

**SUMMARY REPORT FOR THE
TORCH LAKE AREA ASSESSMENT
TORCH LAKE NPL SITE
AND SURROUNDING AREAS
KEWEENAW PENINSULA, MICHIGAN**

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region V Emergency Response Branch
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Gross Ile, Michigan 48138

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Date Prepared	December 13, 2007
TDD Number	S05-0002-0708-020
Contract Number	EP-S5-06-04
Document Control Number	274-2A-ABDT
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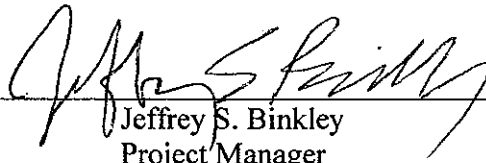
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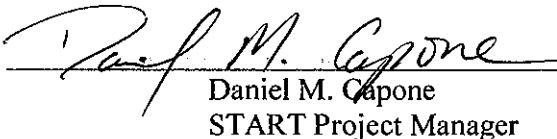
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EXECUTIVE SUMMARY

Weston Solutions, Inc. (WESTON®) has prepared this Summary Report to describe the September 2007 Torch Lake Area Assessment (AA) at the request of the United States Environmental Protection Agency (U.S. EPA), under the Superfund Technical Assessment and Response Team (START) contract between WESTON and the U.S. EPA (Contract No. EP-S5-06-04).

Study Area

The focus of the AA was on 17 Areas of Investigation (AOI) identified jointly by U.S. EPA and the Michigan Department of Environmental Quality (MDEQ) that were impacted by historical copper mining operations in the Keweenaw Peninsula. The AA included portions of the Torch Lake National Priorities List (NPL) Site where stamp sands are the primary media of concern. The AOIs are depicted on **Figure 1**.

Study Objectives

The primary objective of the Torch Lake AA was to evaluate imminent threats to human health, welfare and the environment, along with identification of areas for additional investigation. The specific geographical locations and exposure pathways evaluated during the AA were:

- Direct-contact hazards associated with newly-exposed stamp sand and the potential presence of other mining-era related waste along the western shoreline of Torch Lake as a result of significantly lower surface-water levels. The area evaluated was the recently exposed shoreline between the edge of the U.S. EPA-installed vegetative cover and the waters edge as a result of the significantly lower surface-water levels in Lake Superior and its contiguous water bodies. These previously shallow water areas had not been investigated;
- Direct-contact hazards associated with exposed stamp sand and the potential presence of other mining-era related waste near Gay, Michigan where no remedial efforts have been implemented; and
- Limited evaluation of potential environmental concerns at abandoned mining-era related industrial buildings, ruins, and land areas proximal to the western shoreline of Torch Lake, the shoreline of Lake Superior, and the north side of the Portage Waterway between the Quincy Smelter and H&Y Marina.

WESTON START conducted field tasks including performing visual assessments and documentation of conditions at each AOI, screening soils for metals content by x-ray fluorescence, sampling soils for laboratory analysis, and using global positioning system equipment to log and map targeted locations/media to meet the primary objective as further described in **Section 2**.

Findings

Comprehensive assessments were not in the scope of the AA, and therefore, lead paint, structural stability, physical hazards and other common environmental hazards known to affect historical industrial properties and structures are not included in this report unless suspected materials were readily apparent during reconnaissance or documented through previous studies. Suspect asbestos-containing material (ACM) encountered during reconnaissance or documented through previous studies is noted in the key findings. A complete summary of AA findings is provided in **Section 3**.

Findings at one or more AOI included dilapidated structures and exposed foundation materials and debris, documented and suspect friable ACM and other suspect hazardous building materials, exposed stamp sand and slag, miscellaneous items (including, but not limited to drums, cylinders, aboveground storage tanks, and surface debris), a tar vault and exposed stamp sand and tar along the Portage Waterway shoreline, and underwater drums presumed to be associated with the historical industrial operations surrounding Torch Lake.

Recommendations

Recommendations for further investigation, remedial action, or no further action are provided in **Section 4** for each AOI. The purpose of the Torch Lake AA was to determine if imminent and substantial threats existed and to make recommendations on further assessment. A comprehensive assessment of all environmental hazards known to affect historical industrial properties and structures was not within the scope of the AA. Furthermore, it should be noted that many of the potential environmental issues have been evaluated previously by the MDEQ and the U.S. EPA Remedial Branch.

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SECTION 1 INTRODUCTION

On August 24, 2007, the United States Environmental Protection Agency (U.S. EPA) initiated an area assessment (AA) at select areas of the Torch Lake National Priorities List (Torch Lake NPL) Site along the western shoreline of Torch Lake, the northern shoreline of the Portage Waterway, the western shoreline of Torch Lake, and the exposed shoreline of the Gay Stamp Sands deposit. The purpose of this AA was to identify potential imminent threats to human health, welfare, and the environment, along with identification of areas for additional investigation. U.S. EPA tasked the Weston Solutions, Inc. (WESTON®) Superfund Technical Assessment and Response Team (START) to perform the AA under START Contract No. EP-S5-06-04, Technical Direction Document (TDD) No. S05-0002-0708-020.

