Public Health Assessment

Initial/Public Comment Release

Physical hazards in the Torch Lake Superfund site and surrounding area
Houghton and Keweenaw Counties, Michigan

EPA FACILITY ID: MID980901946

Prepared by
Michigan Department of Community Health

COMMENT PERIOD ENDS: August 10, 2012

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Prepared under a Cooperative Agreement with the
U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Agency for Toxic Substances and Disease Registry
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THE ATSDR PUBLIC HEALTH ASSESSMENT: A NOTE OF EXPLANATION

This Public Health Assessment-Public Comment Release was prepared by ATSDR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund) section 104 (i)(6) (42 U.S.C. 9604 (i)(6), and in accordance with our implementing regulations (42 C.F.R. Part 90). In preparing this document, ATSDR's Cooperative Agreement Partner has collected relevant health data, environmental data, and community health concerns from the Environmental Protection Agency (EPA), state and local health and environmental agencies, the community, and potentially responsible parties, where appropriate. This document represents the agency's best efforts, based on currently available information, to fulfill the statutory criteria set out in CERCLA section 104 (i)(6) within a limited time frame. To the extent possible, it presents an assessment of potential risks to human health. Actions authorized by CERCLA section 104 (i)(11), or otherwise authorized by CERCLA, may be undertaken to prevent or mitigate human exposure or risks to human health. In addition, ATSDR's Cooperative Agreement Partner will utilize this document to determine if follow-up health actions are appropriate at this time.

This document has previously been provided to EPA and the affected state in an initial release, as required by CERCLA section 104 (i) (6) (H) for their information and review. Where necessary, it has been revised in response to comments or additional relevant information provided by them to ATSDR's Cooperative Agreement Partner. This revised document has now been released for a 60-day public comment period. Subsequent to the public comment period, ATSDR's Cooperative Agreement Partner will address all public comments and revise or append the document as appropriate. The public health assessment will then be reissued. This will conclude the public health assessment process for this site, unless additional information is obtained by ATSDR's Cooperative Agreement Partner which, in the agency's opinion, indicates a need to revise or append the conclusions previously issued.

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Please address comments regarding this report to:

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Visit our Home Page at: http://www.atsdr.cdc.gov

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Agency for Toxic Substances and Disease Registry

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Foreword

The Michigan Department of Community Health (MDCH) conducted this evaluation for the federal Agency for Toxic Substances and Disease Registry (ATSDR) under a cooperative agreement. ATSDR conducts public health activities (assessments/consultations, advisories, education) at sites of environmental contamination. The purpose of this document is to identify potentially harmful exposures and actions that would minimize those exposures. This is not a regulatory document and does not evaluate or confirm compliance with laws. This is a publicly available document that is provided to the appropriate regulatory agencies for their consideration.

The following steps are necessary to conduct public health assessments/consultations:

- Evaluating exposure: MDCH toxicologists begin by reviewing available information about environmental conditions at the site: how much contamination is present, where it is found on the site, and how people might be exposed to it. This process requires the measurement of chemicals in air, water, soil, or animals. Usually, MDCH does not collect its own environmental sampling data. We rely on information provided by the Michigan Department of Environmental Quality (MDEQ), U.S. Environmental Protection Agency (EPA), and other government agencies, businesses, and the public.

- Evaluating health effects: If there is evidence that people are exposed – or might be exposed – to hazardous substances, MDCH toxicologists then determine whether that exposure could be harmful to human health, using existing scientific information. The report focuses on public health – the health impact on the community as a whole.

- Developing recommendations: In its report, MDCH outlines conclusions regarding any potential health threat posed by a site, and offers recommendations for reducing or eliminating human exposure to contaminants. If there is an immediate health threat, MDCH will issue a public health advisory warning people of the danger, and will work with the appropriate agencies to resolve the problem.

- Soliciting community input: The evaluation process is interactive. MDCH solicits and considers information from various government agencies, parties responsible for the site, and the community. If you have any questions or comments about this report, we encourage you to contact us.

