

# Health Consultation

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Public Health Implications of Metal Contaminated Soil

MALLORY HAT FACTORY (FORMER)

DANBURY, FAIRFIELD COUNTY, CONNECTICUT

CERCLIS NO. CTD001182120

MARCH 8, 2000

**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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# HEALTH CONSULTATION

Public Health Implications of Metal Contaminated Soil

MALLORY HAT FACTORY (FORMER)

DANBURY, FAIRFIELD COUNTY, CONNECTICUT

CERCLIS NO. CTD001182120

Prepared by:

Connecticut Department of Public Health  
Under 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 incorporate additional information if and when it becomes available. The incorporation of additional data could change the conclusions and recommendations listed in this document.*

## **BACKGROUND AND STATEMENT OF ISSUES**

On December 22, 1999, the U.S. Environmental Protection Agency (EPA) requested that [1] the Agency for Toxic Substances and Disease Registry (ATSDR) examine environmental data available for the Former Mallory Hat Factory Site in Danbury, Connecticut. The EPA requested that the Connecticut Department of Public Health (CT DPH) and ATSDR determine whether the metals-contaminated soil represents an immediate public health hazard.

The Former Mallory Hat Factory complex consists of a 4.8 acre plot with four buildings located along an active freight rail line on the southeast with residential areas to the northeast, north and west, and by Rose Hill Avenue on the southwest. The site is divided by the Still River; which is diverted underneath the complex main building. The City of Danbury has characterized the areas adjacent to the site as consisting of diverse population mix [1]. This section of the City is served by public water and sewer.

The City of Danbury is the current owner of the site. This facility was the location of a hat factory which was in operation from approximately 1860 through 1987. The original site owner was the E. A. Mallory Company, which manufactured fur and felt hats. The manufacturing procedures involved cleaning, coloring, drying, forming, shrinking, shaping, and stiffening the pelts. Production wastes included: acids, animal fur, bleaches, boiler oxidizers, colored dyes, dirt and pelt scraps/cuttings, oil/kerosene, solvents, and wetting agents [1]. After 1987, the buildings were neglected and have deteriorated. The City of Danbury health and law authorities have indicated that the Site has been used by the city's homeless as a shelter [1]. According to the New York Times, there may have been as many as forty single adults living in the buildings at one time [2]. According to the City of Danbury Police Department, as many as 300 homeless people lived in the factory during 1987 through 1999, with no sanitation facilities. Currently, there are no people living at the site. EPA is providing police security after hours during the cleanup. The police security was initiated in December of 1999, after severe fire problems

The dilapidated condition of the site was characterized by the Danbury Fire Chief as a "definite fire and safety hazard due to the structural condition of the building. In the event of a fire, other than if life hazard presents itself (sic), our personnel will not be entering this structure due to its unsafe condition" [1].

The nearest residential structure is approximately 200 yards from the site. That area appears to be densely settled with multi-family dwellings.

A site visit was conducted by the CT DPH on January 11, 2000. The following observations were made. Graffiti has been noted throughout the site, indicating widespread site access in the absence

of police security. The site is fenced by a 6 foot high chain linked metal perimeter fence that is cut in several locations. This fence is breached in one location due to a stone wall collapsing on top of one of the chain linked section. The site consists of numerous abandoned buildings. All buildings have easy access, as all windows and doors are open or missing. Several buildings have asbestos warning signs posted at the entrance, and are marked with yellow caution tape. The interior of the buildings indicate previous extensive trespassing and vandalism. Throughout the floor of the main buildings, there were sharp rusty metal fragments and protruding bolts. Beneath the main building is the Still River. There were access points to the river via floor openings located at various places. These were covered up with wood by EPA cleanup crew, and represent a potential drowning hazard if someone missteps and falls into the river. A separate building, which housed the boiler, contains extensive friable asbestos, and the building appears to be structurally unstable. A removal of asbestos/cement ceiling tiles is being conducted in a rear building area, and there appear to be neither containment or decontamination facilities in place. The decontamination area is inside a building which could not be entered. Two air monitors were observed (one near the residential structures) and the results of each were verbally indicated to have zero detections of asbestos. The site visit included an examination of the 0-3 inch soil sampling locations.