1.1 SITE LOCATION

The Portage Waterway and Torch Lake are located proximal to Hancock, Houghton County, Michigan (**Figure 1**). Gay, Michigan is located approximately 14 miles northeast of Torch Lake, on the shores of Lake Superior. The assessment study area encompasses Areas of Investigation (AOI) that include buildings, structures, five miles of exposed stamp sand shoreline along the western margin of Torch Lake, and five miles of stamp sand shoreline along Lake Superior near the town of Gay, Michigan. Targeted areas are presented in **Section 2**, and depicted on **Figure 1**.

1.2 SITE HISTORY

Copper mining occurred in the Keweenaw Peninsula from the 1890s until 1969. Mill tailings (stamp sands) were deposited in and along the shorelines of multiple lakes. Some industry is present in the area, but the primary business and commerce in the area today centers around recreation and tourism. Approximately 4,000 people live within one mile of Torch Lake.

About 200 million tons of copper mill stamp sands were dumped into Torch Lake, filling about 20 percent (%) of the lake, by volume. The contaminated sediments are believed to be 70 feet thick in some areas, and surface sediments contain copper concentration up to 2,000 parts per million (ppm). The stamp sands deposited in Torch Lake and along the shoreline were dredged during the early part of the 1900s. Flotation and leaching chemicals were used in some instances

to reclaim copper. The stamp sands and much of the flotation chemicals were returned to the lake bed and deposited along the shoreline. In addition to the mined copper, copper-containing materials from other areas were reclaimed. Other wastes were also historically deposited in and along the shoreline of Torch Lake, including mine pumpage, leaching chemicals, explosives residues, and mining byproducts. In 1972, an estimated 27,000 gallons of cupric ammonium carbonate were released into the Torch Lake from storage vats. Barrels have been found at several sites along the shoreline of the lake and on the lake bottom.

The Torch Lake NPL Site is comprised of several smaller sites ranging from approximately 10 acres to more than 200 acres. The sites are located around the Keweenaw Peninsula. The Torch Lake NPL Site was primarily listed because of the detrimental ecological effects of copper and mine tailings on aquatic organisms and to the surface water of Torch Lake. When it was added to the NPL, the Torch Lake NPL Site was defined to include Torch Lake, the northern portion of Portage Lake, North Entry, and tributary areas. Other related areas were added during the investigation phase and the Record of Decision (ROD) for Operable Units 1 and 3 addressed tailing piles and slag piles/beach deposited along the western shore of Torch Lake, Northern Portage Lake, Keweenaw Waterway, Lake Superior, Boston Pond and Calumet Lake. Tailing piles in Lake Linden, Hubbell/Tamarack City, Mason, Calumet Lake, Boston Pond, Michigan Smelter, Isle Royale, Lake Superior, and Gross Point were also included. The remedial investigation and cleanup efforts focused on areas along the shores of Torch Lake and the surrounding areas, where stamp sands and tailings were a concern for erosion into the waterways. Buildings and other related structures that were not shown to be a concern for erosion into surface water, were not included as part of the Torch Lake NPL Site.

By the fall of 2004, approximately 700 acres of stamp sands and slag were remediated by U.S. EPA. This included stamp sands along the western shore of Torch Lake, Dollar Bay, Point Mills, Calumet Lake, Boston Pond, and Michigan Smelter. The U.S. EPA Torch Lake NPL Site cleanup primarily addressed the negative ecological effects on area water bodies as a result of more than a century of copper mining, milling, and smelting in the area. The most significant ecological effect is the degradation of the benthic community in area water bodies as a result of past and current metal and particulate-matter surface water loadings from mining wastes, including stamp sand, located on land along and near area water bodies. The U.S. EPA cleanup

decision for terrestrial portions of Torch Lake NPL Site is documented in the September 30, 1992, U.S.EPA ROD.

The 1992 ROD included constructing a soil and vegetative cover over exposed mining wastes on properties that border area water bodies. This cover was designed to prevent further contamination and ecological degradation of area water bodies by reducing the ongoing transport (*i.e.*, wind erosion, surface water runoff, and shoreline erosion) and loading of mining waste metals and particulate matter. The area water bodies were then allowed to naturally recover.

In August 1994, U.S. EPA contracted with the United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) to perform remedial design work. In September 1998, U.S. EPA also contracted with the USDA-NRCS to perform remedial action management and oversight throughout the cleanup process.

In April 2002, a partial NPL delisting of the Lake Linden portion of the Torch Lake NPL Site and all of operable unit 2 (sediments, surface water, and groundwater) was finalized. The partial delisting of the Hubbell/Tamarack City portion of the Torch Lake NPL Site was finalized in 2004.