Please write to: Toxicology and Response Section
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Or call us at: 1-800-648-6942 (toll free)
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www.michigan.gov/mdch-toxics

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Acronyms and Abbreviations

ACM	asbestos-containing material
ATSDR	Agency for Toxic Substances and Disease Registry
C & H	Calumet and Hecla
EPA	U.S. Environmental Protection Agency
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
MDNRE	Michigan Department of Natural Resources and Environment
MSP	Michigan State Police
NPL	National Priorities List
OU	Operable Unit
PCBs	polychlorinated biphenyls
PHA	public health assessment
RRD	Remediation and Redevelopment Division
TLAA	Torch Lake Area Assessment
UST	underground storage tank
WUPHD	Western Upper Peninsula Health Department

Torch Lake Superfund Site Public Health Assessment Documents: An Introduction

The federal Agency for Toxic Substances and Disease Registry (ATSDR) is mandated to provide public health activities (assessments, advisories, education) at National Priorities List (NPL, or "Superfund") sites. The Michigan Department of Community Health (MDCH) conducts these activities for ATSDR in Michigan, under a cooperative agreement.

Due to its size and complexity, the Torch Lake Superfund site in Michigan's Upper Peninsula was divided into three Operable Units (OUs), as stated in the United States Environmental Protection Agency's (EPA)'s 1992 Record of Decision[1]:

OU1 includes surface tailings, drums, and slag pile/beach on the western shore of Torch Lake. These tailing piles include stampsands in Lake Linden, Hubbell/Tamarack City, and Mason, and? a slag pile/beach located in Hubbell.

OU2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Channel, and other water bodies at the site.

OU3 includes tailings and slag deposits located in the north entry of Lake Superior, Michigan Smelter, Quincy Smelter, Calumet Lake, Isle-Royale, Boston Pond, and Grosse-Point.

MDCH previously produced several documents for the Torch Lake Superfund site: a Preliminary Health Assessment in 1989; a Site Review and Update in 1995; and a Health Consultation in 1998 The latter wasrequested by the Michigan Department of Environmental Quality (MDEQ), which was conducting a Brownfields assessment at various locations within the site.

In 2007, MDEQ requested that MDCH provide further public health input on exposure issues for which there was new environmental and toxicological information. MDCH visited the site in June 2008 to gain a better understanding of MDEQ's concerns. The Western Upper Peninsula Health Department (WUPHD) accompanied MDCH, MDEQ, and EPA on this site visit. Issues discussed included:

- ►physical hazards
- ►inhalation of resuspended stampsands
- ►the potential for drinking water contamination
- ►recreational exposure at beaches
- ►exposure via consuming local sport-caught fish.

Following the site visit, WUPHD requested that MDCH determine the possible public health implications of these various exposure pathways. MDCH will address the issues listed above in separate Public Health Assessment (PHA) documents. Each document will be released for public review and comment, following which MDCH will respond in a final document. Send comments to the MDCH report author (see "Preparers of Report" page) at the address in the foreword section of this document.

[1] United S. Environmental Protection Agency (EPA).Superfund Record of Decision: Torch Lake, MI. Washington, D.C.: Office of Emergency and Remedial Response, United States Environmental Protection Agency; 1992 Sept. Report No.: EPA/ROD/R05-92/215.

Summary

The Michigan Department of Environmental Quality (MDEQ) and the Western Upper Peninsula Health Department (WUPHD) requested an updated public health assessment of the Torch Lake Superfund site and vicinity in Houghton and Keweenaw Counties in Michigan. The Torch Lake Superfund site is a complex site, with numerous Operable Units (OUs) throughout the Keweenaw Peninsula of Michigan's Upper Peninsula, dealing primarily with contamination left behind by copper mining activities. This document addresses the physical hazards at or related to the former area mining sites.

The Michigan Department of Community Health (MDCH) has reached the following conclusion regarding physical hazards in the Torch Lake Superfund and surrounding areas.

MDCH has concluded that there are many physical hazards at the former copper mining-related sites in the Torch Lake area and vicinity. Some of the sites have restricted access, but still have trespassers. Other sites are openly available to the public. Physical hazards should be removed or corrected, or access to these areas better restricted.

Next Steps: Property owners or responsible parties should:

- improve access restriction to sites where physical and any associated chemical hazards are present;
- develop a plan to remove or correct physical hazards in accordance with local desires to preserve the historic nature of the area;
- address any chemical hazards and contamination associated with these sites in accordance with current or planned future use of the property.

MDCH will provide technical assistance as necessary.

MDCH supports the preservation of these sites, if possible, for their historic value but emphasizes that public safety should be considered first.

