ADDENDUM NO. 1
TO
SAMPLING AND ANALYSIS PLAN
FOR THE
ABANDONED MINING WASTES
CALUMET AND HECLA (C&H) LAKE LINDEN OPERATIONS AREA
TORCH LAKE NON-SUPERFUND SITE
HOUGHTON COUNTY, MICHIGAN
SITE IDENTIFICATION NO. 31000098

Prepared for:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
Remediation and Redevelopment Division
55195 US Highway 41
Calumet, Michigan 49913

Prepared by:

WESTON SOLUTIONS OF MICHIGAN, INC.
P.O. Box 577
Houghton, MI 49931

April 2015

Work Order No. 20177.001.001.0010

ADDENDUM NO. 1
TO
SAMPLING AND ANALYSIS PLAN
FOR THE
ABANDONED MINING WASTES
CALUMET AND HECLA (C&H) LAKE LINDEN OPERATIONS AREA
TORCH LAKE NON-SUPERFUND SITE
HOUGHTON COUNTY, MICHIGAN
SITE IDENTIFICATION NO. 31000098

Prepared for:

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
Remediation and Redevelopment Division
55195 US Highway 41
Calumet, Michigan 49913

_____
Daniel P. Liebau
Principal Project Leader

_____
Jeffrey S. Binkley
Senior Project Manager

Prepared by:

WESTON SOLUTIONS OF MICHIGAN, INC.
P.O. Box 577
Houghton, MI 49931

April 2015

Work Order No. 20177.001.001.0010

TABLE OF CONTENTS

Section **Page**

LIST OF TABLES

Title

LIST OF FIGURES

Title

INTRODUCTION

Weston Solutions of Michigan, Inc. (WESTON®) has prepared this Sampling and Analysis Plan (SAP) Amendment No.1 to supplement the identified data collection activities and associated quality assurance/quality control (QA/QC) measures specific to the Abandoned Mining Wastes – Torch Lake non-Superfund Site (Project) in Houghton County, Michigan presented in the WESTON-prepared document entitled *Sampling and Analysis Plan for the Abandoned Mining Wastes Torch Lake Non-Superfund Site, Calumet and Hecla Lake Linden Operations Area, Houghton County, Michigan* (SAP for the C&H Lake Linden Operations Area [CHLL]) dated May 2014.

SAP Addendum No.1 has been prepared in accordance with the *Scope of Work, Schedule, and Budget Estimate - Abandoned Mining Wastes – Torch Lake non-Superfund Site, C&H Lake Linden Operations Area, Houghton County Michigan, December 16, 2013* and the subsequent *Scope of Work, Schedule, and Budget Estimate for Modification 1 (July 2014) and Modification 2 (February 2014)* prepared by WESTON in response to requests from the Michigan Department of Environmental Quality (MDEQ), Remediation and Redevelopment Division, under the Indefinite Scope, Indefinite Delivery (ISID) Professional Services contract between WESTON and the MDEQ (Contract No. 00477).

PROJECT OBJECTIVES

SAP Addendum No.1 presents data collection activities, field protocols, equipment, sampling requirements, and procedures that were not included in the SAP for the CHLL. The work items outlined in SAP Addendum No.1 were either previously planned activities that were not completed due to site accessibility, or additional investigative tasks based on the findings of the *Draft Site Investigation Report for Abandoned Mining Wastes Torch Lake Non-Superfund Site Calumet and Hecla – Lake Linden Operations, Houghton County, Michigan* (WESTON, January 2015).

The phased management approach implemented for the Project incorporates change management, allowing the MDEQ to accumulate high quality data that supports subsequent investigative and/or remedial decisions.

Both supplemental and scheduled activities are planned to be completed at the CHLL including the initial or expanded assessment of the following areas:

<u>CHLL</u>

- Traprock Dump;
- Torch Lake Backwater;
- Lake Linden Recreation Area (including Sands, the Campground, the Public Beach, the Village Park, and the Marina and Boat Launch);
- Calumet Stamp Mill;

- C&H Power Plant (exclusive of EPA efforts);
- Hubbell Coal Dock;
- Mineral Building;
- Hubbell Smelter;
- Hubbell Red Slags; and,
- Hubbell Slag Dump (including the Public Beach, the Boat Launch, and the Bay).

The aforementioned areas are identified on **Figure 1**. SAP Addendum No.1 has been organized so that it parallels the contents of the SAP for the CHLL; however, the document does not restate means and methods described within the document, but instead incorporates those procedures by reference. The following sections outline any deviations from the SAP for the CHLL and the implementation of SAP Addendum No.1.