Low lake levels experienced during 2007 at Torch Lake exposed stamp sands and, in the Village of Lake Linden, a sludge material previously under water along the shore. The Michigan Department of Environmental Quality (MDEQ) collected samples of the sludge which was located adjacent to a public beach within the Lake Linden Recreation Park (LLRP). Laboratory analysis of the sludge revealed the presence of antimony, arsenic, barium, copper, and lead at concentrations exceeding MDEQ Part 201 Residential Direct Contact Criteria (RDCC) (Use of surveyed properties varied and comparison to RDCC is for reference only), and exceeded, by a factor of 20, the extract of Toxicity Characteristic Leaching Procedure (TCLP) limits. These results indicate the sludge was a characteristically hazardous waste under 40 Code of Federal Regulations (CFR) 261.24. This discovery prompted a time-critical removal action to remove the sludge and the need for additional assessment to determine if other areas were similarly impacted.

1.3 **PROJECT OBJECTIVE**

The primary project objective of the Torch Lake AA was to evaluate imminent threats to human health, welfare and the environment, along with identification of areas for additional investigation. The specific geographical locations and pathways evaluated during the AA were:

- Direct-contact hazards associated with exposed stamp sand and the potential presence of other mining-era related waste along the western shoreline of Torch Lake. The area evaluated was the recently exposed shoreline between the edge of the U.S. EPA-installed vegetative cover and the waters edge as a result of the significantly lower surface-water levels in Lake Superior and its contiguous water bodies. These previously shallow water areas had not been investigated;
- Direct-contact hazards associated with exposed stamp sand and the potential presence of other mining-era related waste near Gay, where no remedial efforts have been implemented; and,
- Limited evaluation of potential environmental concerns at abandoned mining-era related industrial buildings, ruins, and land areas proximal to the western shoreline of Torch Lake, the shoreline of Lake Superior, and the north side of the Portage Waterway between the Quincy Smelter and H&Y Marina.

SECTION 2

SCOPE OF WORK REVIEW

A scope of work (SOW) was developed and implemented through efforts by the U.S. EPA and WESTON START to accomplish the project objectives of identifying imminent threats to human health, welfare, and the environment at multiple AOIs at the Torch Lake NPL Site, and additional AOIs identified in cooperation with U.S. EPA and the MDEQ Remediation and Redevelopment Division (RRD).

The SOW was divided into the following tasks: Pre-assessment activities, AA field activities, sample and data management activities, and preparation of the AA report.

2.1 **TASK 1 – PRE-ASSESSMENT ACTIVITIES**

Pre-assessment activities were completed prior to the start of AA field activities. This work included preparing the site-specific work plan (WP) and health and safety plan (HASP), conducting a preliminary investigation of potential AOIs, and assisting U.S. EPA with site access.

The WP was prepared based on discussions with the U.S. EPA On-Scene Coordinator (OSC), a review of aerial photographs, available file materials, and a preliminary survey of potential AOIs along the western shoreline of Torch Lake and the Portage Waterway.

In addition, WESTON START performed a review of existing information and an evaluation of current site conditions. WESTON START reviewed the available MDEQ-RRD and U.S. EPA file information for select AOIs. A list of the documents that were reviewed is presented in **Section 5.0**. **Attachment A** lists the current status of site access for each area under investigation.

2.2 **TASK 2 – AA ACTIVITIES**

In general, AA activities were conducted using a phased approach that included an initial reconnaissance/assessment and follow-up sample collection (if appropriate) at each AOI. Three field teams composed of U.S. EPA Field Environmental Decision Support (FIELDS) personnel and WESTON START conducted the AA. All field activities were completed using the approach outlined in the site-specific WP and the *START III Generic Quality Assurance Project*

Plan (QAPP), dated June 2006, and AOI-specific Incident Action Plans developed for the AA.

Depending upon the features associated with each AOI, AA efforts included the following:

- Visual assessment/photo documentation of buildings, structures, exposed debris and materials, and areas with exposed stamp sand shorelines;
- Visual assessment/photo documentation of site soils, sediments, and surface water;
- Use of global positioning system (GPS) equipment to log and map specific locations/media targeted for additional assessment (WESTON START);
- Real-time x-ray fluorescence (XRF) screening of soils for metals, with verification by collection of laboratory analytical samples from a subset of the XRF screening locations (WESTON START);
- Collection of XRF and GPS screening of soils and exposed sediments along Torch Lake and Lake Superior shoreline areas (Gay Stamp Sands) utilizing the Rapid Assessment Tools (RAT) system, with verification by collection of laboratory analytical samples from a subset of the XRF screening locations (U.S. EPA FIELDS);
- Inclusion of PCB analysis in the samples collected for laboratory analysis; and
- Collection of additional, multi-media samples and laboratory analysis, as determined necessary in the field.

Photo documentation of AA activity and site features referenced in this document is presented in **Attachment B**.