Purpose and Health Issues

Previously, the Michigan Department of Community Health (MDCH) produced several documents discussing public health issues at the Torch Lake Superfund site (ATSDR 1989, 1995, 1998b). In 2007, the Michigan Department of Environmental Quality (MDEQ)[2] requested that MDCH provide public health input regarding potential exposures at the Torch Lake Superfund site and surrounding area based on new or updated information. This document addresses physical hazards at or related to selected areas of interest.

Due to the historic mining activities in Michigan Upper Peninsula in general, and the Keweenaw Peninsula specifically, there are many mine and stamp mill ruins throughout the area (see

[2] In January 2010, the Michigan Department of Environmental Quality (MDEQ) merged with the Michigan Department of Natural Resources (MDNR) and became the Michigan Department of Natural Resources and Environment (MDNRE). In 2011, the MDEQ was re-established. Citations within this document refer to the agency name at the time the reference was created.

www.coppercountryexplorer.com for examples). The MDCH understands that many of these sites can provide historical value and interest to students, researchers, and visitors. MDCH does not intend that areas of historical relevance be made off-limits or removed, but rather that people use and enjoy them safely.

MDCH conducted this health assessment for the federal Agency for Toxic Substances and Disease Registry (ATSDR) under a cooperative agreement. ATSDR conducts public health activities (assessments/consultations, advisories, education) at sites of environmental contamination and concern. ATSDR is primarily an advisory agency. Therefore, its reports usually identify what actions are appropriate to be undertaken by the regulatory agency overseeing the site, other responsible parties, or the research or education divisions of ATSDR. As such, ATSDR recommendations may not encompass all types of federal and state requirements from a regulatory perspective. The purpose of a health assessment is not to evaluate or confirm regulatory compliance, or assess ecological risk, but to determine if any potentially harmful exposures or physical hazards are occurring or may occur in the future.

Background

The Torch Lake Superfund site is located in Houghton County in the Keweenaw Peninsula of Michigan's Upper Peninsula (Figure 1 [see Appendix A for figures]). It was added to the National Priorities List (NPL), also known as Superfund, in 1984 due to the presence of copper mining waste. Copper mining occurred in this area from the 1890s until 1969. Waste from the copper mining includes stampsands (a type of mine tailing), slag piles, and remains of industrial facilities (Weston 2007).

In June 2008, MDCH toxicologists conducted a site visit of the Torch Lake Superfund site and surrounding area with staff from MDEQ, the U.S. Environmental Protection Agency (EPA), and the Western Upper Peninsula Health Department (WUPHD). They visited, among other locations, the former Mohawk stamping mill at Gay in Keweenaw County (Figure 1), which is not part of the Superfund site; and various points along the western shore of Torch Lake, including the former Quincy reclamation plant at Mason, a public beach and the former coal docks in Hubbell, and the Ahmeek mill ruins in Tamarack City (near Hubbell; Figure 1). MDEQ also provided MDCH with anecdotal information about physical hazards.

Discussion

Physical Hazards Noted at Selected Sites and Public Access to Them

Former Mohawk Mill – Gay

The former Mohawk stamping mill at Gay generated vast amounts of stampsands. Most of the structures were demolished and removed. However, a tall stack, portions of the conveyor that deposited the stampsands into Lake Superior, and various piles of rubble remain. People may attempt to explore the interior of the stack (Figure 2) at its base and the interior of the underground structure of the conveyor (Figure 3). The stability of these structures is unknown. Also, there appears to be asbestos-containing material (ACM) near several rubble piles (not

shown); ACM is discussed further in the *Chemical Hazards Associated with Physical Structures* section.

Although the main road entrance to the Gay stampsands, where the stack and ruins are located, is gated and locked, people reportedly can gain access to the site (A. Keranen, MDEQ Remediation Division [RD], personal communication, 2008). The stampsands along the Lake Superior shoreline, starting at Gay, extend about five miles and may not be fenced their entire length. If so, it may be difficult to prevent people from accessing the site.

Former Quincy Reclamation Plant – Mason

The former Quincy reclamation plant is along the shore of Torch Lake near Mason. The property holds the ruins of a leach plant (Figures 4-6), a circular track for a swinging bridge just off shore (Figure 7; see http://www.coppercountryexplorer.com/2009/02/rails-on-water/ for description of previous use), a partially sunken dredge (Figures 8 and 9) as well as a completely sunken dredge, and a stack (Figure 10). There may be an underground storage tank (UST), most likely used for fuel, in the plant-ruins complex (Figure 6). There is evidence of people using the site for recreational activities (Figures 5 and 9). People can readily access the site via land or water.