PROJECT DESCRIPTION

Historical operational and background information summarized under the *Project Description* of the SAP, including the *Site Background*, *Site Location and Description*, and *Contaminants of Concern and Target Analytes* was not modified during preparation of SAP Addendum No.1. Implementation of the supplemental sampling activities described herein will rely on **Section 2 – Project Description** of the SAP for the aforementioned information. The conceptual boundaries of the CHLL are depicted on **Figure 1**.

PROPOSED SCHEDULE

The initial field investigative components of the CHLL SAP were implemented during 2014. Implementation of the supplemental sampling activities described herein will be conducted concurrent with the field mobilizations described in the WESTON-prepared document entitled *Draft Sampling and Analysis Plan for the Abandoned Mining Wastes Torch Lake Non-Superfund Site, Calumet and Hecla Tamarack City Operations Area, Houghton County, Michigan* dated March 2015. The following table provides a summary of the anticipated field mobilization schedule for the work outlined in SAP Addendum No.1.

Activities	Dates (Month Day, Year)		Deliverables	Deliverable Due Date
	Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Field Sample Collection – GSU Terrestrial Investigation	May 12, 2015	May 19, 2015	Log Books, Sampling and Screening Logs	2 weeks after completing field activities
Laboratory Analysis – MDEQ Environmental Laboratory	May 20, 2015	June 10, 2015	Laboratory Analytical Report	3 weeks after submitting the last sample(s)
Field Sample Collection – GSU Offshore Investigation	May 27, 2015	June 2, 2015	Log Books, Sampling and Screening Logs	2 weeks after completing field activities

Activities	Dates (Month Day, Year)		Deliverables	Deliverable Due Date
	Anticipated Date(s) of Initiation	Anticipated Date of Completion		
Laboratory Analysis – MDEQ Environmental Laboratory	June 3, 2015	June 24, 2015	Laboratory Analytical Report	3 weeks after submitting the last sample(s)
Field Sample Collection – GSU Terrestrial Investigation	August 17, 2015	August 26, 2015	Log Books, Sampling and Screening Logs	2 weeks after completing field activities
Laboratory Analysis – MDEQ Environmental Laboratory	August 27, 2015	September 17, 2015	Laboratory Analytical Report	3 weeks after submitting the last sample(s)
Field Sample Collection – GSU Offshore Investigation	July 7, 2015	July 14, 2015	Log Books, Sampling and Screening Logs	2 weeks after completing field activities
Laboratory Analysis – MDEQ Environmental Laboratory	July 15, 2015	August 6, 2015	Laboratory Analytical Report	3 weeks after submitting the last sample(s)

Mobilization and field sampling activities are subject to change based on factors related to unforeseen circumstances, personnel and equipment and availability, and similar conditions.

FIELD PROCEDURES AND SAMPLE COLLECTION

The field procedures and sample collection activities that will be implemented in the CHLL under SAP Addendum No.1 will be consistent with the methodologies described in the SAP for the CHLL. Planned field procedures and sampling activities to be conducted under SAP Addendum No.1 will include procedures outlined under the *Potential Physical and Health Hazard Inventory*, *Surface Soil and Waste Deposit Sampling*, *Subsurface Soil Sampling*, *Groundwater Sampling*, and *Sediment Sampling* included in **Section 4 – Field Procedures and Sample Collection** described in the SAP for the CHLL.

Samples selected for metals analyses will be analyzed for the following inorganic contaminants:

- Aluminum;
- Antimony;
- Arsenic;
- Barium;
- Beryllium;
- Cadmium;
- Chromium;
- Cobalt;
- Copper;
- Cyanide;
- Iron;
- Lead;
- Lithium;
- Magnesium;
- Manganese;
- Mercury;
- Nickel;
- Selenium;
- Silver;
- Thallium; and,
- Zinc.

Proposed sampling locations, proposed laboratory analyses, and sampling rationale for samples to be collected under SAP Addendum No.1 are summarized on **Table 1**. Proposed sampling locations are depicted on **Figure 2** through **Figure 7**.

SAMPLING PROCEDURES

The sampling procedures that will be implemented in the CHLL under SAP Addendum No.1 will be consistent with the methodologies described in the SAP for the CHLL. Planned sampling procedures to be conducted under SAP Addendum No.1 will include procedures outlined under the *Sample Nomenclature*, *Decontamination Procedures and Management of Investigative-Derived Wastes*, *Sample Handling, Tracking, and Custody Procedures*, *Sampling Standard Operating Procedures*, and *Field Log Book* included in **Section 5 – Sampling Procedures** described in the SAP for the CHLL.

The field sampling team will assign each sample its unique identification based on the nomenclature defined in the SAP for the CHLL. The sample identification will be used for documentation purposes in field logbooks, as well as for presentation of the analytical data in memoranda and reports.