The purpose of this health consultation is to determine whether the heavy metals detected in the surface soil represent an immediate public health hazard.

## DISCUSSION

### *Sampling results*

Eleven soil samples were collected by the EPA from depths of one to two inches below the surface. The sample locations were obtained from areas that are in some instances easily accessible, and thus a high exposure potential. These samples were collected on November 4, 1999, and analyzed for a limited set of contaminants. These samples were analyzed only for the following metals: arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver. The choice of parameters was made based on previous more extensive sampling, and targeted the potentially contaminated areas of the site. These metals may have been used during the hat making processes. Table 1 lists three of these metals which were detected above their respective health comparison values. One sample was also obtained from a bag-house duct sample. That sample did not detect metals at levels above health comparison values.

Table 1. Metals Analytical Results from Surficial Soil (1-2 inches) Collected at the Former Mallory Hat Factory site, Danbury, CT[1]

Contaminant	Concentration Range		Comparison Value	
	Minimum (ppm)	Maximum (ppm)	ppm	Source
Arsenic	ND	18.6	0.5	CREG
Lead	26	607	400	EPA SSL
Mercury	4.2	94.2	20	EPA SSL

<b>CREG</b>	Cancer Risk Evaluation Guide – ATSDR soil screening risk-based conc. to prevent cancer effects from direct soil exposure.
<b>EPA SSL</b>	EPA Soil Screening Level – EPA Office of Solid Waste risk-based concentrations to protect against direct exposure.
<b>ND</b>	This compound was not detected
<b>ppm</b>	parts per million

### Exposure Assessment - Child and Adult

The contamination present on this site is in surface soil contained within a fenced site. The nearest residence is 200 yards. In order to assess the public health risks posed by exposure to surface soil at this site, the CT DPH developed several exposure assumptions. These include such factors as frequency of site access, soil ingestion rates, dermal exposure factors, and duration of exposure. The potential exists for ingestion and dermal exposures to contaminated soils for persons who trespass on the former Mallory Hat Factory Site. The exposure pathways examined include the incidental adult and children's ingestion of contaminated soil (200 mg/day), and the dermal absorption of contaminants from soil adhering to the skin. The exposure duration used for contaminated soil was assumed to be a trespasser accessing the site for up to sixty days. This duration was established after consultation with the EPA, and represents the likely maximum exposure duration. Exposures beyond that duration are not likely to occur due to site activities and remediation activities, and considering future planned non-residential land use.

### TOXICOLOGICAL EVALUATION - *Child and Adult*

To evaluate health effects, the ATSDR has developed a Minimal Risk Level (MRL) for contaminants commonly detected at hazardous waste sites. The MRL is an estimate of daily human exposure to a contaminant below which non-cancer, adverse health effects are unlikely to occur. An exposure above an MRL does not indicate that an adverse health effect is likely to occur. Rather, an exceedance is used as an indication that additional review for that chemical is required. MRLs are developed for each route of exposure such as ingestion, inhalation, and dermal absorption and for the length of exposure, such as acute (less than 15 days), intermediate (15 to 364 days), and chronic (greater than 364 days). This evaluation included an assumption of a sixty-day trespasser scenario. This assessment focused on the acute and intermediate exposures.

Exposure to arsenic, lead, and mercury may have occurred in the past, and may be occurring now to persons who trespass on the Former Mallory Hat Factory Site and contact contaminated soil.

The amount of these metals ingested per body weight was calculated for adults. A similar value was calculated for children. Both values includes a component known as dermal absorption. The dermal absorption component was incorporated into the exposure scenario, because access to the site may occur through the breach in the fence, and the possibility exists for children to play in the contaminated soil.