These structures have slip-and-fall hazards. Also, the UST has the potential for an explosion if fuel vapors are present. The exposed dredge likely has sharp edges, its sturdiness is questionable, and people jumping off of it into the lake may misjudge the water's depth. Although a buoy marks the location of the completely sunken dredge, it is unclear how near the water surface the structure is and whether it poses a hazard to swimmers or boaters. Similar to the stack at Gay, people may choose to explore the interior of the stack here, if accessible.

"Building in Mason"

On the west side of M-26 in Mason, slightly north of the former Quincy Reclamation Plant area, is a former industrial building that is no longer in use. MDCH did not stop here during the site visit in 2008, but MDEQ pointed out the structure. The property is not part of the Torch Lake Superfund site. Along with the building, the property also contains exposed foundation materials and debris (Figure 11), empty drums, and suspected ACM (Figure 12). There reportedly is evidence of trespassing and vandalism (Weston 2007).

There are numerous safety hazards at this site: debris could cause tripping, sheet metal and cables may have sharp edges, and the integrity of the structure is questionable. The proximity of the property to M-26 may attract looters seeking scrap metal to sell.

Pilings and Former Docks Along Torch Lake Shoreline

All along the western Torch Lake shoreline, between Mason and the village of Lake Linden at the northern end of the lake, are wooden pilings in the water, which are remnants of docks that served the stamp mills (Figures 13 and 14). These former dock areas are accessible by land or water. There are no markers or buoys to warn boaters of the pilings, some of which are submerged (A. Keranen, MDEQ RD, personal communication, 2010).

The pilings present a hazard to boaters and personal watercraft ("jetski") users who may be unaware of their presence and not see them soon enough to avoid them.

Former Ahmeek Mill –Tamarack City/Hubbell

The former Ahmeek stamp mill in Tamarack City (also known as the "Tamarack City stamp mill" ruins) is adjacent to a playground (Figure 15). Although there is a small "No Trespassing" sign between the two areas (Figure 16), there is no access restriction between the playground the ruins. There is evidence of graffiti (Figures 17 and 18) and dumping (Figure 18) at the site.

The ruins present a falling hazard, as it is evident people have climbed on them (Figure 17). The dumping area presents a trip-and-fall hazard, and it is not known what might have been dumped there other than what is shown in Figure 18.

Public Beach by Slag Dump - Hubbell

There is a township park in Hubbell that includes a boat launch, docks, a playground, and a swimming beach on the shore of Torch Lake. Immediately northeast of the beach, also on the shore, is a former dump where slag and other wastes were deposited (Figures 19 and 20). The dump has a vegetative cover, but the cover is not intact. There are reports of swimmers and divers seeing old appliances and batteries on the lake bottom near the swimming beach (A. Keranen, MDEQ RD, personal communication, 2010). Weston (2007) reports direct discharges of residential sewage from local homes via piping to the northeast lobe of the beach (i.e., the former dump area.) There is also a pipe that discharges from the dump into the lake (identified as "Water Storm Discharge" in Figure 19; A. Keranen, MDEQ RD, personal communication, 2011).

At the very least, the presence of visible waste is a nuisance. The waste in the former dump has not been fully characterized (A. Keranen, MDEQ RD, personal communication, 2011), thus there may be physical or chemical hazards posed by the items in that area. If untreated sewage is entering the lake, that can pose a biological hazard to persons using the beach and lake.

Mineral Building – Hubbell

Further northeast of the public beach and former slag dump at Hubbell is a structure called the Mineral Building, next to a former smelter. The building is dilapidated, and debris includes potential ACM, empty drums, ash, slag, and stampsands (Figures 21 and 22). There is poor security at the site and evidence of household-waste dumping (Weston 2007).

Since people are dumping residential trash at this location, it is reasonable to expect that other trespassers may be coming to the site. The old building and debris on the site may pose physical hazards (sharp edges, slip-and-fall), and mining-related or household waste could pose chemical hazards.