The samples collected under SAP Addendum No.1 will continue the *Sample Number Code* established in the SAP. The following provides a list of the first new sample to be collected by sample media and sample number code during implementation of SAP Addendum No.1:

- Surface Soil – SS10;
- Subsurface Soil – SB142;
- Groundwater – MW64;
- Sediment – SD72; and,
- Bulk Suspect Asbestos Containing Material (SACM) – ASBBLK38.

In the case of samples that were previously identified in the SAP for the CHLL, the original sample number code will be maintained.

LABORATORY INFORMATION

The laboratories and data quality objectives that will be used under SAP Addendum No.1 will be consistent with the facilities and criteria described in the SAP for the CHLL. Investigative samples collected during implementation of SAP Addendum No.1 will be delivered by a courier or shipped under chain of custody to the designated laboratory listed in the SAP for the CHLL. The laboratory will utilize the performance criteria outlined under the *Measurement and Performance Criteria*, and *Data Quality Objectives* included in **Section 6 – Laboratory Information** described in.

QUALITY CONTROL ACTIVITIES

The quality control procedures that will be will be utilized in the field and laboratory during implementation of SAP Addendum No.1 will be consistent with the methodologies described in the SAP for the CHLL. Planned quality control activities to be conducted under SAP Addendum No.1 will include procedures outlined under the *Field Quality Control*, *Analytical Quality*

Control, *Performance Evaluation Samples, Quality Assurance Assessment/Corrective Actions, Documentation, Records, and Data Management*, and *Data Validation Requirements* included in **Section 7 – Quality Control Activities** described in the SAP for the CHLL.

REFERENCES

One additional reference was utilized during the development of SAP Addendum No.1, listed as follows:

1. Weston Solutions of Michigan, Inc. (WESTON). *Draft Site Investigation Report for Abandoned Mining Wastes Torch Lake Non-Superfund Site, Calumet and Hecla – Lake Linden Operations, Houghton County, Michigan.* January 2015.

Additional references are included in **Section 8 – References** listed in the SAP for the CHLL.

TABLES

Table 1
Sampling and Analysis Summary
C&H Lake Linden Operations
Torch Lake Backwater Area
Houghton County, Michigan

Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sampling Method	Sample Type/Matrix						Sample Analyses						Duplicate Analyses				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Oil and Grease	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
CHLL-SB158-0-6"	Data Gap - Lack of historical data	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									O							
CHLL-SB158-X-Y	Data Gap - Lack of historical data	Composite sample from above water table	Direct Push Boring		X								O							
CHLL-GW70-X-Y	Data Gap - Screen due to historic industrial use of surrounding properties	Shallow screen interval - Representative of shallow groundwater table	Peristaltic Pump			X				X	X	X	X							
CHLL-GW70-X-Y	Data Gap - Screen due to historic industrial use of surrounding properties	Deep screen interval - Representative of typical potable wells in the area	Peristaltic Pump			X				X	X	X	X							
CHLL-SD01-0-6"	Proximity to a historical generating station or electrical substation.	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD01-1-3'	Proximity to a historical generating station or electrical substation.	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD01-3-5'	Proximity to a historical generating station or electrical substation.	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD02-0-6"	Proximity to a historical generating station or electrical substation.	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD02-1-3'	Proximity to a historical generating station or electrical substation.	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD02-3-5'	Proximity to a historical generating station or electrical substation.	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD03-0-6"	Proximity to reported dumping/disposal areas	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X					X	X	
CHLL-SD03-1-3'	Proximity to reported dumping/disposal areas	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD03-3-6'	Proximity to reported dumping/disposal areas	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD04-0-6"	Based on undewater surveillance, proximity to submerged debris	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD04-1-3'	Based on undewater surveillance, proximity to submerged debris	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD04-3-5'	Based on undewater surveillance, proximity to submerged debris	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD06-0-6"	Proximity to reported dumping/disposal areas	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD06-1-3'	Proximity to reported dumping/disposal areas	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD06-3-5'	Proximity to reported dumping/disposal areas	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
Total Sample Count				**1**	**1**	**2**	**0**	**15**	**0**	**2**	**7**	**7**	**19**	**0**	**0**	**0**	**0**	**1**	**1**	**0**

Notes:
CHLL = C&H Lake Linden Operations
O = Potential analyte based on field observations
PNAs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds
X = Planned analyte based on the sampling rationale and the horizontal and vertical location of the sample.

Laboratory Quality Assurance/Quality Control Matrix Spike and Matrix Spike Duplicate samples will be a batch quality control sample prepared by the laboratory
All sampling locations are subject to change based on visual observations or actual field conditions
Additional analytes may be selected at the descretion of the field sampling team based on visual observations or field conditions.
Surface water and sediment sampling locations area subject to change based on underwater assessment activities.