2.2.1 Targeted AOIs

The list of targeted AOIs for the Torch Lake AA includes: (listed according to locational relationship)

- AOI 7 – Quincy Smelter;
- AOI 15 – Additional Properties Adjacent to Quincy Smelter;
- AOI 16 – Dollar Bay Wire Mill;
- AOI 17 – Dollar Bay Well Field;
- AOI 10 – Mason Sands;
- AOI 18 – Building in Mason;
- AOI 19 – Former C&H Leach Plant and Hubbell Stamp Sands;
- AOI 20 – Tamarack City Stamp Mill;
- AOI 21 – Hubbell Beach and Slag Dump;
- AOI 22 – Hubbell Docks, Mineral Building, and C&H Smelter;

- AOI 12 – Lake Linden Sands;
- AOI 23 – C&H Power Plant;
- AOI 24 – Backwater Area of Torch Lake;
- AOI 25 – Traprock Slag Dump;
- AOI 26 – Bootjack Stamp Sands;
- AOI 14 – Gay Stamp Sands;
- Various AOIs – Western Shoreline of Torch Lake; and
- AOI 27 – Drums on Lake Bottom.

A detailed description of each primary targeted AOI is provided in **Section 3.0**.

2.2.2 Soil Screening Using XRF

Targeted soils were initially screened by WESTON START/U.S. EPA FIELDS using an XRF (Niton and/or Innov-X 4000 XP/Auto XRF models) instrument in accordance with procedures outlined in the site-specific WP. All locations where XRF screenings were conducted by WESTON START were located utilizing a sub-meter GPS device. U.S. EPA FIELDS personnel utilized the RAT system software to collect XRF and GPS data. The RAT software, developed by U.S. EPA's Region V FIELDS Team, enables the user to collect real-time data utilizing GPS and other monitoring devices using their digital data outputs. Use of the RAT software at the Torch Lake AA site allowed U.S. EPA FIELDS teams to collect and store real time XRF and GPS data in a flat file, which in turn allowed the data to be plotted and viewed in the field on aerial photography. Automated collection of data in the field allowed WESTON START to produce daily GIS plots showing locations of data collected.

Sample collection for laboratory analysis was performed at suspect locations or at a target minimum of 10% of the screening locations to verify the XRF results and to assess the presence of the contaminants of concern (COCs).

2.2.3 Soil and Exposed Sediment Sampling

The U.S. EPA FIELDS and WESTON START teams collected soil and exposed sediment samples for laboratory analysis during follow-up AA activities based on the results of initial reconnaissance efforts and XRF screening results. Twenty-four soil and exposed stamp sand

samples were collected per WESTON START standard operating procedures (SOP) as outlined in the *START III Generic QAPP*, for laboratory analysis of 14 select Target Analyte List (TAL) metals and polychlorinated biphenyls (PCBs).

Laboratory data and validation reports for all soil sampling results discussed in the text are presented in **Attachment C**.

2.2.4 Waste Sampling

The WESTON START team collected one waste sample of a tar-like material from AOI 15 (See **Section 3.2.3**) during the AA using WESTON START SOPs, as outlined in the *START III Generic QAPP*. The sample was submitted to the laboratory for analysis of 14 select TAL metals, PCBs, Semi-volatile and volatile organic compounds (SVOC/VOC), and cyanide.

The laboratory data and validation report for the waste sampling results discussed in the text are presented in **Attachment C**.

2.3 TASK 3 – SAMPLE AND DATA MANAGEMENT ACTIVITIES

All laboratory analytical samples were collected in laboratory-supplied containers using sampling techniques and equipment in accordance with the site-specific WP and the *START III Generic QAPP*. All sample containers were tightly sealed and immediately packed upright, on ice, in coolers. Upon collection of all samples, the appropriate laboratory chain-of-custody forms were completed. Sample coolers were securely taped prior to transport to prevent any tampering or loss of samples. Samples were shipped, under chain of custody, via overnight courier in coolers with packing material to prevent breakage of sample containers. Samples were shipped in compliance with all applicable Department of Transportation (DOT) and International Airline Transportation Authority (IATA) Regulations.

SECTION 3 AREA ASSESSMENT RESULTS

3.1 AOI 7 – QUINCY SMELTER

3.1.1 Site Description

The Quincy Smelter (AOI 7) is located at 48991 Maple Street, Ripley, Franklin Township, Houghton County, Michigan (**Figure 2a**). AOI 7 consists of approximately 25 acres in a roughly rectangular shape, encompassing 1,483 feet of shoreline along Portage Lake. A former copper smelter and support buildings (total of 27 buildings) occupy AOI 7. Portage Lake is to the south of AOI 7, Highway 26 to the north, and private properties border AOI 7 to the east and west. The Hancock/Ripley Trail (HRT), a designated snowmobile trail also used for walking, running, and all-terrain vehicles, crosses AOI 7 from east to west along a former railroad bed.

The Quincy Mining Company (QMC) owned and operated AOI 7 as part of historic copper mining operations from the middle 1800s until 1969 when it closed. After smelting operations ended, QMC continued to operate a water company on AOI 7. In 1986, the Quincy Development Corporation (QDC) assumed ownership of the Quincy Smelter property. Franklin Township took ownership from QDC in 1999. AOI 7 is currently owned by Franklin Township.