Incident Involving Ruins

Ruins of former mining activities (stampmills, leaching plants, other processing plants) in the Torch Lake area may not always be evident and could pose a health and safety hazard. The Michigan State Police (MSP) recorded the following incident (paraphrased from the report),

which occurred on August 29, 2008, on private wooded property on the west side of M-26, about halfway between Mason and Hubbell:

> A local resident, in his early 50s, was walking through a brushy, overgrown area when he suddenly fell through some rotten planking covering an open shaft. The shaft was about 15 feet deep. The man was not seriously hurt but could not climb out of the shaft. He was able to follow a culvert to daylight on the other side of M-26 to get out. The poured-concrete shaft is part of a culvert installed by the C & H (Calumet and Hecla) Mining Company. The company covered the opening with planks in the 1960s, but the planks are now quite rotted. The current property owner, another local resident, indicated he would cap the shaft with concrete as soon as possible. In the meantime, the police taped the area off with yellow police tape (MSP Incident No. 088-0001691-08(21)).

According to the MDEQ, the yellow police tape still surrounds the shaft opening (A. Keranen, MDEQ RD, personal communication, 2011). It is not known whether the opening has been capped, nor is it known how many similar structures may exist in areas where people or pets might walk. It was fortunate that the man who fell into the shaft was not seriously injured and that he found his way out. Another person in such a situation may not have had the presence of mind to seek an alternative way out, assuming the person was not injured or killed in the fall. Injury or death could result from the impact of dropping 15 feet or, since the culvert can still carry water, a person could be knocked unconscious and land in water deep enough to drown.

Trespassing Witnessed at Former C & H Power Plant

The former C & H Power Plant property, north of Hubbell near the village of Lake Linden, is privately owned. There is evidence of trespassing at this location (Figure 23) as well as a report of two unauthorized persons (adult and child, together) entering the structure during an inspection by MDNRE and EPA (A. Keranen, MDEQ RD, personal communication, 2010).

There are several deep open pits inside the plant, some with fall protection but others without (Figure 23). Partially submerged drums were observed in some of the pits. There are sediments in the pits that have been shown to contain polychlorinated biphenyls (PCBs; MDEQ, unpublished data, 2008). ACM has been reported at this property, both in and outside the building (http://www.epaosc.org/site/site_profile.aspx?site_id=5961). Thus, there are physical as well as chemical hazards present at the former C & H Power Plant. The EPA Emergency Removal branch currently is involved in addressing the hazards at this site. MDCH is evaluating possible public health implications in a separate health consultation.

Chemical Hazards Associated with Physical Structures

In 2007, EPA hired Weston Solutions, Inc. to conduct an assessment of the Torch Lake area (TLAA; Weston 2007). The TLAA report indicated many areas where there were abandoned drums, ACM, lead-based paint, and other chemical hazards. Drum contents may not be known and may not match any labeling on the containers.

ACM is present both within and outside of buildings, some of which are in residential areas, such as the C & H Power Plant property (A. Keranen, MDEQ RD, personal communication, 2010). Asbestos poses an inhalation hazard when its fibers are friable and become airborne. People who breathe high levels of asbestos, usually workers, can develop a severe breathing disability called asbestosis. Breathing lower levels of asbestos can result in the development of plaques on pleural (lung) membranes, which may eventually restrict breathing. Asbestos is a human carcinogen (ATSDR 2001).

Lead is a potent neurotoxin and is especially hazardous to children, although it can affect adults' nervous systems as well. Exposure can also damage the kidneys, the reproductive system, and cause anemia. Children may eat dried lead-based-paint flakes from the walls of stamp-mill structures, or flakes may have fallen into the surrounding dirt, allowing soil contact to be an exposure pathway (ATSDR 2007).

Other chemical hazards include PCBs, which may be in old electrical or other equipment used at the stamp mills. Exposure to high concentrations of PCBs, such as direct contact with the chemical, can result in rashes and a severe acne-like reaction. In this situation, it is more likely that people would be exposed to PCBs by eating contaminated fish. Long-term consumption of PCB-contaminated fish can lead to an increased risk in the development of cancer, diabetes, and certain immune disorders. Children born to or nursed by exposed mothers may have behavioral and learning problems (ATSDR 2000).

Children's Health Considerations

In general, children may be at greater risk than adults from exposure to hazardous substances at sites of environmental contamination. Children engage in activities such as playing outdoors and hand-to-mouth behaviors that could increase their intake of hazardous substances. They are shorter than most adults and, therefore, breathe dust, soil, and vapors found closer to the ground. Their lower body weight and higher intake rate results in a greater dose of hazardous substance per unit of body weight. The developing body systems of children can sustain permanent damage if toxic exposures are high enough during critical growth stages. Fetal development involves the formation of the body's organs. Injury during key periods of prenatal growth and development could lead to malformation of organs (teratogenesis), disruption of function, and premature death. Exposure of the mother could lead to exposure of the fetus, via the placenta, or affect the fetus because of injury or illness sustained by the mother (ATSDR 1998a). The implication for environmental health is that children can experience substantially greater exposures to toxicants in soil, water, or air than adults can.

