

**ABANDONED MINING WASTES
TORCH LAKE CASE STUDY
HOUGHTON COUNTY, MICHIGAN**

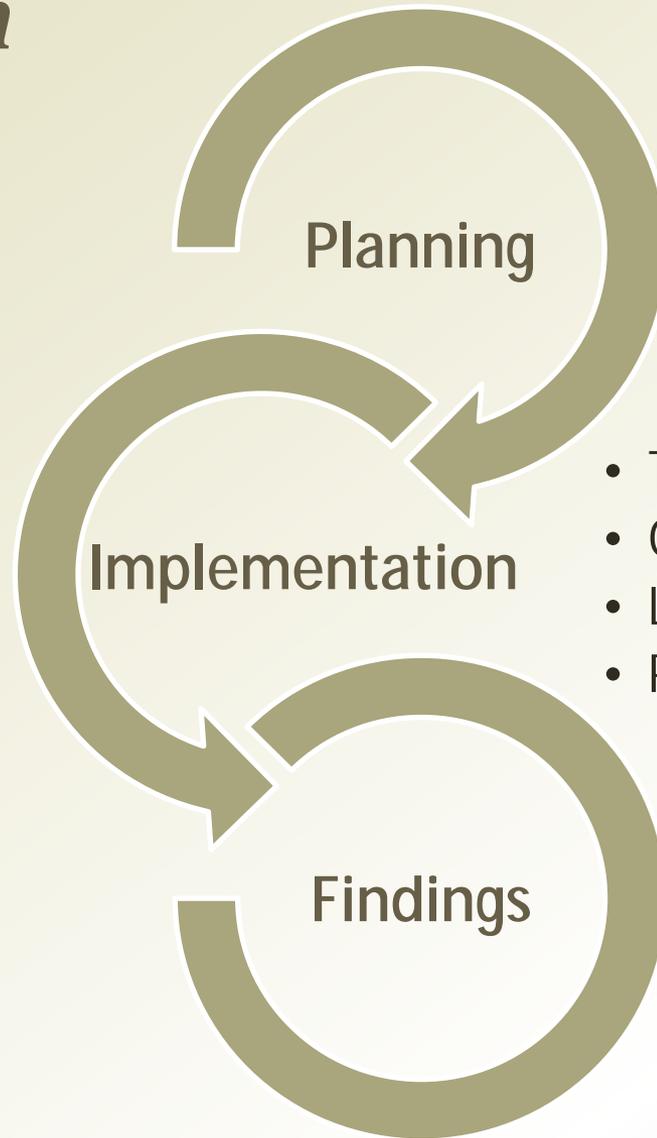


U.P. CONTAMINATED PROPERTY MANAGEMENT CONFERENCE

13 APRIL 2016

Presentation Overview

- Problem Statement
- Purpose
- Background
- Study Design
- Findings to Date
- Benefits
- Path Forward



Planning

- Data Compilation
- Data Gap Analysis
- Property Access
- Personnel
- Equipment

Implementation

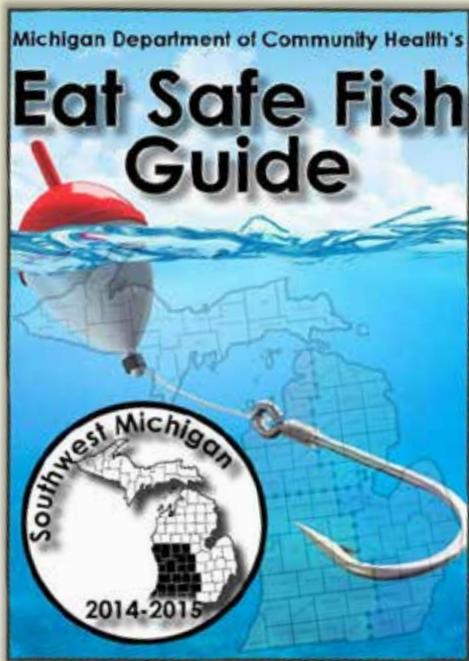
- Terrestrial Investigation
- Offshore Investigation
- Laboratory Analyses
- Physical Inspections

Findings

- Comprehensive Data Evaluation
- Exposure Assessment

Project Problem Statement

Environmental impairments within Torch Lake and industrial areas along the shoreline caused by historical mining and industrial operations are limiting the recovery of the Torch Lake ecosystem and present uncertainty over beneficial reuse of the land.



100 Years of Copper Processing

- Milling Ore
- Reclamation of stamp sands
- Regrinding, Leaching, Flotation
- Scrapping
- Refining
- Electrification

Photo Courtesy Michigan Tech Archives



Photo Courtesy Michigan Tech Archives



C&H Smelter
Complex

Photo Courtesy Michigan Tech Archives



A. F. 1919 LACE LAUREN HIGH

GALINET & WELLS

Photo Courtesy Michigan Tech Archives



Project Purpose

- *Identify and quantify environmental impairments not previously addressed; and,*
- *Support a comprehensive management approach that will guide MDEQ's decision making process in addressing potential human health and ecological concerns, and promote beneficial reuse of the land.*



MDEQ RRD's focus in 2016 is primarily on the terrestrial impairments that are distinct and separate from those addressed under the U.S. Environmental Protection Agency's (EPA's) Superfund program.



What Abandoned Mining Waste Are...

Abandoned mine waste are mining-era chemical containers and residues historically discarded in or near Torch Lake.

- *Significant in-lake and/or terrestrial sources of contamination including PCBs;*
- *Uncharacterized waste deposits, including more than 750 drums, reportedly, on the lake bottom;*
- *Bulk disposal areas, in part including slag dumps and landfills; and,*
- *Industrial ruins including coal storage areas, underground storage tanks (USTs), asbestos containing building materials (ACBM), residual process materials, and other waste materials.*





What Abandoned Mining Wastes Are Not...

- *This project does not address wastes remediated by the Superfund efforts: generally, the upper six inches of material underlying any soil cap and vegetative cover applied to such areas by EPA.*
- *This project also does not address stampsand or slag, as these wastes are no longer Part 201 issues per 2014 amendments.*

Where Abandoned Mining Wastes Are Located...

Private and publicly held properties in several townships, villages, and cities in Houghton County, Michigan. These properties are often located along waters of the state including the Portage Canal, Lake Superior, and Torch Lake (and its tributaries).



Abandoned Mining Wastes Project

Current Study Area

- *Four miles of Torch Lake shoreline*
- *265 acres*
- *227 parcels*



Torch Lake Superfund Site Background



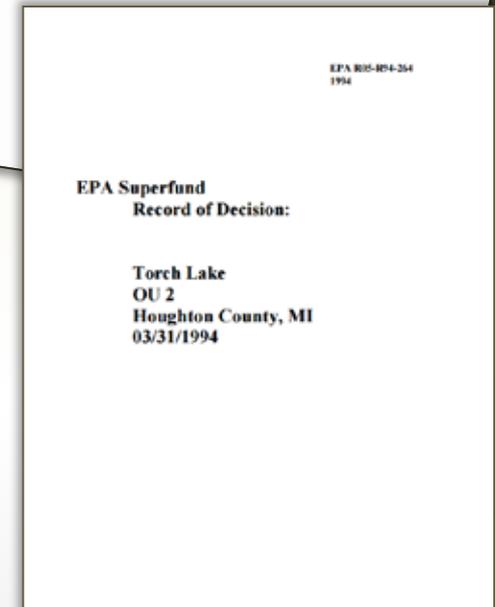
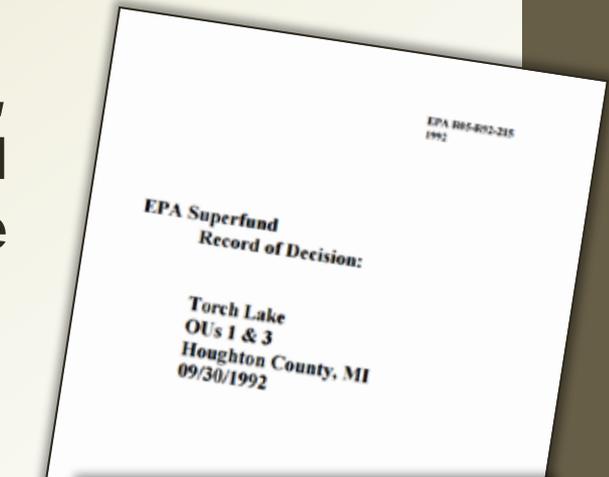
- Defined in 1986, by EPA, as the lands and waterways throughout the Keweenaw Peninsula that were the location of copper milling and beneficiation activities beginning in circa 1860s.
- Through a series of studies, EPA concluded the Site may present an imminent and substantial endangerment to public health, welfare, or the environment.