3.1.2 Review of Existing Site Information

AOI 7 is included in the Torch Lake NPL Site. From 2002 through 2004, MDEQ, U.S. EPA, QDC, National Park Service (NPS), Franklin Township, and the Keweenaw National Historical Park have performed numerous investigations at this property, including:

- Brownfields Redevelopment Assessment (BFRA) (MDEQ, 2002);
- Historical land use survey (Archimede and Martin, 2002);
- Critical safety and preservation needs assessment and stabilization plan (Franklin Township, February 2003);

- Comprehensive Environmental Resource Conservation and Liability Act (CERCLA) removal assessment and removal action, including the transportation and disposal of more than 1,000 gallons of waste material from drums, tanks, vats, and small containers of oils, greases, solvents, powders, laboratory chemicals, and contaminated debris and soil (http://epaosr.net/site_profile.asp?site_id=889);
- Asbestos and heavy metals exposure/health-risk assessment following identification of friable asbestos-containing materials (ACM) at AOI 7 and determination that concentrations of metals in AOI 7 surface soils were above State of Michigan Part 201 direct contact and inhalation criteria (MDEQ, 2002); and
- Assessment of asbestos-related and physical hazards, documenting substantial amounts of friable bulk asbestos and ACM, as well as dangerous conditions due to the presence of dilapidated structures (WESTON, 2004).

Because sufficient information about AOI 7 was available in the MDEQ and U.S. EPA files, no additional AA field activities were conducted at this AOI.

3.2 **AOI 15 – PROPERTIES ADJACENT TO QUINCY SMELTER**

3.2.1 **Site Description**

Additional properties along the Portage Waterway shoreline east of the Quincy Smelter property to the H&Y Marina and the surrounding area makeup AOI 15. AOI 15 includes areas of exposed drums, tanks, a former manufactured gas plant (MGP) (Houghton County Gas & Coke) site, and debris and material related to historic mining-era-related industrial uses within the AOI limit. Currently, properties within AOI 15 (**Figure 2a**) include:

- Julio Marine and Salvage;
- Hanke Property;
- Copper Bowl;
- Diane B. Sprague Trust Property;
- Franklin Township Property;
- Zenith M. Manwell Property;
- Bootjack Holding/Ripley LLC or Raymond Kolehmainen Property (Former location of Houghton County Gas & Coke);
- Mickelsen Property;
- Julio Undeveloped Property;
- Julio Contracting;
- Clarence G. Hocking Trust Property;

- Julio Property;
- H&Y Marina; and
- The HRT (traverses all of AOI 15).

3.2.2 Review of Existing Site Information

Existing information was available for a selection of the properties in this AOI and is summarized in the following paragraphs.

Bootjack Holding/Ripley LLC or Raymond Kolehmainen Property (Former location of Houghton County Gas & Coke)

Two sources provided information regarding the former Houghton County Gas & Coke Plant: the current property owner, Mr. Raymond Kolehmainen; and Sanborn Maps from 1907 and 1917, coincident with plant operation. Notations on the 1907 Sanborn Map indicate that “coal gas process operation [occurred] day and night,” and indicate the presence of a coke shed, coal shed, storage, and a large, round object labeled “gasometer”. The 1917 Sanborn Map indicates the presence of a 15,000-gallon tank, located at ground level on the north side of the property near the former railroad tracks.

Mr. Raymond Kolehmainen, the current property owner, has communicated with individuals who were present at the property when it was operational. Reportedly, one individual mentioned that an open tar pit was located on the north side of the property; this was likely the 15,000-gallon ground-level tank. Pictures from the era of site operations, also provided by the owner, show a large above-ground storage tank (AST) containing fuel oil on site; this was likely the large round object labeled “gasometer” on the Sanborn Maps.

Mickelsen Property/ Undeveloped Julio Property

Notations on the Sanborn Maps from 1907 and 1917 referred to above indicate that these properties comprised the Portage Coal & Dock Company and were used for hauling and storing coal. Docks were located along the shoreline of Portage Lake in front of the Mickelsen and Undeveloped Julio Property.

Julio Contracting

Reviews of existing documents indicated that during audits performed by MDEQ in 1995, the Julio Contracting property was determined to be in violation of several natural resource regulations, including:

- Michigan's Part 111 of the Natural Resources and Environmental Protection Act (NREPA), 1994 PA 451, as amended (Part 111 of Act 451);
- Michigan Compiled Laws (MCL) 324.11101 *et seq.*, and Subtitle C of the Federal Resource Conservation and Recovery Act (RCRA), as amended; and
- Any regulations promulgated pursuant to these Acts.