## Arsenic

### *Non-cancerous Effects*

#### ***Based on the Chronic MRL***

The maximum measured concentration of arsenic in surface soil is 18.6 ppm. Using this value, the exposure dose was calculated for adults ( $2.9 \times 10^{-5}$  mg/kg/day), and for children ( $2.7 \times 10^{-4}$  mg/kg/day). Although there is no acute or intermediate MRL, the adult value does not exceed the chronic MRL ( $3 \times 10^{-4}$  mg/kg/day). Therefore the non-carcinogenic risks of adults exposed to arsenic in the surface soil at this site may be classified as unlikely. Although the child exposure dose approaches the chronic MRL a review of the scientific basis for this was assessed, and non-carcinogenic health risks for the child are also classified as unlikely.

#### **Carcinogenicity Classification:**

Arsenic has been classified by the EPA as a known human carcinogen (Group A).

#### **Brief description:**

Arsenic is a naturally-occurring element. Pure arsenic is a gray metal-like material which is usually found in the environment combined with other elements such as oxygen, chlorine, and sulfur. Arsenic combined with these elements is called inorganic arsenic [3]. Arsenic is found in the earth's crust at an average level of 2 ppm [3]. Most natural soils contain low levels of arsenic, but industrial wastes and pesticide applications may increase concentrations. Background arsenic concentrations in soil range from about 1 to 40 ppm, with a mean value of about 5 ppm [3].

## Lead

### *Non-cancerous Effects*

Lead was detected at a maximum concentration in the surface soils at 607 ppm. Using this value, the exposure dose was calculated for adults ( $9.6 \times 10^{-4}$  mg/kg/day), and for children ( $8.8 \times 10^{-3}$  mg/kg/day). There are no MRLs for lead. However, since the exposure doses exceeded the comparison value of 400 ppm, an assessment of the health risks posed by the maximum lead concentration was conducted. An examination of acute exposures in humans was investigated in the scientific literature. The lowest exposure doses in the literature which resulted in adverse effects (minor blood changes) was ten-fold higher than the exposure doses calculated for this site. Therefore, the non-carcinogenic health risks for a child and adults exposed to lead in the surface soil at this site may be classified as unlikely.

#### ***Carcinogenicity Classification:***

Although lead has been classified by the EPA as a probable human carcinogen (EPA group B2), there is insufficient information to conduct any cancer assessment for this compound.

#### ***Brief Description of Chemical:***

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. It has no characteristic taste or smell. Metallic lead does not dissolve in water and does not burn. Some natural and man-made substances contain lead, but do not look like lead in its metallic

form [5]. The lead content of soil derived from crustal rock, ranges from less than 10 to 30 ppm. The concentration of lead soil varies widely due to man-made sources. Elevated soil lead concentrations have been detected in larger urban areas. Some concentrations exceeded 300 ppm lead [5].

## Mercury

### ***Non-cancerous Effects - Based on the Intermediate MRL***

The maximum measured concentration of mercury in surface soil is 94.2 ppm. Mercury can occur in many different forms (i.e., species). The identification of the form is determined by mercury speciation analysis. This technique was not conducted on these samples. Consequently, the form used in this assessment is the most toxic of the inorganic species; mercuric chloride. Using this value, the exposure dose was calculated for adults ( $1.4 \times 10^{-4}$  mg/kg/day), and for children ( $1.3 \times 10^{-3}$  mg/kg/day). Neither value exceeds the acute MRL ( $7 \times 10^{-3}$  mg/kg/day). The non-carcinogenic risks of adults exposed to mercury in the surface soil at this site may be classified as unlikely. Although the child exposure dose approaches the intermediate MRL ( $2 \times 10^{-3}$  mg/kg/day), a review of the scientific foundation for this was evaluated, and non-carcinogenic health risks for the child are also classified as unlikely.