Torch Lake Superfund Site (Continued)

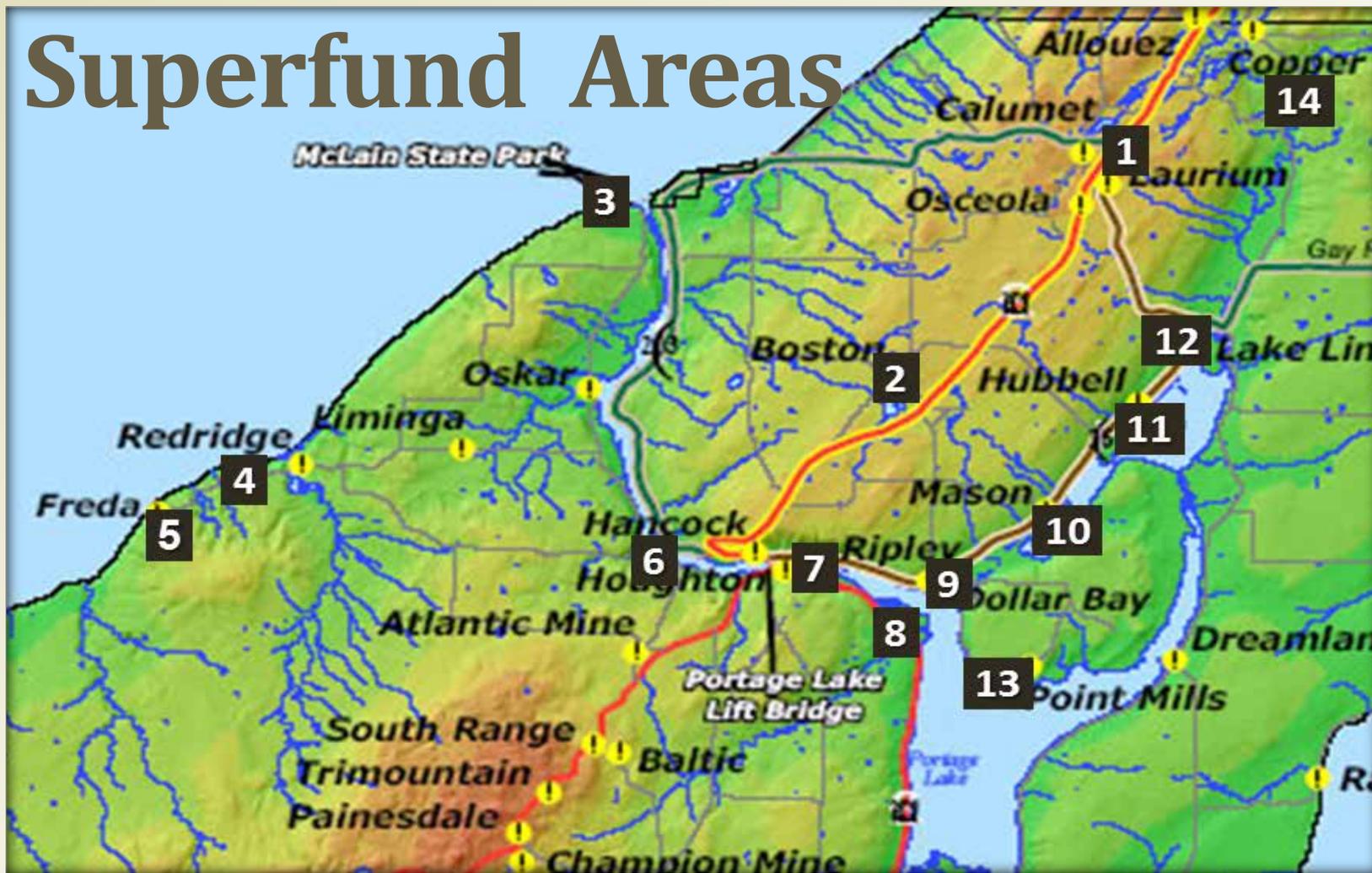
Given the complexity of the region wide issue, the EPA's 1992 Record of Decision (ROD) divided the Torch Lake Superfund Site into three Operable Units (OUs):

- *OU 1 - Lake Linden, Hubbell, Tamarack City, and Mason;*
- *OU 2 - Torch Lake, Portage Lake, the Portage Canal, and other water bodies; and,*
- *OU 3 - Lake Superior, Michigan Smelter, Quincy Smelter, Calumet Lake, Isle-Royale, Boston Pond, and Point Mills.*

OU 1 and in part OU 2 are included in the IJC's Torch Lake Area of Concern.



Superfund Areas



Torch Lake Superfund Site Overview

EPA's remedy included capping of the stamp sand deposits. Through these measures it was concluded that the following Remedial Actions Objectives (RAO) would be met:



- *Reduce or minimize potential future risks to human health associated with the inhalation of airborne contaminants from the tailings and/or slag;*
- *Reduce or minimize potential future risks to human health associated with direct contact with and/or the ingestion of the tailings and/or the slag;*
- *Reduce or minimize the release of contaminants in tailings to the groundwater through leaching; and,*
- *Reduce or minimize the release of contaminants in tailings to the surface water and sediment by soil erosion and/or air deposition.*









Torch Lake Superfund Site Overview (Continued)

The EPA selected a "No Action" remedy in their 1994 ROD for OU 2. To meet the RAO, the remedy selected for OU 2 took into consideration and relied upon:



- *The reduction of stamp sand loading to surface water bodies expected as a result of the remedial action taken at OU 1 and OU 3;*
- *Ongoing natural sedimentation and detoxification such as that which is occurring in other surface water bodies in the area;*









Torch Lake Superfund Site Overview (Continued)

The EPA selected a "No Action" remedy in the 1994 ROD for OU 2. To meet the RAO, the remedy selected for OU 2 took into consideration and relied upon:

- *Institutional programs and practices controlling potential future exposure to site-affected groundwater which are intended to be administered at the county and state level; and,*
- *The long-term monitoring and the five year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.*



Abandoned Mining Wastes

Other EPA involvement:

Post ROD implementation, other response activities completed or overseen by the EPA Emergency Removal Branch include:

- *2007 PCB & Lead Removal Action - Lake Linden's Village Park and Public Beach;*
- *2007 Torch Lake Area Assessment;*
- *2014 Asbestos Removal at Tamarack City Stamp Mill; and*
- *2011 - 2014 Asbestos & PCB Removal Action - C&H Power Plant Site.*