Children may access many of the sites discussed above, as well as other areas related to former copper mining activities in the Torch Lake Superfund site and vicinity. These sites may appear attractive for exploration and play. Not all of the sites have fences or other deterrents, such as "No Trespassing" signs. Unsupervised children and teens may choose to enter sites regardless of strictures placed upon access.

Children are not expected to recognize chemical hazards, such as powdery-looking piles of asbestos, lead-based paints, and oily sludges that may contain PCBs.

Community Health Concerns

The supervisor for Osceola Township reportedly has concerns about the physical and potential chemical hazards at the Ahmeek ruins (Tamarack City) and is interested in learning about funding opportunities to assist with cleaning up the property (A. Keranen, MDEQ RD, personal communication, 2010). MDCH does not provide grants for this type of activity. MDEQ, EPA, or private foundations might provide such grants.

According to MDEQ, an individual expressed concern about Hubbell Beach being adjacent to a former slag dump. As discussed earlier, the dump, also used for municipal waste, borders the beach area, and anecdotal reports have indicated old appliances being visible along the lake bottom. The individual further stated that he would not take his children swimming at the Hubbell Beach (A. Keranen, MDEQ RD, personal communication, 2010).

Conclusions

MDCH has concluded that there are many physical hazards at the former copper mining-related sites in the Torch Lake area and vicinity. Some of the sites have restricted access but still have trespassers. Other sites are openly available to the public. Physical hazards should be removed or corrected, or access to these areas better restricted.

MDCH supports the preservation of these sites, if possible, for their historic value, but emphasizes that public safety should be considered first.

Recommendations

Improve access restriction to sites where physical and any associated chemical hazards are present.

Develop a plan to remove or correct physical hazards in accordance with local desires to preserve the historic nature of the area.

Address any chemical hazards and contamination associated with these sites in accordance with current or planned future use of the property.

Public Health Action Plan

Responsible parties and property owners will be made aware of real or potential hazards on their properties by the release of this document.

Local officials and groups will incorporate a plan to remove or correct hazards as they develop the areas for intended use.

The MDEQ and EPA will collect additional environmental data to enhance the current understanding of contamination issues and provide regulatory oversight.

MDCH has provided this public health assessment document to regulatory agencies and local officials.

MDCH will remain available as needed for future consultation at this site.

If any citizen has additional information or health concerns regarding this health assessment document, please contact MDCH's Division of Environmental Health at 1-800-648-6942.

Preparers of Report

This Public Health Assessment was prepared by the Michigan Department of Community Health under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR). It is in accordance with the approved agency methods, policies, procedures existing at the date of publication. Editorial review was completed by the cooperative agreement partner. ATSDR has reviewed this document and concurs with its findings based on the information presented. ATSDR's approval of this document has been captured in an electronic database, and the approving agency reviewers are listed below.

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Appendix A: Figures

Figure 1. Selected areas of interest in the Torch Lake Superfund Site and vicinity, Houghton and Keweenaw Counties, Michigan.