### **Carcinogenicity Classification:**

Mercury has been assessed by the EPA as to its carcinogenic potential. This compound has been designated as a Group D carcinogen, which is in the category of compounds not classifiable as to human carcinogenicity

### **Brief description:**

Mercury is a metal (element) that occurs naturally in the environment in several forms. In the metallic or elemental form, mercury is a shiny, silver-white, odorless liquid familiar to anyone who has used a mercury thermometer. Some evaporation of metallic mercury occurs at room temperature to form mercury vapor, a colorless, odorless gas [4]. The National Oceanic and Atmospheric Administration (NOAA) conducted an analysis between 1984 and 1987, and the results include the finding that 38 of 175 locations contained mercury concentrations in excess of 0.41 ppm [4].

## Conclusions

### **Physical Site Conditions**

The structural integrity of sections of several building has been damaged to such an extent that a building collapse is likely. In addition, there are numerous covered holes in the building floor (leading directly into the Still River beneath) located inside the main building which present a physical hazard to trespassers. Therefore, on the basis of the physical site conditions, ATSDR and CT DPH conclude that this site represents a public health hazard.

## **Surficial Soil**

- Based on review of limited surface soil sampling data provided for the Former Mallory Hat Factory Site, ATSDR and CT DPH conclude that levels of contamination in surface soil represent no apparent public health hazard to trespassers. The specific scenario addressed in this assessment was a sixty-day trespasser.
- In the absence of remediation activities at this site, the levels of contaminants present represent a public health hazard for extended exposures (greater than 60 days) if they were to occur.
- These conclusions are based on the review of the surface soil samples and may change if additional data is collected. ATSDR and CT DPH would appreciate the opportunity to review any new data.
- These conclusions are based on limited data, as only 11 metals were analyzed for. Other contaminants may be present which may represent a public health concern.

## **Recommendations**

1. ATSDR and the CT DPH recommend site access be restricted due to the physical hazards.
2. If contaminant levels remain for an extended period beyond the sixty-day scenario, then the ATSDR and the CT DPH would recommend that access to these contaminated soils be restricted.
3. Conduct remediation activities that are most protective of nearby residents, and on-site workers.
4. A complete site characterization should be conducted to fully delineate the contaminants.

## **Preparer of Health Consultation**

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### **ATSDR Regional Representative:**

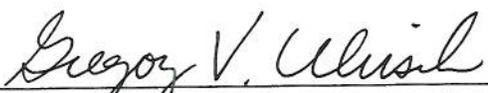
William Sweet  
ATSDR Region I

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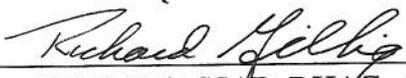
Greg Ulirsch  
Superfund Site Assessment Branch  
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## CERTIFICATION