AOI 15 – General

Review of existing documents also indicated that MDEQ performed a BFRA for the HRT. MDEQ's findings for surface soil analysis indicated the presence of benzene, ethylbenzene, xylenes, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, aluminum, antimony, arsenic, chromium, cobalt, iron, magnesium, manganese, mercury, selenium, silver, cyanide, and vanadium at concentrations greater than the Generic Residential Cleanup Criteria (GRCC) of Part 201 of the NREPA. The concentrations of arsenic, cyanide, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene exceeded the soil RDCC. The concentration of benzo(a)pyrene also exceeded the Generic Industrial Cleanup Criteria of Part 201 of the NREPA. Because these contaminants were detected at concentrations in excess of the GRCC, the HRT property was considered a "facility" under Part 201 of the NREPA.

The MDEQ assessment also indicated that contaminants detected at the property may migrate toward downgradient receptor areas and into other environmental media within the property. Based on site characteristics and sampling data, the soil is the primary source of contamination at the property, and contaminants in the soil may potentially be transported from soil to groundwater, soil to surface water, or soil to air. The potential exposure routes that have been identified for the property include ingestion of drinking water and soil, dermal adsorption of contaminants in groundwater, and inhalation of dusts and vapors from soil.

3.2.3 Summary of Field Activities

WESTON START personnel performed visual and photo assessments of the properties visible from the HRT on September 6, 2007, before access to any of the properties was granted. Several ASTs, underground storage tanks (UST) located above ground as scrap, compressed-gas cylinders, and drums were noted for further investigation. All noted items discovered while traversing the HRT were documented on properties where access was later granted. These properties are discussed below. Access was granted to all properties warranting additional assessment based on the September 6, 2007, HRT survey. Property owners granting access to U.S. EPA and WESTON START for the AA and sampling include those listed in **Section 3.2.1**.

Julio Marine and Salvage

The Julio Marine and Salvage is a commercial scrap metal recycling yard (**Figure 2a**). Drums, ASTs, USTs, electrical equipment, compressed-gas cylinders labeled as propane and other materials, crushed gas tanks, engines, automobiles with oil and gas tanks present, and car batteries were observed on site. With the exception of the car batteries, automobiles, and some of the drums, all items appeared empty and stacked with like materials. Large piles of stamp sands were also present on site, stockpiled for creating and repairing roads within the scrap yard. Per the scope of the AA, XRF screening was conducted only at the property shoreline.

Other site features that were documented during the AA include:

- Evidence of past fires in more than one location;
- Several drums with unknown contents stored within a tall metal vault;
- A large pile of stained soil mixed with metal debris, approximately 20 feet long, five feet wide, and three feet tall, located near a scale station; and
- An oily sheen west of the scrap yard main building.

Historical information indicated that transformers had been identified on the property in the past, but neither transformers nor evidence of transformers were observed during the AA.

Franklin Township Property

WESTON START personnel performed the AA at the Franklin Township property on September 12, 2007. This property is an undeveloped, vacant lot. No suspicious material was observed during the AA at this property and no XRF screening was performed.

Hanke Property

WESTON START personnel performed the AA at the Hanke Property on September 12, 2007. The Hanke Property is a residential location north of the HRT. The majority of the site is paved with asphalt. No suspicious material was noted during the AA and no XRF screening was performed at this location.

Copper Bowl

WESTON START personnel performed the AA at the Copper Bowl on September 12, 2007. The Copper Bowl is a commercial bowling alley open to the public. The majority of the site is paved with asphalt. A bulged drum, discolored with black residue, was observed on the south edge of the property along the HRT. The drum may contain grease or other food-related waste. No XRF screening was performed at this location.

Bootjack Holding/Ripley LLC or Raymond Kolehmainen Property (former location of Houghton County Gas & Coke)

WESTON START conducted the AA at the Kolehmainen Property, formerly the Houghton County Gas & Coke Plant on September 10 and 11, 2007. Two buildings currently exist on site along with debris, slag, coal, tar-like debris, ASTs, compressed-gas cylinders, and exposed stamp sands along the shoreline. The current landowner capped the majority of the property with gravel. The landowner showed WESTON START personnel the location of a tar vault that he discovered while digging on site approximately one year prior to the AA. On September 10, 2007, the landowner dug up the tar vault so WESTON START personnel could observe the tar, and collect a tar/soil sample. The landowner reported that the vault contains a black liquid with tar-like odor and the consistency of molasses. WESTON START collected a wet, tar-like sample from material outside the vault (MGP-TAR).

Tar was also observed at the property shoreline. It appears as though the tar seeps to the ground surface during warmer weather.

Other site features that were documented during the AA include:

- Dilapidated site structures;
- An unknown extent of tar-like material;
- Piles of coal;
- ASTs and compressed gas cylinders present in both buildings; and
- Evidence of a well located inside a sandstone building.

Due to documented conditions on site and the inability of the WESTON START to view all site areas, there is a potential that other non-observed sources of contamination are present.

Mickelsen Property

WESTON START personnel performed the AA at the Mickelsen property on September 12, 2007. This property is in the process of being developed and has been capped. The current landowner has poured a foundation and plans to construct a home. The property is adjacent to the former location of Houghton County Gas & Coke and may contain tar-like material under the surface cap near the shoreline, based on information provided by the owner of the former Houghton County Gas & Coke site. Historically, this property was used for coal storage and WESTON START observed coal and coal mixed with soils on site.