Abandoned Mining Waste Project

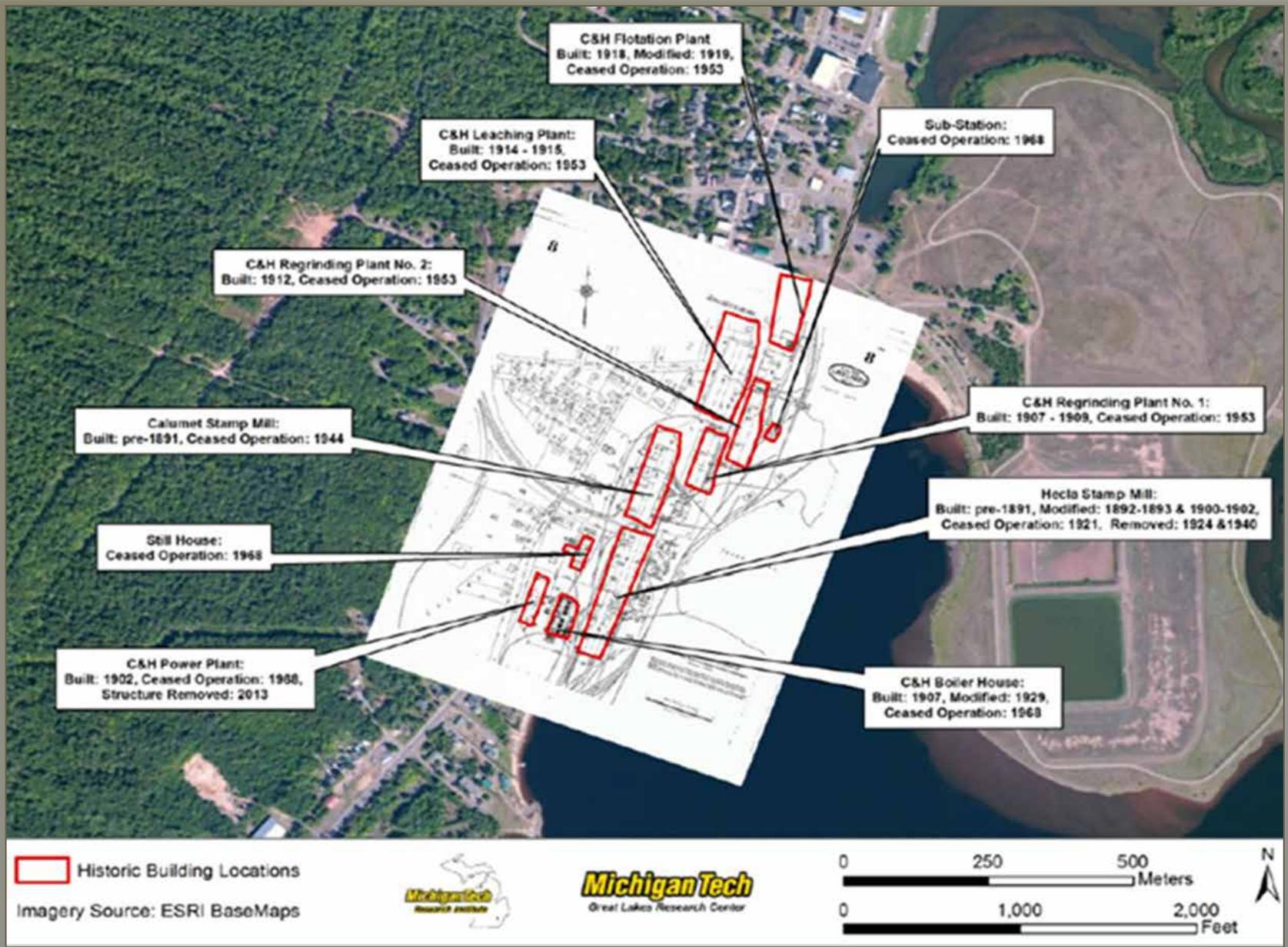
In 2013, MDEQ U.P. District was assigned the task of addressing the waste streams and hazardous substances not addressed during the EPA Torch Lake remedial actions.



Study Design

Archive research that identified the location of C&H facilities and operational areas. The research identified potential mining-era sources of contaminants, including PCBs, through the evaluation of waste streams from industrial buildings and processes.