For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

In areas that have been resurfaced or capped, analytical samples will be collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.

Table 1
Sampling and Analysis Summary
C&H Lake Linden Operations
Lake Linden Sands Area
Houghton County, Michigan

Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sampling Method	Sample Type/Matrix						Sample Analyses						Duplicate Analyses				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Oil and Grease	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
CHLL-SD05-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD05-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD05-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD72-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD72-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD72-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD73-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD73-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X					X	X	
CHLL-SD73-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD74-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD74-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD74-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD75-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD75-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD75-3-6'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD76-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X					X	X	
CHLL-SD76-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD76-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD77-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD77-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD77-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD78-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD78-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD78-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD79-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD79-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X				X		X	
CHLL-SD79-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD80-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD80-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD80-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SD81-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore					X				X	X							
CHLL-SD81-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore					X			X		X							
CHLL-SD81-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore					X					X							
CHLL-SW01-X-Y'	Proximity to PCB detections requiring delineation	1 foot above the sediment surface	Peristaltic Pump				X						X							
CHLL-SW02-X-Y'	Proximity to PCB detections requiring delineation	1 foot above the sediment surface	Peristaltic Pump				X						X							
CHLL-SW03-X-Y'	Proximity to PCB detections requiring delineation	1 foot above the sediment surface	Peristaltic Pump				X						X						X	
		Total Sample Count		**0**	**0**	**0**	**3**	**33**	**0**	**0**	**11**	**11**	**36**	**0**	**0**	**0**	**1**	**2**	**4**	**0**

Notes:
CHLL = C&H Lake Linden Operations
O = Potential analyte based on field observations
PNAs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds
X = Planned analyte based on the sampling rationale and the horizontal and vertical location of the sample.

Laboratory Quality Assurance/Quality Control Matrix Spike and Matrix Spike Duplicate samples will be a batch quality control sample prepared by the laboratory
All sampling locations are subject to change based on visual observations or actual field conditions
Additional analytes may be selected at the descretion of the field sampling team based on visual observations or field conditions.
Surface water and sediment sampling locations area subject to change based on underwater assessment activities.

For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

In areas that have been resurfaced or capped, analytical samples will be collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.

Table 1
Sampling and Analysis Summary
Lake Linden Processing Area
C&H Lake Linden Operations
Houghton County, Michigan

Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sample Method	Sample Type/Matrix						Sample Analyses						Duplicates				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Oil and Grease	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
CHLL-SB23-0-6"	Proximity to a historical generating station or electrical substation.	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB23-X-Y	Proximity to a historical generating station or electrical substation.	Composite sample from above water table	Direct Push Boring		X								X							
CHLL-SB24-0-6"	Proximity to a historical generating station or electrical substation.	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X								X	X							
CHLL-SB24-X-Y'	Proximity to a historical generating station or electrical substation.	Composite sample from above water table	Direct Push Boring		X								X							
CHLL-SB25-0-6"	Proximity to a historical generating station or electrical substation.	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X								X	X							
CHLL-SB25-X-Y	Proximity to a historical generating station or electrical substation.	Composite sample from above water table	Direct Push Boring		X								X						X	
CHLL-SB142-0-6"	Proximity to mining era structures and historical contaminant detections	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X		X					
CHLL-SB142-X-Y	Proximity to mining era structures and historical contaminant detections	Above the Capillary fringe	Direct Push Boring		X					X	X		X							
CHLL-SB143-0-6"	Proximity to mining era structures and historical contaminant detections	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X		X					
CHLL-SB143-X-Y'	Proximity to mining era structures and historical contaminant detections	Composite sample from above water table	Direct Push Boring		X					X	X		X							
CHLL-SB144-0-6"	Proximity to mining era structures and historical contaminant detections	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X		X					
CHLL-SB144-X-Y'	Proximity to mining era structures and historical contaminant detections	Above the Capillary fringe	Direct Push Boring		X					X	X		X							
CHLL-SB145-0-6"	Proximity to mining era structures and historical contaminant detections	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X		X					
CHLL-SB145-X-Y'	Proximity to mining era structures and historical contaminant detections	Composite sample from above water table	Direct Push Boring		X					X	X		X							
CHLL-GW12-X-Y	Proximity to a historical generating station or electrical substation.	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X							
CHLL-GW13-X-Y	Proximity to a historical generating station or electrical substation.	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X							
CHLL-GW14-X-Y	Proximity to a historical generating station or electrical substation.	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X						X	
CHLL-GW64-X-Y	Proximity to mining era structures and historical contaminant detections	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X							
CHLL-GW65-X-Y	Proximity to mining era structures and historical contaminant detections	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X							
CHLL-GW66-X-Y	Proximity to mining era structures and historical contaminant detections	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X							
CHLL-GW67-X-Y	Proximity to mining era structures and historical contaminant detections	Screen interval 5 -10 feet below the groundwater surface	Peristaltic Pump			X				X	X		X							
CHLL-SD26-0-6"	Data Gap - Lack of historical data	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD26-1-3'	Data Gap - Lack of historical data	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD26-3-5'	Data Gap - Lack of historical data	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD82-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD82-1-2'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD82-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD83-0-6"	Data Gap - Lack of historical data	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD83-1-3'	Data Gap - Lack of historical data	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X						X	
CHLL-SD83-3-5'	Data Gap - Lack of historical data	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD84-0-6"	Data Gap - Lack of historical data	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD84-1-3'	Data Gap - Lack of historical data	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD84-3-5'	Data Gap - Lack of historical data	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD85-0-6"	Proximity to a historical generating station or electrical substation.	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD85-1-3'	Proximity to a historical generating station or electrical substation.	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD85-3-5'	Proximity to a historical generating station or electrical substation.	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SW04-X-Y'	Proximity to PCB detections requiring delineation	1 foot above the sediment surface	Peristaltic Pump				X						X							
Total Sample Count				**7**	**7**	**7**	**1**	**15**	**0**	**11**	**11**	**2**	**37**	**0**	**4**	**0**	**0**	**0**	**3**	**0**