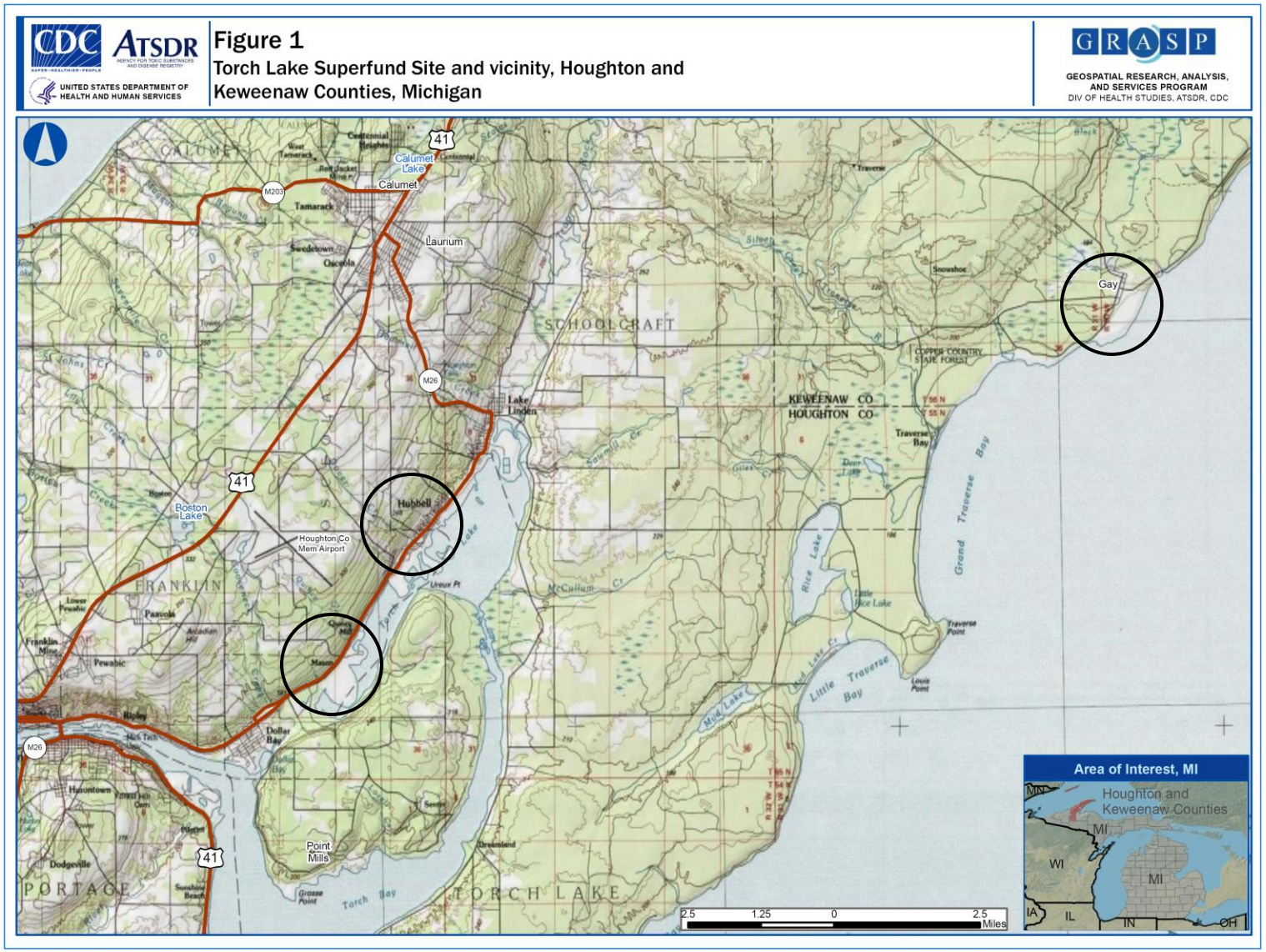

Figure 2. Ruins and stack at former Mohawk stamping mill, Gay (Keweenaw County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 3. Ruins of conveyor that carried stampsands to Lake Superior at former Mohawk stamping mill, Gay (Keweenaw County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 4. Ruins of Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 5. Closer view, with evidence of paintball splatters, of ruins of Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 6. Possible underground storage tank at former Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken September 6, 2007. Source: Weston 2007.)

Figure 7. Circular track offshore in Torch Lake at former Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 8. Partially sunken dredge in Torch Lake near former Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 9. Closer look, with evidence of graffiti, at dredge in Torch Lake near former Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