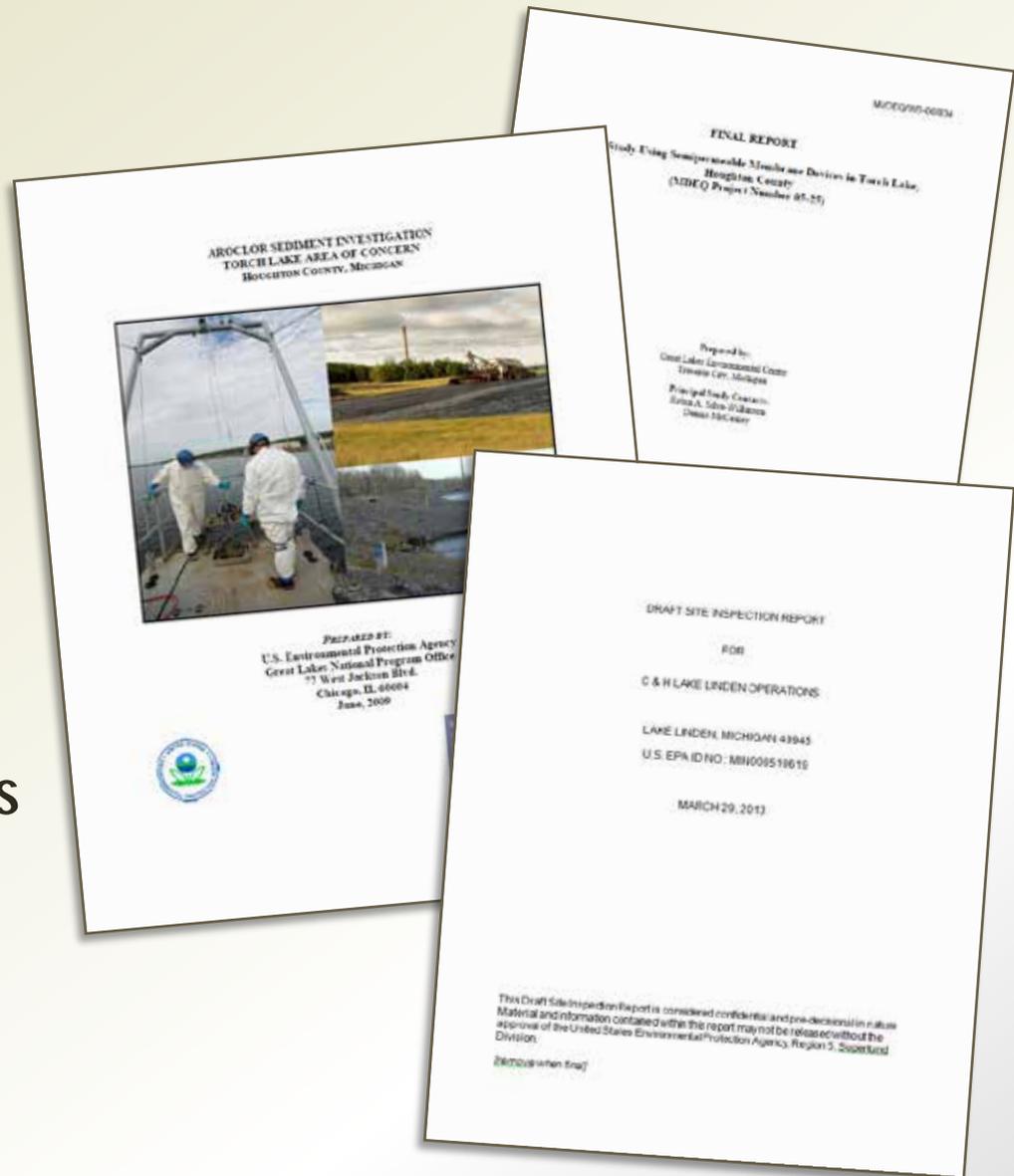


Georeferenced Sanborn Fire Insurance Map



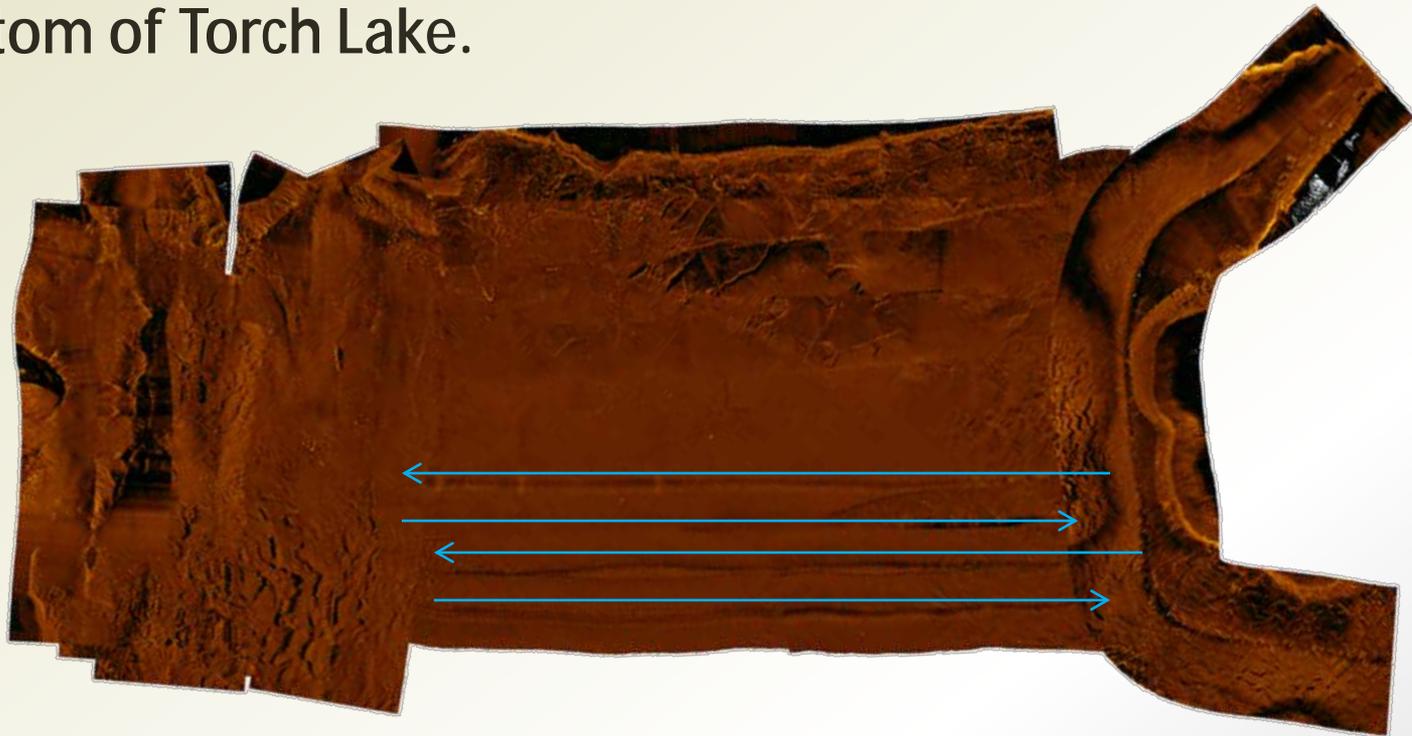
Study Design

Evaluation and interpretation of multiple previous investigative activities to create a baseline understanding of conditions and to minimize redundancies in data collection

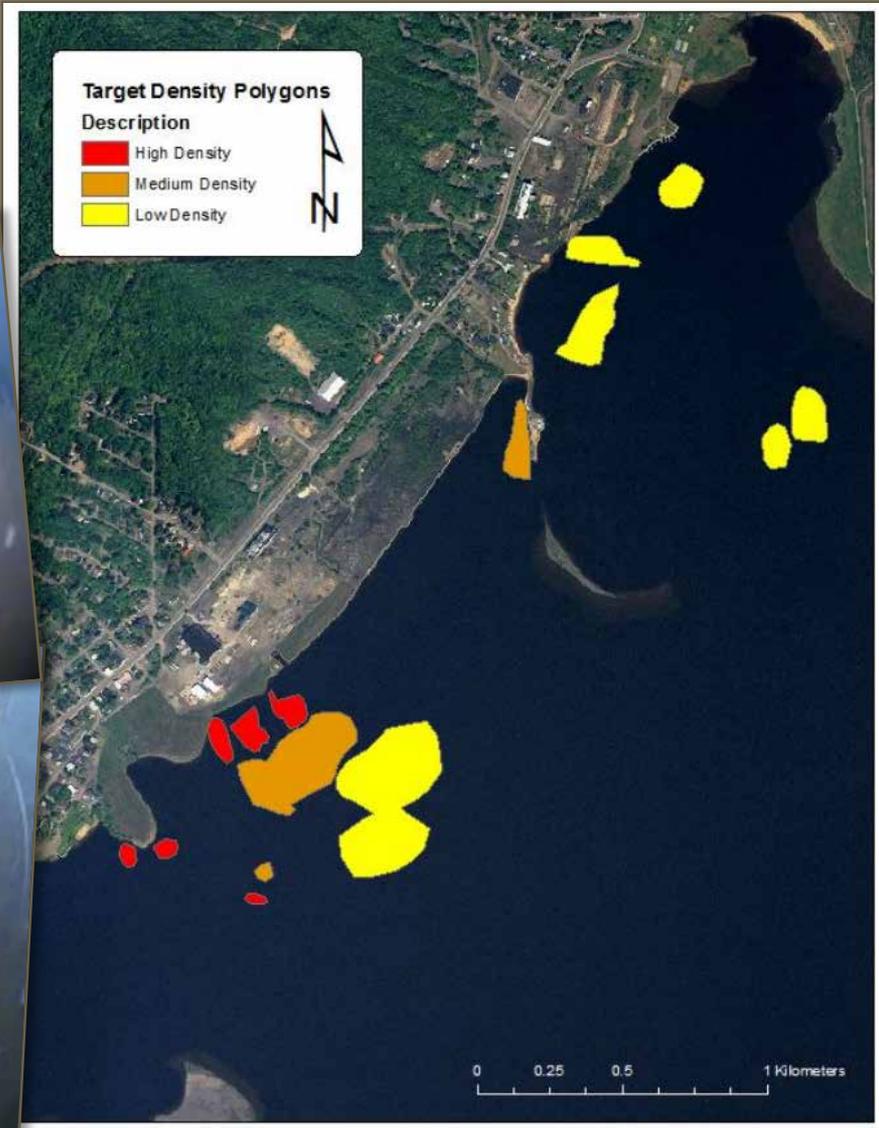


Study Design

Underwater mapping using side scan sonar and Autonomous Underwater Vehicles (AUV) video surveillance to locate submerged drums, containers, and waste deposits on the bottom of Torch Lake.