Julio Undeveloped Property

WESTON START personnel performed the AA at the Julio Undeveloped Property on September 12, 2007. This property is an undeveloped, vacant lot. No suspicious material was noted and no XRF screening was performed.

Julio Contracting

WESTON START personnel performed the AA at the Julio Contracting property on September 12, 2007. During the AA, WESTON START observed drums, ASTs, USTs, automobile and marine batteries, historic debris piles, stamp sand piles for road construction, construction debris, and construction equipment.

Other site features that were documented during the AA include:

- Oil-stained soil on the north side of the HRT and northeastern side of the property;
- A 20,000-gallon AST located on the northwestern side of the property;
- A well located next to the large AST;
- A creek running perpendicular to M-26 , located on the western side of the property, that was stagnant, murky, and brown in color; and
- Empty, submerged drums located along the shoreline where boats were docked.

Clarence G. Hocking Trust Property

WESTON START personnel performed a portion of the AA at the Clarence G. Hocking Trust Property on September 7, 2007. This property is currently used for boat storage and the majority of the site is paved with asphalt. No suspicious material was observed.

Julio Property

WESTON START personnel performed the AA at the Julio Property on September 12, 2007. This commercial property contains construction debris, ASTs, drums, automobile and marine batteries, a large pile of stacked household-sized liquid propane tanks, piles of stamp sands for road building and repair, old equipment, and historical mining-related buildings. None of the buildings were open for reconnaissance.

Other features observed during the AA include:

- A large AST that appeared to be leaking slowly from a spigot;
- Old Michigan Department of Transportation equipment used for road-building that may still contain tar-like materials; and
- An oil heater tank that may contain oil.

H&Y Marina

WESTON START personnel performed the AA at the H&Y Marina on September 12, 2007. This location is a commercial boat marina. Stamp sands were identified along the shoreline where low lake levels have exposed previously submerged material. The area from the newly exposed shoreline to M-26, north of the lake, appeared to have been capped. The owner was present and mentioned that he had been operating the marina for more than 20 years.

3.2.4 Summary of XRF Results

Locations at AOI 15 where XRF screening was conducted and results exceed RDCC (use of surveyed properties varied and comparison to RDCC is for reference only) are shown on **Figure 2b**. All XRF screening results are presented in **Table 1**.

Julio Marine and Salvage

The majority of the shoreline was covered with rock/brick debris. Three shoreline areas of exposed stamp sand and/or slag were screened with an Innov-X 4000 XP/Auto XRF (JulioScrap-3 through JulioScrap-5). No metals were detected at concentrations exceeding RDCC.

Bootjack Holding/Ripley LLC or Raymond Kolehmainen Property (former location of Houghton County Gas & Coke)

Ten locations were screened with an Innov-X 4000 XP/Auto XRF at this location, nine on September 10, 2007, and one on September 11, 2007. Two of the ten locations screened by XRF exhibited concentrations of metals in excess of RDCC. The hard, brown, tar-like material (MGP-23) contained concentrations of lead in excess of RDCC, and the black-stained soils (MGP-25) contained concentrations of arsenic in excess of RDCC.

Mickelsen Property

During the AA, two locations were screened with an Innov-X 4000 XP/Auto XRF; the shoreline of exposed stamp sands (Mickelsen-6), and black-stained soils east of the future residence (Mickelsen-7). No metals were detected in excess of RDCC at either screening location.

Julio Contracting

Per the scope of the AA, XRF screening was performed only along the shoreline at one location, JulioCon-13. No metals were detected in excess of RDCC. The majority of the shoreline consisted of rip-rap, brick, and/or block debris with little or no stamp sand exposure.

Clarence G. Hocking Trust Property

One location at the exposed stamp sand shoreline was screened with an Innov-X 4000 XP/Auto XRF (HockingsB-20). All metal concentrations were below RDCC.

Julio Property

Per the scope of the AA, XRF screening was performed only along the shoreline at two locations (JulioSalvage-15 and JulioSalvage-16). All metals concentrations detected in both samples were below RDCC.

H&Y Marina

Three locations were screened with an Innov-X 4000 XP/Auto XRF, two stamp sand locations and one black-stained soil. One of the stamp sand locations exhibited arsenic concentrations in excess of RDCC (H&Ymarina-17) and the black-stained soil location (H&Ymarina-19) exhibited iron concentrations in excess of RDCC.

3.2.5 Summary of Laboratory Results

Locations at AOI 15 where laboratory samples were collected and analytical results for metals exceed RDCC are documented on **Figure 2b**. All laboratory results for metals are presented in **Table 1**, and laboratory results for PCBs are presented in **Table 2**. Samples for laboratory analysis were collected from six locations within AOI 15.