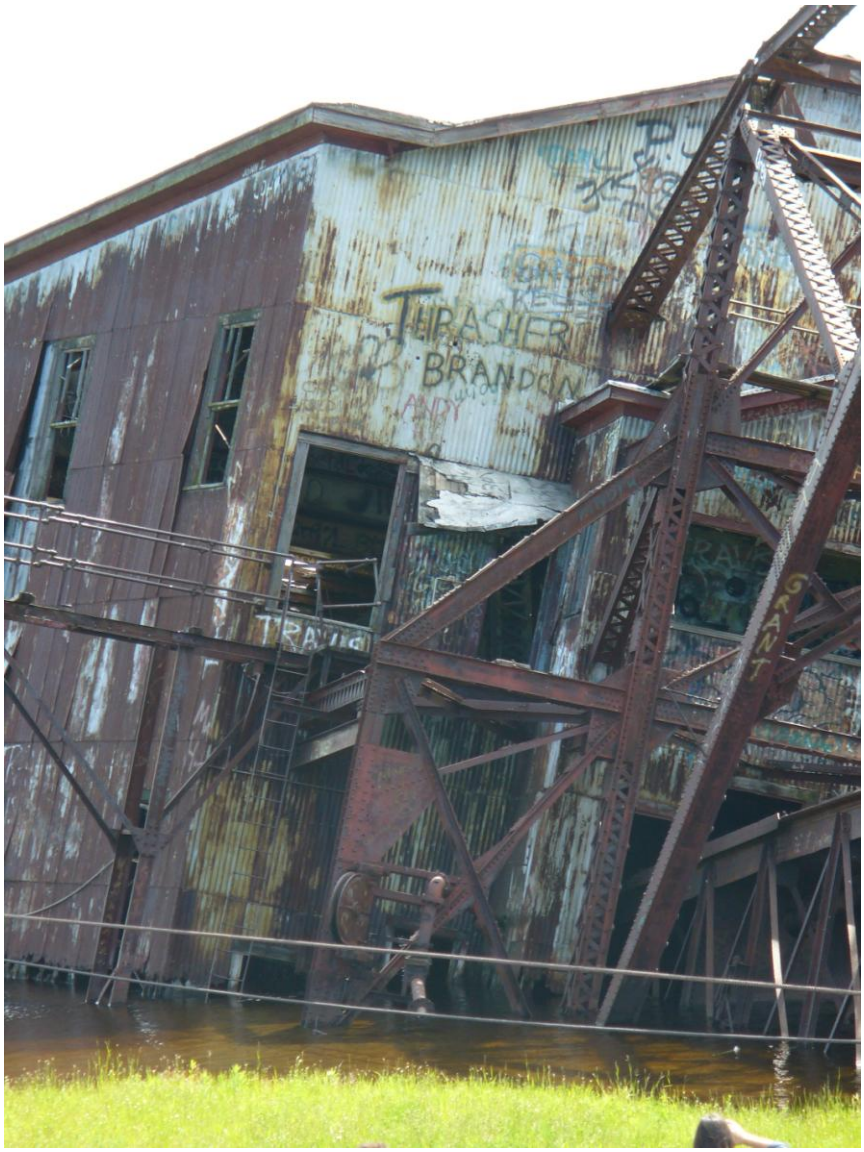

Figure 10. View of stack and partially sunken dredge near former Quincy reclamation plant in Mason (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 11. Debris at "Building in Mason," west of former Quincy Reclamation Plant area (across M-26) in Mason (Houghton County), Michigan. (Picture taken September 6, 2007. Source: Weston 2007.)

Figure 12. Suspected asbestos-containing material at “Building in Mason,” west of former Quincy Reclamation Plant area (across M-26) in Mason (Houghton County), Michigan. (Picture taken September 6, 2007. Source: Weston2007.)

Figure 13. Remnants of coal docks along Torch Lake shoreline between Mason and Hubbell (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 14. Remnants of coal docks along Torch Lake shoreline north of Hubbell (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 15. Playground near former Ahmeek stamping mill ruins in Tamarack City/Hubbell (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 16. Wall with "No Trespassing" sign separating playground/picnic area from former Ahmeek stamping mill ruins in Tamarack City/Hubbell (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 17. Evidence of graffiti at former Ahmeek stamping mill ruins in Tamarack City/Hubbell (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 18. Evidence of graffiti and dumping at former Ahmeek stamping mill ruins in Tamarack City/Hubbell (Houghton County), Michigan. (Picture taken June 16, 2008. Source: MDCH.)

Figure 19. Overview of public beach and former slag dump in Hubbell (Houghton County), Michigan. (Symbols indicate environmental sampling locations, not discussed here. Source: Weston 2007.)

Figure 20. Public beach on Torch Lake at Hubbell (Houghton County), Michigan, looking north at former slag dump. (Picture taken September 11, 2007. Source: Weston 2007.)

Figure 21. Mineral Building in Hubbell (Houghton County), Michigan. (Picture taken September 7, 2007. Source: Weston 2007.)

Figure 22. Debris at Mineral Building in Hubbell (Houghton County), Michigan. (Picture taken September 7, 2007. Source: Weston 2007.)

Figure 23. Interior of former Calumet and Hecla Power Plant showing graffiti and floor pits (white arrows), Lake Linden (Houghton County), Michigan. (Photo date unknown. Source: MDNRE.)