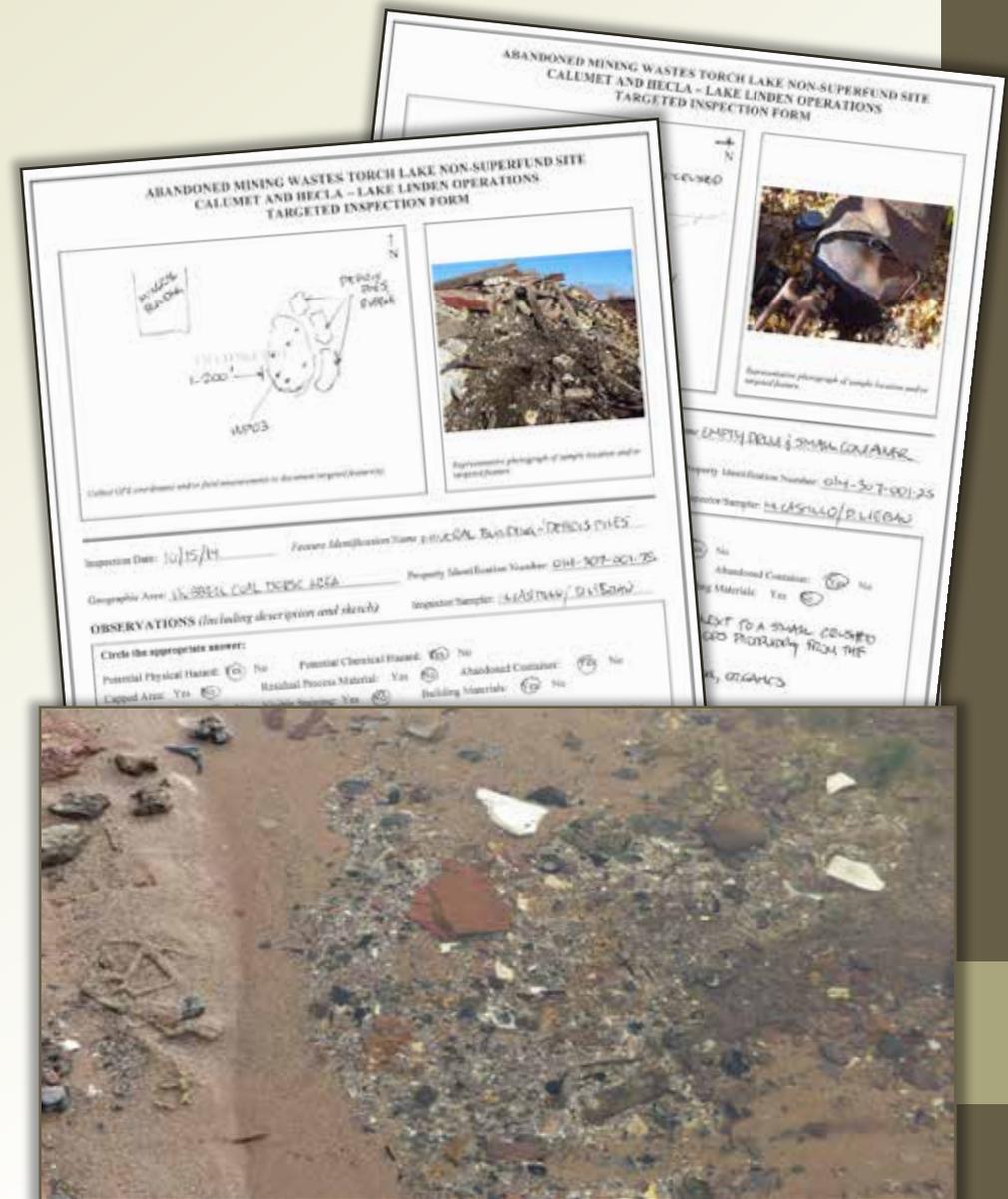
Side Scan Sonar Interpretation



Site Investigation

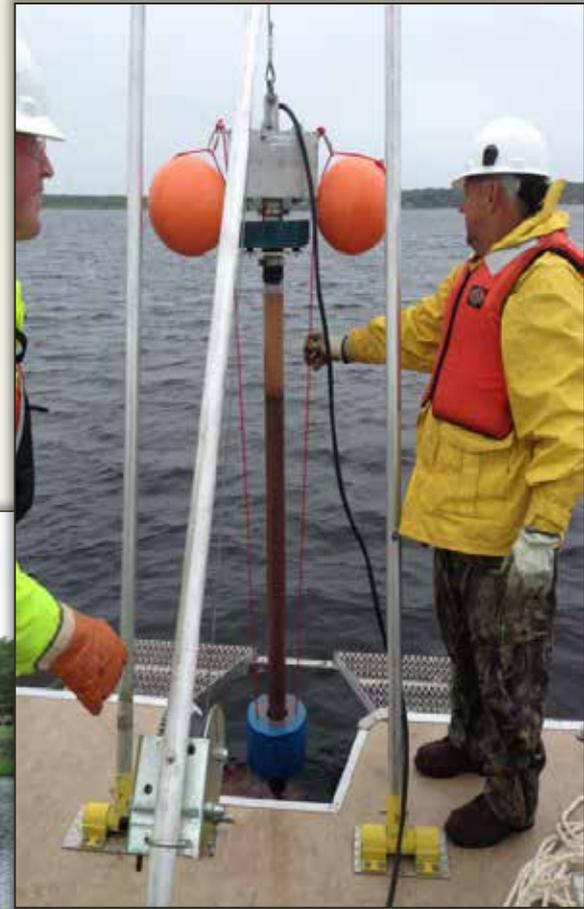
Inspected the study area for potential physical and health hazards.

Such hazards may include abandoned containers, ACBM, stained or oily soils, and physical hazards



Site Investigation

Sampling and analysis of soil, groundwater, surface water, sediment, waste, residual process material, and Suspect ACM to determine the nature and location of PCBs and other contaminants of concern



Calumet Mill & Launder



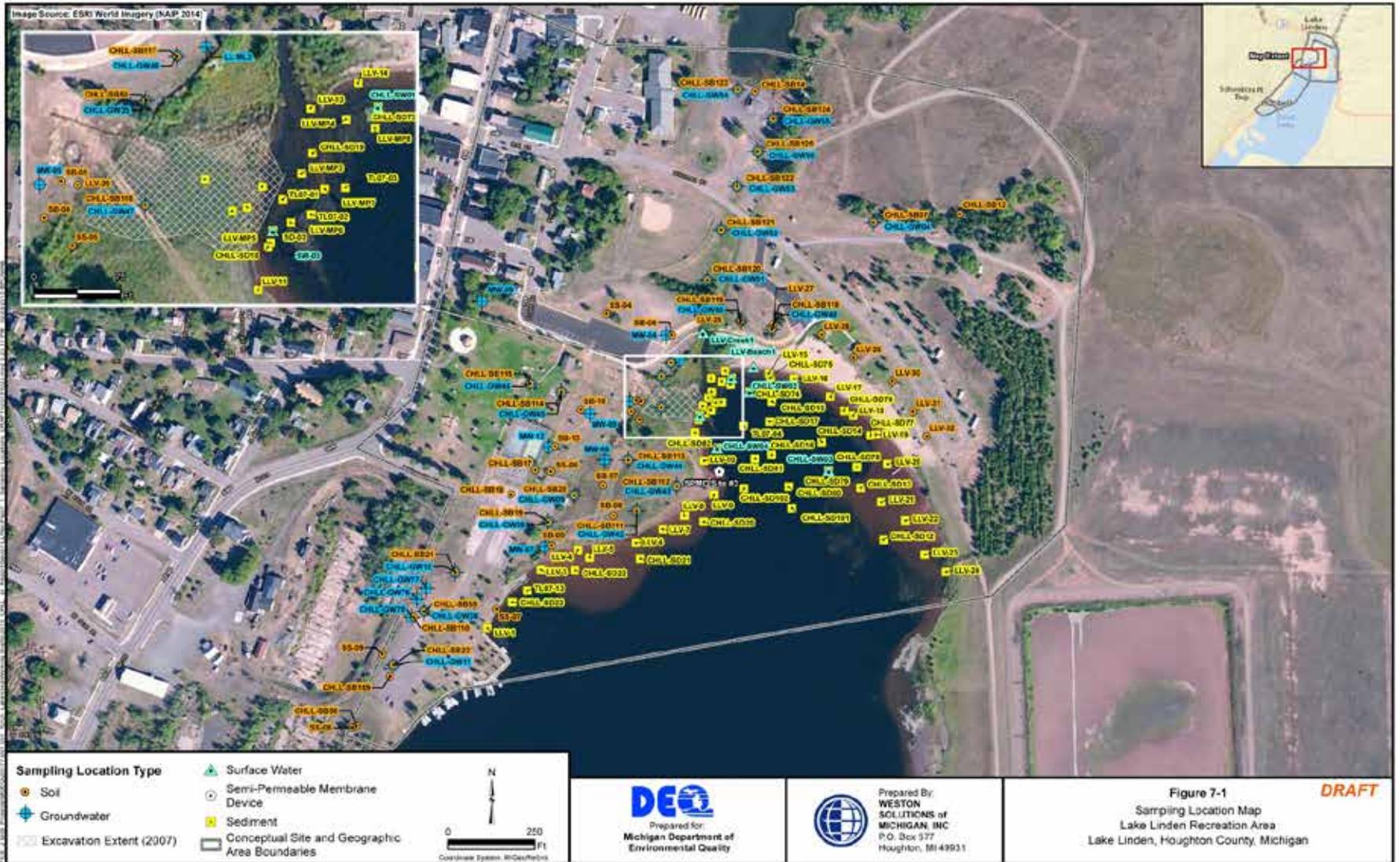
Lake Linden Mills:
Hecla 1860s-1921
Calumet 1870s-1944