Notes:
CHLL = C&H Lake Linden Operations
O = Potential analyte based on field observations
PNAs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds
X = Planned analyte based on the sampling rationale and the horizontal and vertical location of the sample

Laboratory Quality Assurance/Quality Control Matrix Spike and Matrix Spike Duplicate samples will be a batch quality control sample prepared by the laboratory.
All sampling locations are subject to change based on visual observations or actual field conditions.
Additional analytes may be selected at the descretion of the field sampling team based on visual observations or field conditions.
Surface water and sediment sampling locations area subject to change based on underwater assessment activities.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.
In areas that have been resurfaced or capped, analytical samples will be collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.

Table 1
Sampling and Analysis Summary
Hubbell Coal Dock Area
C&H Lake Linden Operations
Houghton County, Michigan

Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sample Method	Sample Type/Matrix						Sample Analyses						Duplicates				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Chloride/Sulfate	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
CHLL-SB146-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB146-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB146-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X						X	
CHLL-SB147-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB147-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB151-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X							
CHLL-SB148-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB146-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB146-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X							
CHLL-SB149-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB149-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB149-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X							
CHLL-SB150-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB150-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X						X	
CHLL-SB150-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X							
CHLL-SB151-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB151-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB151-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X							
CHLL-SB152-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB152-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB152-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X							
CHLL-SB153-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the soil boring	Direct Push Boring	X									X							
CHLL-SB151-6"-2.5'	Proximity to PCB detections requiring delineation	Underlying 6 inches to 2.5 feet of the soil boring	Direct Push Boring		X								X							
CHLL-SB151-2.5'-Y'	Proximity to PCB detections requiring delineation	Composite sample from 2.5 feet to the water table	Direct Push Boring		X								X						X	

Table 1
Sampling and Analysis Summary
Hubbell Coal Dock Area
C&H Lake Linden Operations
Houghton County, Michigan

Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sample Method	Sample Type/Matrix						Sample Analyses						Duplicates				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Chloride/Sulfate	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
													X							
	Proximity to PCB detections requiring delineation												X							
	Proximity to PCB detections requiring delineation																			
	Proximity to PCB detections requiring delineation																			
													X							
																			X	
	Proximity to PCB detections requiring delineation												X							
	Proximity to PCB detections requiring delineation																			
	Proximity to PCB detections requiring delineation																			
																			X	
			Total Sample Count	**12**	**24**	**2**	**1**	**3**	**0**	**2**	**2**	**0**	**42**	**2**	**0**	**0**	**0**	**0**	**5**	**0**

Notes:
en Operations
ased on field observations
PNAs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds
X = Planned analyte based on the sampling rationale and the horizontal and vertical location of the sample

Laboratory Quality Assurance/Quality Control Matrix Spike and Matrix Spike Duplicate samples will be a batch quality control sample prepared by the laboratory.
All sampling locations are subject to change based on visual observations or actual field conditions.
Additional analytes may be selected at the descretion of the field sampling team based on visual observations or field conditions.
Surface water and sediment sampling locations area subject to change based on underwater assessment activities.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

In areas that have been resurfaced or capped, analytical samples will be collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.