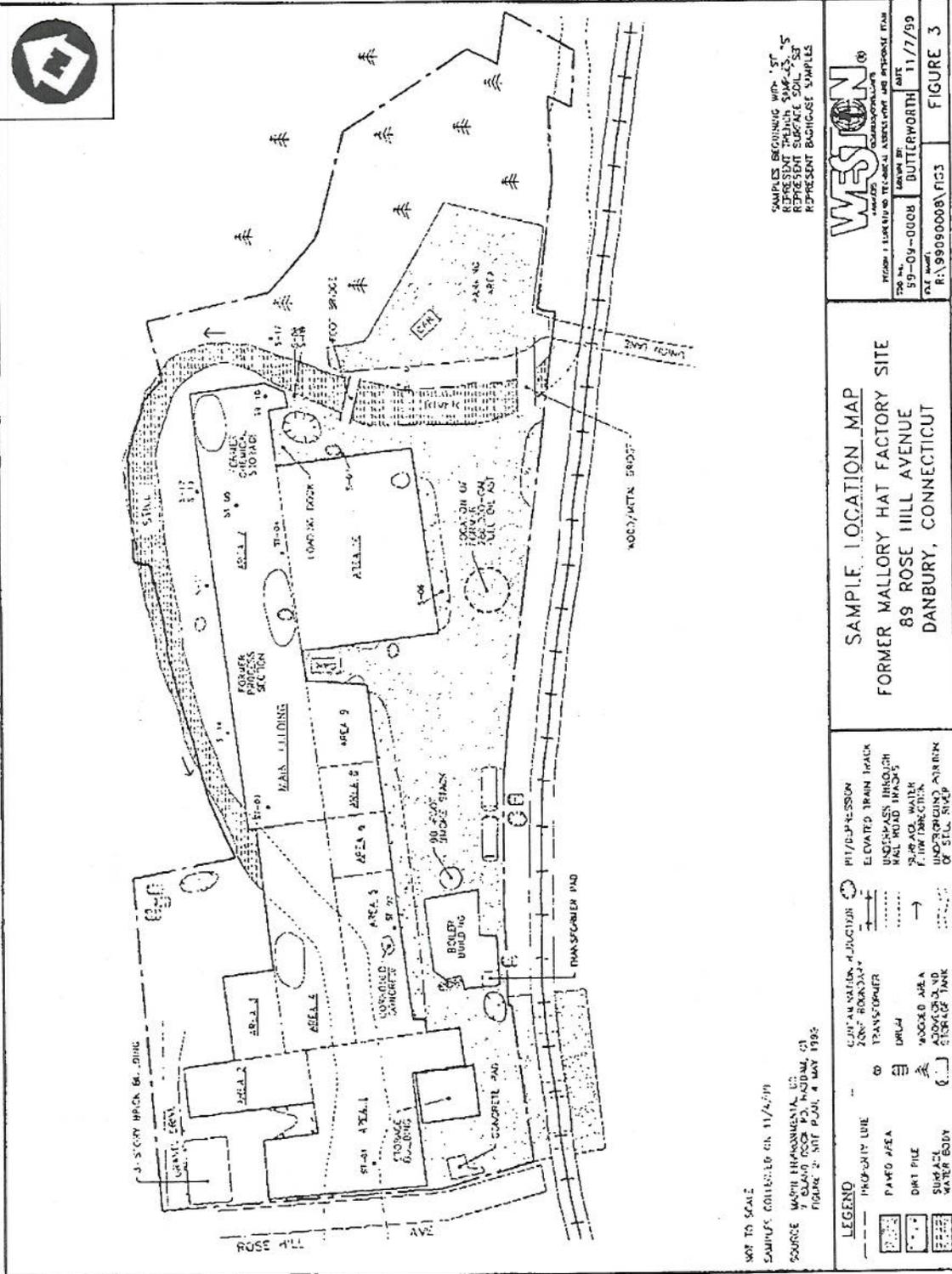
The Health Consultation for the Public Health Implications of Metal Contaminated Soils at the Former Mallory Hat Factory site was prepared by the Connecticut Department of Public Health under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with approved methodology and procedures existing at the time the health consultation was initiated.

  
Technical Project Officer, SPS, SSAB, DHAC

The Division of Health Assessment and Consultation, ATSDR, has reviewed this Health Consultation and concurs with its findings.

  
Chief, SPS, SSAB, DHAC, ATSDR

# Site Diagram



## REFERENCES

1. Memorandum from Mary Ellen Stanton (On-Scene Coordinator, Site Evaluation and Response Section, EPA), to William Sweet (Senior Regional Representative, ATSDR Region 1), December 22, 1999.
2. New York Times. Demolition of Factory Scatters Homeless, by Frances Chamberlain, Section 14, Connecticut. Sunday, January 9, 2000
3. Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Arsenic", April 1993.
4. Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Mercury", April 1993.
5. Agency for Toxic Substances and Disease Registry, "Toxicological Profile for Lead", April 1993.

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