Torch Lake Backwater Area Sampling Location Map



Lake Linden Sands Area Sampling Location Map



Lake Linden Recreation Area Sampling Location Map

Photo Courtesy Michigan Tech Archives



C&H Smelter Complex:
Mineral house, Coal Pulverization Plant, Smelter, Electrolytic Plant, Coal Dock



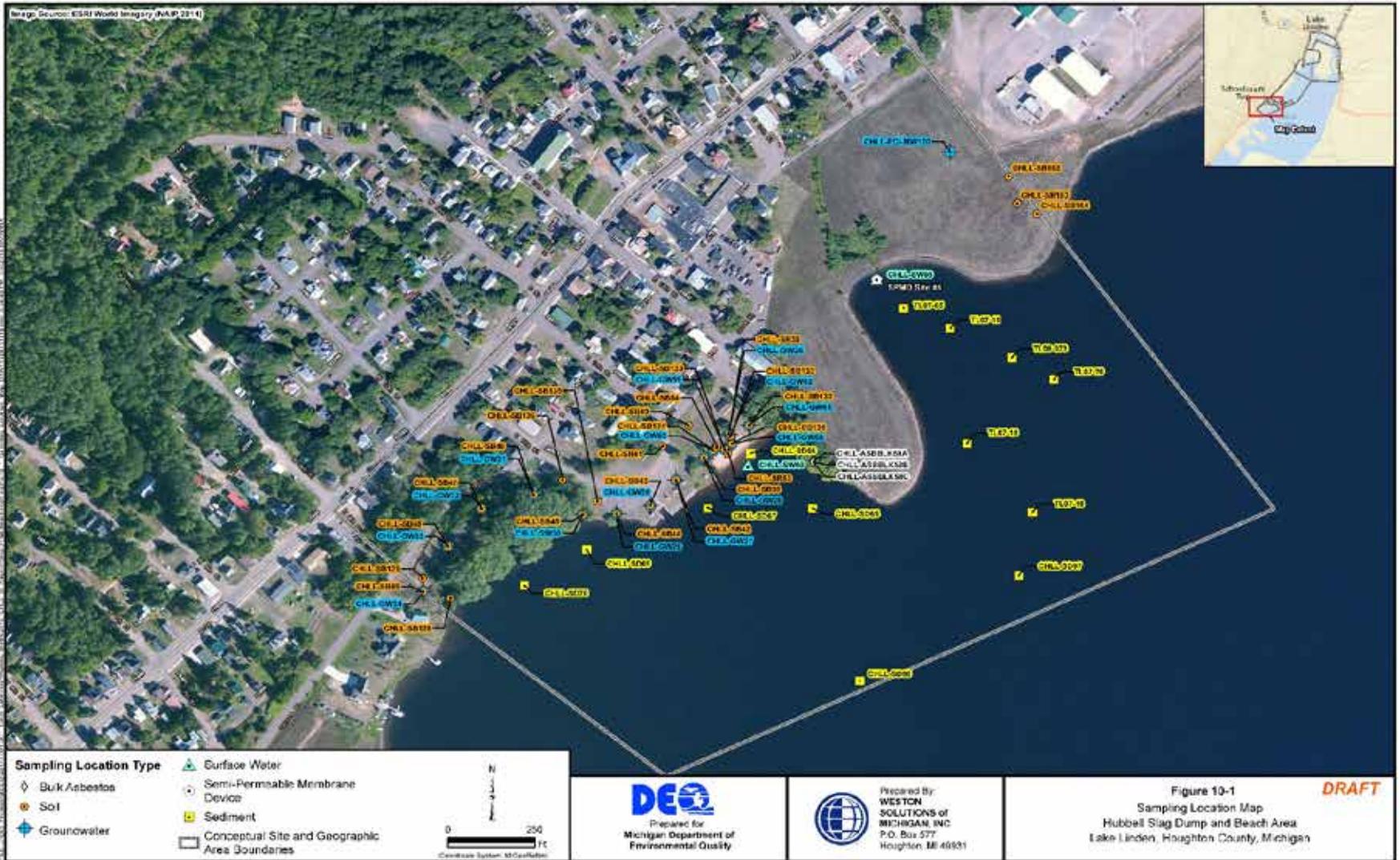
Hubbell Processing Area Sampling Location Map



Hubbell Processing Area Sampling Location Map



Hubbell Processing Area Sampling Location Map



Hubbell Beach and Slag Dump Area Sampling Location Map

Photo Courtesy Michigan Tech Archives



Ahmeek Stamp Mill
1947

AERIAL VIEW OF MIDBELL, AHMEEK MILL AND CANADACK CITY LOOKING SOUTH-EAST. CHIEF COOCHE
ROAD AT RIGHT FOREGROUND, WITH PARADISE ROAD AT UPPER RIGHT.

Print No. 114C

[1947]

Photo by W. J. Kraft



Ahmeek Stamp Mill Complex Sampling Location Map



Ahmeek Mill Processing Area – Osceola Township Park Sampling Location Map



Tamarack Processing Area- Tamarack Reclamation Plant Sampling Location Map



Tamarack Processing Area- Tamarack Stamp Mill Complex Sampling Location Map



Tamarack Processing Area- Tamarack Stamp Mill Sampling Location Map

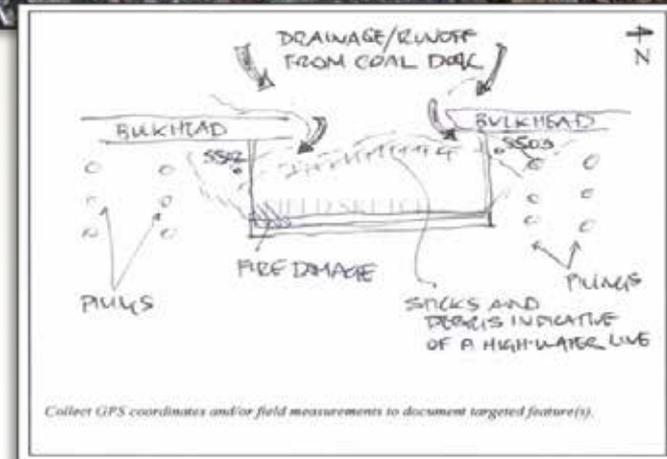
Terrestrial Study Findings to Date...