Table 1
Sampling and Analysis Summary
Hubbell Smelter Area
C&H Lake Linden Operations
Houghton County, Michigan

Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sample Method	Sample Type/Matrix						Sample Analyses						Duplicates				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Oil and Grease	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
CHLL-SD87-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD87-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X						X	
CHLL-SD87-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD88-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD88-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD88-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD89-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD89-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD89-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD90-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD90-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD90-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X						X	
CHLL-SD91-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD91-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD91-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD92-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD92-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD92-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD93-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD93-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD93-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD94-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD94-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD94-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X						X	
CHLL-SD95-0-6"	Proximity to PCB detections requiring delineation	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD95-1-3'	Proximity to PCB detections requiring delineation	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD95-3-5'	Proximity to PCB detections requiring delineation	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SW06-X-Y'	Proximity to PCB detections requiring delineation	1 foot above the sediment surface	Peristaltic Pump				X						X						X	
CHLL-SW07-X-Y'	Proximity to PCB detections requiring delineation	1 foot above the sediment surface	Peristaltic Pump				X						X							
		Total Sample Count		**0**	**0**	**0**	**2**	**27**	**0**	**0**	**0**	**0**	**29**	**0**	**0**	**0**	**0**	**0**	**4**	**0**

Notes:
CHLL = C&H Lake Linden Operations
O = Potential analyte based on field observations
PNAs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds
X = Planned analyte based on the sampling rationale and the horizontal and vertical location of the sample

Laboratory Quality Assurance/Quality Control Matrix Spike and Matrix Spike Duplicate samples will be a batch quality control sample prepared by the laboratory.
All sampling locations are subject to change based on visual observations or actual field conditions.
Additional analytes may be selected at the descretion of the field sampling team based on visual observations or field conditions.
Surface water and sediment sampling locations area subject to change based on underwater assessment activities.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.
In areas that have been resurfaced or capped, analytical samples will be collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.

Table 1
Sampling and Analysis Summary
Hubbell Slag Dump and Beach Area
C&H Lake Linden Operations
Houghton County, Michigan

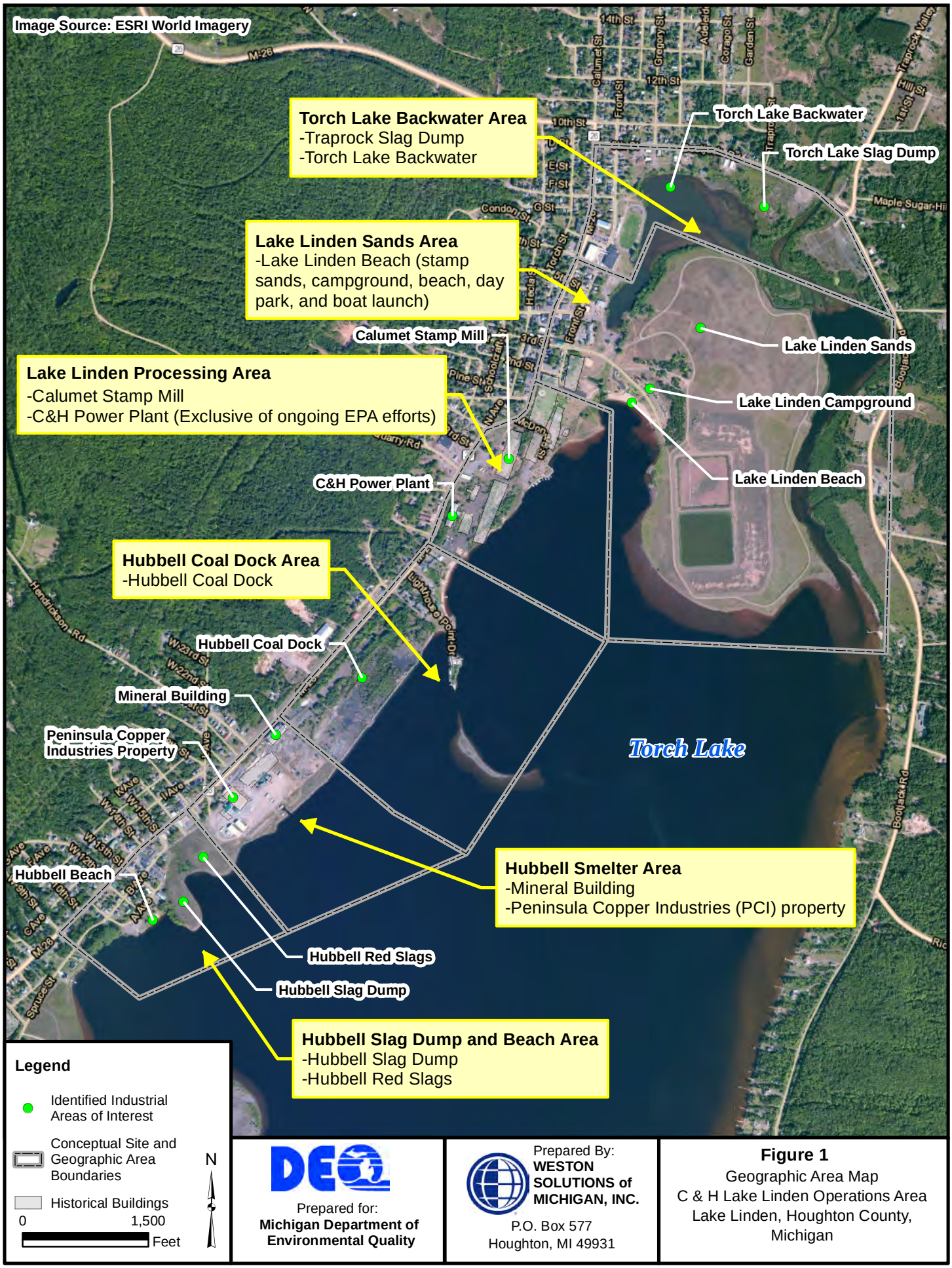
Proposed Sampling Location	Sampling Rationale	Sample Interval	Anticipated Sample Method	Sample Type/Matrix						Sample Analyses						Duplicates				
				Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums and Containers	VOCs	PNAs	Metals	PCBs	Oil and Grease	Asbestos	VOCs	PNAs	Metals	PCBs	Oil and Grease
CHLL-SD65-0-6"	Based on undewater surveillance, proximity to submerged debris	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD65-1-3'	Based on undewater surveillance, proximity to submerged debris	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD65-3-5'	Based on undewater surveillance, proximity to submerged debris	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
CHLL-SD66-0-6"	Based on undewater surveillance, proximity to submerged debris	The upper-most 0-6 inches of the sediment sampling location	Vibracore Sampler					X					X							
CHLL-SD66-1-3'	Based on undewater surveillance, proximity to submerged debris	Sediment from 1-3 feet below the sediment surface	Vibracore Sampler					X					X						X	
CHLL-SD66-3-5'	Based on undewater surveillance, proximity to submerged debris	Sediment from 3-5 feet below the sediment surface	Vibracore Sampler					X					X							
			Total Sample Count	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**6**	**0**	**0**	**0**	**0**	**0**	**1**	**0**

