5 mg/kg
Nickel = 110 mg/kg
Zinc = 820.4 mg/kg

ATTACHMENT C: ATSDR Public Health Hazard Categories

Category	*Definition*	*Criteria*
A. Urgent public health hazard	*This category is used for sites that pose an urgent public health hazard as the result of short-term exposures to hazardous substances.*	*evidence exists that exposures have occurred, are occurring, or are likely to occur in the future AND* *estimated exposures are to a substance(s) at concentrations in the environment that, upon short-term exposures, can cause adverse health effects to any segment of the receptor population AND/OR* *community-specific health outcome data indicate that the site has had an adverse impact on human health that requires rapid intervention AND/OR* *physical hazards at the site pose an imminent risk of physical injury*
B. Public health hazard	*This category is used for sites that pose a public health hazard as the result of long-term exposures to hazardous substances.*	*evidence exists that exposures have occurred, are occurring, or are likely to occur in the future AND* *estimated exposures are to a substance(s) at concentrations in the environment that, upon long-term exposures, can cause adverse health effects to any segment of the receptor population AND/OR* *community-specific health outcome data indicate that the site has had an adverse impact on human health that requires intervention*
C. Indeterminate public health hazard	*This category is used for sites with incomplete information.*	*limited available data do not indicate that humans are being or have been exposed to levels of contamination that would be expected to cause adverse health effects; data or information are not available for all environmental media to which humans may be exposed AND* *there are insufficient or no community-specific health outcome data to indicate that the site has had an adverse impact on human health*
D. No apparent public health hazard	*This category is used for sites where human exposure to contaminated media is occurring or has occurred in the past, but the exposure is below a level of health hazard.*	*exposures do not exceed an ATSDR chronic MRL or other comparable value AND* *data are available for all environmental media to which humans are being exposed AND* *there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health*
E. No public health hazard	*This category is used for sites that do not pose a public health hazard.*	*no evidence of current or past human exposure to contaminated media AND* *future exposures to contaminated media are not likely to occur AND* *there are no community-specific health outcome data to indicate that the site has had an adverse impact on human health*