- *Historic and recent studies were generally characterized by detections of organic and inorganic contaminants in soil, groundwater, sediment, surface water, residual process materials, waste piles, and building materials in excess of applicable generic criteria.*

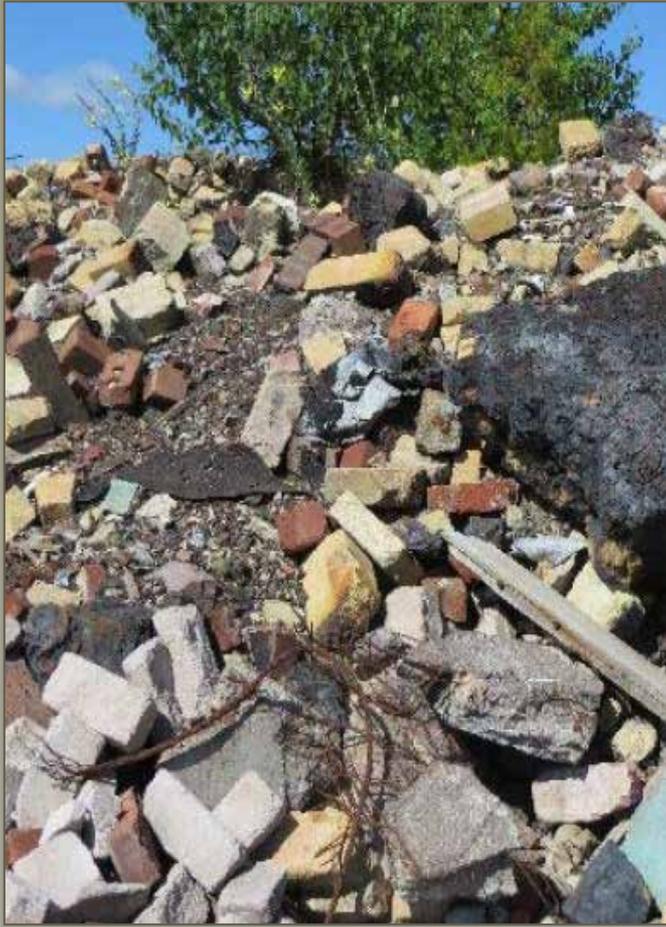


Terrestrial PCBs Study Findings to Date...

- *PCB contamination is present in debris, charred residual process materials, waste piles, and soil at one of the parcels investigated. PCBs were also detected in groundwater on an adjacent parcel.*



Study Findings to Date...



Study Findings to Date...

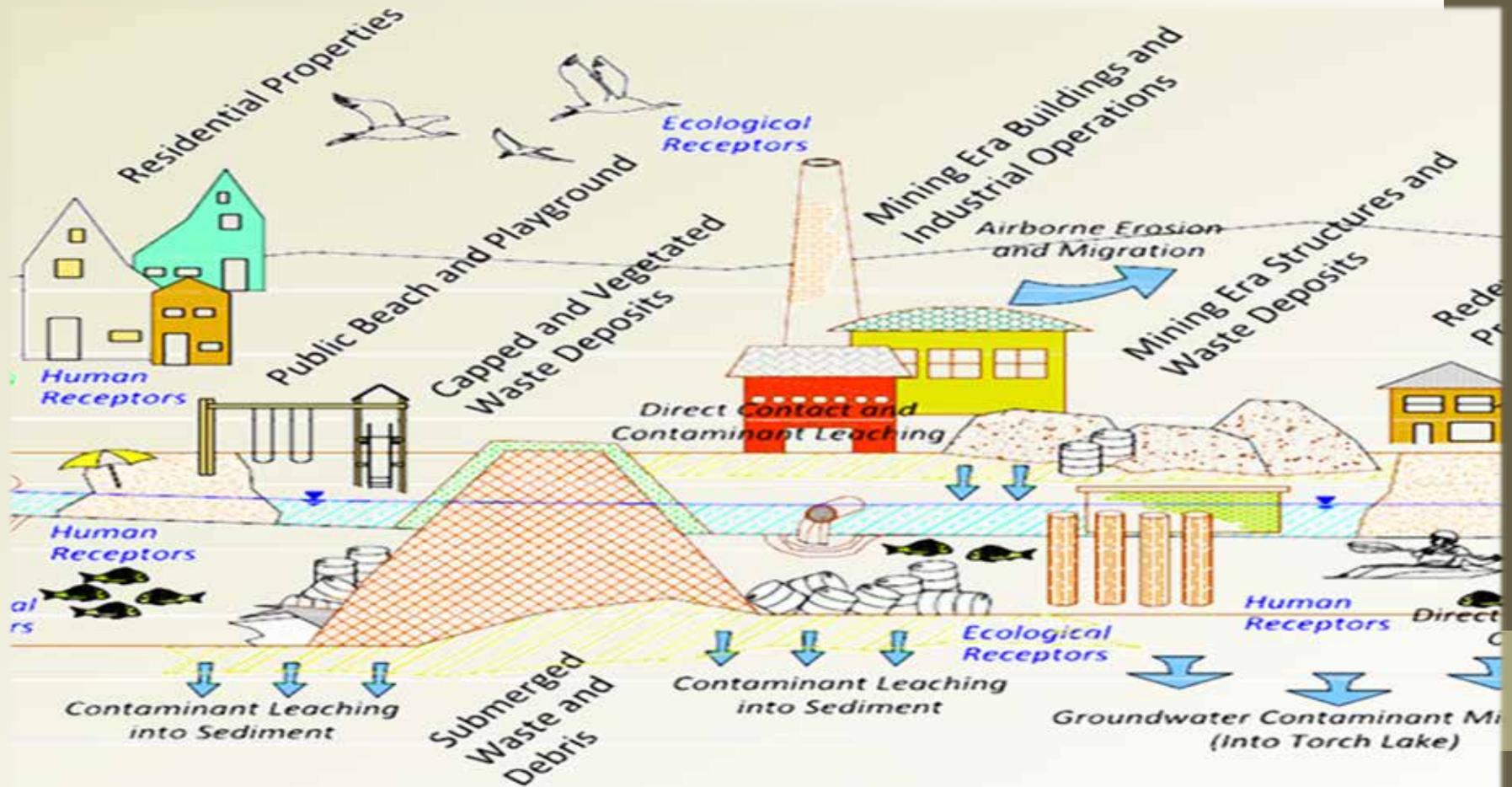


Study Findings to Date...



Terrestrial Study Findings to Date...

- *Property-specific risk assessments are necessary to confirm the potential presence of human health and ecological concerns identified based on generic MDEQ cleanup criteria.*



Study Findings to Date...

Torch Lake



Study Findings to Date...