Notes:
CHLL = C&H Lake Linden Operations
O = Potential analyte based on field observations
PNAs = Polynuclear Aromatic Hydrocarbons
PCBs = Polychlorinated Biphenyls
VOCs = Volatile Organic Compounds
X = Planned analyte based on the sampling rationale and the horizontal and vertical location of the sample

Laboratory Quality Assurance/Quality Control Matrix Spike and Matrix Spike Duplicate samples will be a batch quality control sample prepared by the laboratory.
All sampling locations are subject to change based on visual observations or actual field conditions.
Additional analytes may be selected at the descretion of the field sampling team based on visual observations or field conditions.
Surface water and sediment sampling locations area subject to change based on underwater assessment activities.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

In areas that have been resurfaced or capped, analytical samples will be collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.

FIGURES



Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC.
P.O. Box 577
Houghton, MI 49931

Figure 1
Geographic Area Map
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

FILE: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1F1_GeographicArea_v20150303.mxd 9:41:53 AM 3/3/2015 BROWNK

Surface water and sediment sampling locations are subject to change based on underwater assessment activities.
All sampling locations are subject to change based on visual observations or actual field conditions.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

Legend

Proposed Sampling Locations

- Soil Boring/ Groundwater
- Sediment

Conceptual Site and Geographic Area Boundaries

N

0 350 Ft

Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC
P.O. Box 577
Houghton, MI 49931

Figure 2
Proposed Sampling Location Map - Torch Lake Backwater Area
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

File: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1\F2_TorchLakeBackwater_v20150326.mxd, 3/26/2015 4:10:11 PM, BROWNK

Image Source: ESRI World Imagery

CHLL-SD05
CHLL-SD72
CHLL-SD75
CHLL-SD73/CHLL-SW01
CHLL-SD76
CHLL-SD74/CHLL-SW02
CHLL-SD77
CHLL-SD81
CHLL-SD78
CHLL-SD79/CHLL-SW03
CHLL-SD80

Condon St
6th St
Kilmar St
Torch St
5th St
Saw St
Pear St
Poplar St
W 3rd St
4th St
Kit St
Harris St
Hecla St
3rd St
Front St
Hiltunen St
Douglas St
2nd St
Linden St
Pine St
Osceola St
Schoolcraft St
Bridge St
1st St
Summit St
Tunnel St
N Ave
McDonald St
W 32nd St
W 33rd St
Quarry Rd
W 31st St
W 30th St
Poisson St
M-26
Edgewood St
M Ave
Lighthouse Point Dr
Boojack Rd
Sawmill Rd