Torch Lake

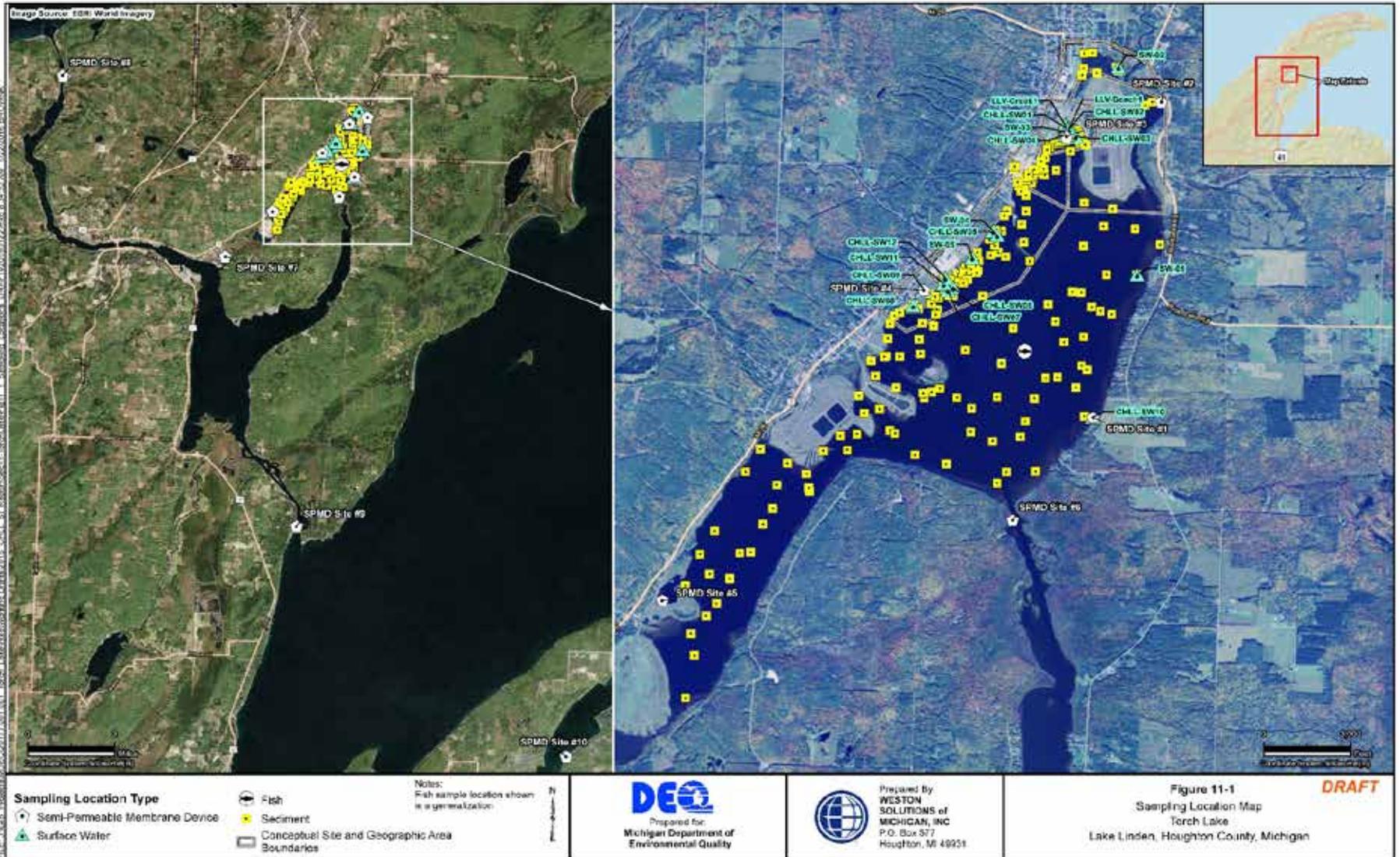
- In-lake sources of contamination are present in the form of inorganic COCs and Total PCBs in Torch Lake.
- Industrial ruins, mining area containers, and wastes were identified in the Lake.



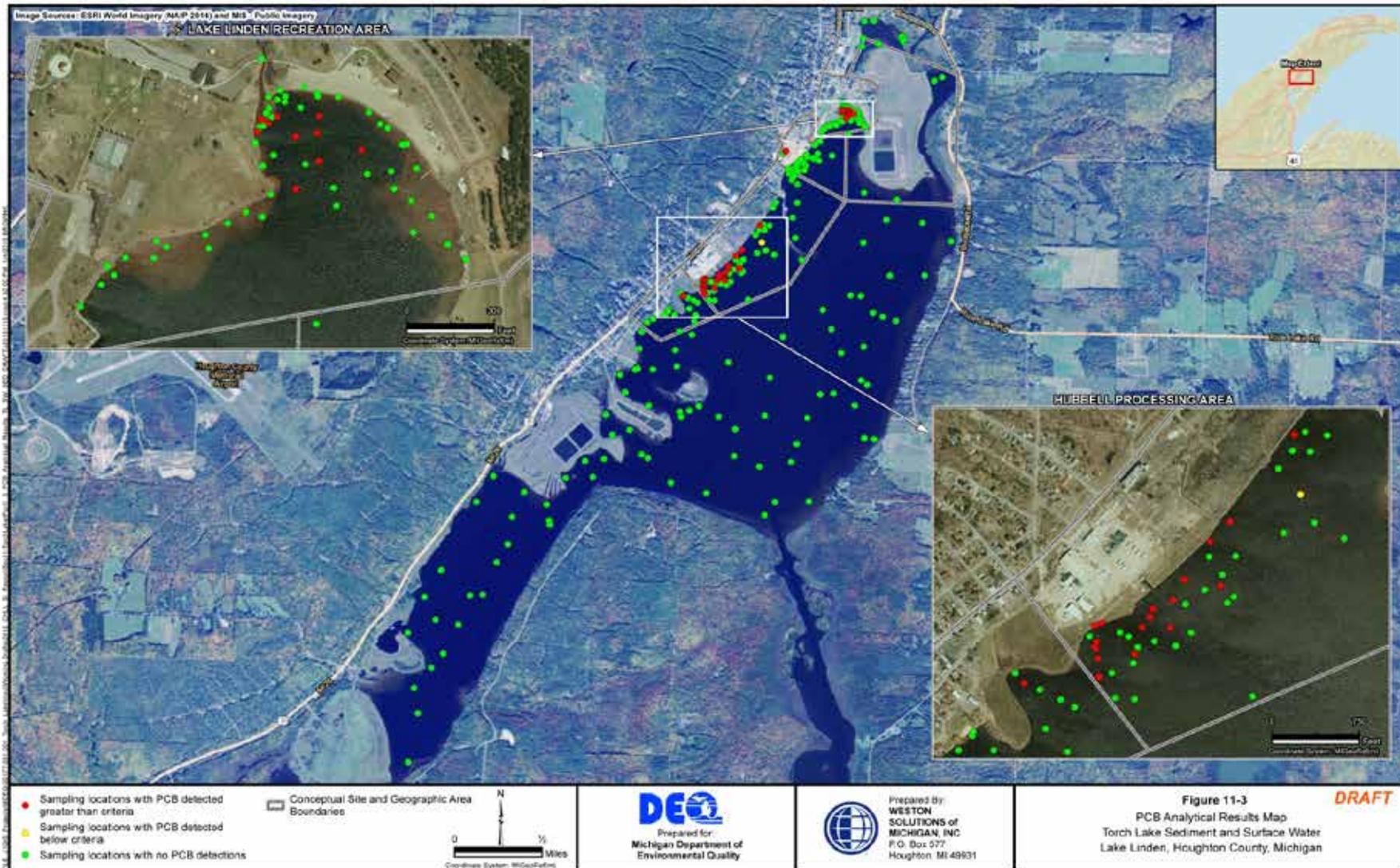


Underwater Reconnaissance Video

Submersible Camera Offshore of the Hubbell Processing Area



Torch Lake Comprehensive Sampling Location Map



Torch Lake – Sediment and Surface Water Comprehensive PCB Analytical Results Map

Project Benefits

- *Provides a comprehensive assimilation and assessment of key information.*
- *Identifies environmental impairments not addressed previously.*
- *Facilitates stakeholders responsible for implementation and monitoring EPA's remedy to determine if any remedy modifications are necessary in light of the new information.*
- *Supports MDEQ's comprehensive management approach to the area.*
- *Encourages public involvement and education.*
- *Promotes safe and beneficial reuse of the land.*
- *Remediates most significant concerns through time-critical actions.*





Tamarack Sands Area
CHTC Asbestos on Trail Response – September 2015



Calumet Stamp Mill – ACM Removal Anticipated in 2016

Path Forward

Support Safe and Beneficial Reuse of the Land Through:

- *Identify and implement additional remedial actions.*
- *Educate property owner/operators regarding property-specific risks and due care responsibilities.*
- *Continue to engage the public through open houses and newsletters.*
- *Continue to assess former mining operations areas and provide study data to stakeholders responsible for assessing potential public health impacts and for implementation and monitoring EPA's remedy for the Torch Lake Superfund Site.*