Surface water and sediment sampling locations are subject to change based on underwater assessment activities.
All sampling locations are subject to change based on visual observations or actual field conditions.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

Legend

Proposed Sampling Locations

- Sediment
- Sediment/ Surface Water
- Low Density
- Medium Density
- High Density
- Conceptual Site and Geographic Area Boundaries

N

0 650 Ft

Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC
P.O. Box 577
Houghton, MI 49931

Figure 3
Proposed Sampling Location Map - Lake Linden Sands Area
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

File: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1\F3_LakeLindenRecSands_v20150326.mxd, 3/26/2015 4:02:58 PM, BROWNK

Image Source: ESRI World Imagery

CHLL-SD82/CHLL-SW04
CHLL-SB142/CHLL-GW64
CHLL-SB143/CHLL-GW65
CHLL-SB144/CHLL-GW66
CHLL-SB145/CHLL-GW67
CHLL-SD26
CHLL-SB23/CHLL-GW12
CHLL-SD83
CHLL-SD84
CHLL-SD85
CHLL-SB24/CHLL-GW13
CHLL-SB25/CHLL-GW14

Linden St
Pine St
Atlantic St
Osceola St
2nd St
Front St
Hecla St
1st St
Summit St
Bridge St
Old M-26
Tunnel St
II Ave
McDonald St
W 32nd St
W 33rd St
Quarry Rd
W 31st St
M-26
W 30th St
Poisson St
Edgewood St
Lighthouse Point Dr
M-26

Legend

Proposed Sampling Locations

- Soil Boring/ Groundwater
- Sediment
- Sediment/ Surface Water

- Low Density
- Medium Density
- High Density
- Conceptual Site and Geographic Area Boundaries

N

0 400 Ft

Surface water and sediment sampling locations are subject to change based on underwater assessment activities. All sampling locations are subject to change based on visual observations or actual field conditions.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC
P.O. Box 577
Houghton, MI 49931

Figure 4
Proposed Sampling Location Map - Lake Linden Processing Area
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

File: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1\F4_LakeLindenProcessing_v20150326.mxd, 3/26/2015 4:07:32 PM, BROWNK

Surface water and sediment sampling locations are subject to change based on underwater assessment activities.
All sampling locations are subject to change based on visual observations or actual field conditions.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

Legend

Proposed Sampling Locations

- Soil Boring
- Soil Boring/ Groundwater
- Sediment/ Surface Water

- Low Density
- Medium Density
- High Density
- Conceptual Site and Geographic Area Boundaries

N

0 450 Ft

Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC
P.O. Box 577
Houghton, MI 49931

Figure 5
Proposed Sampling Location Map - Hubbell Coal Dock Area
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

File: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1\F5_HubbellCoalDock_v20150326.mxd, 3/26/2015 4:21:08 PM, BROWNK

Image Source: ESRI World Imagery

Surface water and sediment sampling locations are subject to change based on underwater assessment activities.
All sampling locations are subject to change based on visual observations or actual field conditions.
For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake.

W 21st St
M-26
W 19th St
L Ave
26
M-26
E 17th St
CHLL-SD87
CHLL-SD92
CHLL-SD88
CHLL-SD89
CHLL-SD90/CHLL-SW06
CHLL-SD93
CHLL-SD91/CHLL-SW07
CHLL-SD94
CHLL-SD95

Legend

Proposed Sampling Locations

- Sediment
- Sediment/ Surface Water
- Sonar-modified Sampling Locations
- Low Density
- Medium Density
- High Density
- Conceptual Site and Geographic Area Boundaries

N

0 300 Ft

Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC
P.O. Box 577
Houghton, MI 49931

Figure 6
Proposed Sampling Location Map - Hubbell Smelter Area
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

File: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1\F6_HubbellSmelterArea_v20150326.mxd, 3/27/2015 2:27:09 PM, BROWNK

Prepared for:
Michigan Department of Environmental Quality

Prepared By:
WESTON SOLUTIONS of MICHIGAN, INC
P.O. Box 577
Houghton, MI 49931

Figure 7
Proposed Sampling Location Map -
Hubbell Slag Dump and Beach Area
C & H Lake Linden Operations Area
Lake Linden, Houghton County, Michigan

File: T:\GIS_Projects\MDEQ\20177.001.001_Torch_Lake\mxd\2014_SAP_Addendum_1\F7_HubbellSlagDumpandBeach_v20150326.mxd, 3/26/2015 4:31:06 PM, BROWNK