Bootjack Holding/Ripley LLC or Raymond Kolehmainen Property (Former location of Houghton County Gas & Coke)

Samples were collected for laboratory analysis at three of the soil locations that were screened with an XRF; MGP-1, MGP-21, and MGP-26. Laboratory results from MGP-21 and MGP-26 exhibited arsenic concentrations in excess of the RDCC. XRF screening results at locations MGP-21 and MGP-26 did not exceed RDCC. As discussed previously, this is likely due to the limit of detection of the XRF screening method. No PCBs were detected in these samples at concentrations greater than RDCC.

An additional sample was collected of a tar-like material present at the site (MGP-TAR). All metals concentrations in this sample, as determined in the laboratory, were below RDCC. Concentrations of the following SVOCs were detected in excess of RDCC in sample MGP-TAR: acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, naphthalene, and phenanthrene (**Table 3**). VOC concentrations in sample MGP-TAR that exceeded RDCC include: 1,2,4-trimethylbenzene, 1,3,5-trimethylbenzene, benzene, naphthalene, toluene, and total xylenes. The concentration of total cyanide in sample MGP-TAR was below RDCC.

Mickelsen Property

During the AA, a sample was collected for laboratory analysis at one of the two locations screened with an XRF, Mickelsen-6. The concentration of arsenic in the sample, as determined by the laboratory, was in excess of the RDCC. However, no metals were detected in excess of RDCC during XRF screening of this sample. The limit of detection of the XRF screening method is typically higher than that of laboratory analysis. No PCBs were detected in sample Mickelsen-6.

H&Y Marina

A sample was collected for laboratory analysis at one of the three locations screened with an XRF, H&Y marina-19. XRF screening results revealed iron concentrations in excess of the RDCC and the laboratory results exhibited arsenic and lead concentrations in excess of RDCC. The RDCC for lead is 400 milligrams per kilogram (mg/kg). The XRF screening result for

sample H&Y marina-19 was 340 mg/kg and the laboratory results was 440 mg/kg. Therefore, the relatively low variability between XRF lead results and laboratory lead results was significant since XRF screening indicated a concentration below RDCC while laboratory results indicated a concentration greater than RDCC. Iron was not analyzed in the laboratory sample. No PCBs were detected in excess of RDCC in sample H&Y marina-19.

3.3 AOI 16 – DOLLAR BAY WIRE MILL

3.3.1 Site Description

The former use of the Dollar Bay Wire Mill property is unknown at this time, although it is assumed that mining-era operations occurred at this property. Numerous buildings remain on site, and the property is currently an operational boat storage yard (**Figure 3a**).

3.3.2 Review of Existing Site Information

The U.S. EPA previously remediated the western portion of this property by placing a gravel cover as part of the Torch Lake NPL remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the gravel cover is not restated here.

3.4 AOI 17 – DOLLAR BAY WELL FIELD

3.4.1 Site Description

There are two areas associated with AOI 17. The first area includes two parcels of privately-owned land between the Dollar Bay Well Field and the Dollar Bay Wire Mill (AOI 16). These parcels are owned by Paul and Lois Malinowski. The second area of AOI 17 is the Dollar Bay Well Field, currently owned by Osceola Township, and the surrounding area that was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts (**Figure**

3a). This area constitutes a new AOI based on the presence of foundation materials, slag, and refractory brick on site.

3.4.2 Review of Existing Site Information

One of the privately-owned parcels of this AOI, between the Dollar Bay Well Field and the Dollar Bay Wire Mill, was previously remediated by U.S. EPA via the placement of a vegetative cover and fencing on the parcel as part of the Torch Lake NPL Site remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

The second area of AOI 17, the Dollar Bay Well Field and the surrounding area that was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts, contains foundation materials, slag, and refractory brick. In addition, the property includes stamp sand deposits. WESTON START did not identify any existing documentation pertaining to this portion of AOI 17.

3.4.3 Summary of Field Activities

WESTON START personnel performed the AA at AOI 17 on September 7 and September 12, 2007. No suspicious material was observed in the capped area of AOI 17 with the exception of exposed stamp sands along the shoreline of the capped property. The uncapped property contained exposed foundation materials, debris, slag, and exposed stamp sands.

3.4.4 Summary of XRF Results

A total of four locations were screened with the XRF at this AOI (**Table 4**). Three locations were located in the uncapped area of the site: the exposed stamp sand shoreline and two suspicious-looking slag/stamp sand piles located on the interior of the property. Both of the slag/stamp sand piles screened in the uncapped area contained concentrations of arsenic

exceeding of RDCC (locations DollarB-11 and DollarB-12, **Figure 3b**). One of the samples also contained copper concentrations exceeding RDCC (DollarB-12), and another contained iron in excess of the RDCC (DollarB-19). The screening location DollarB-11 was part of a large surface deposit of stamp sands approximately 100 feet long by 100 feet wide. Screening location DollarB-12 was at a slag/stamp sand pile approximately five feet long by four feet wide.

3.4.5 Summary of Laboratory Results

No laboratory analytical samples were collected at this AOI.

3.5 AOI 10 – MASON SANDS

3.5.1 Site Description

The Mason Sands AOI includes the Quincy Mining Company Leach Plant ruins, a beached dredge, a smokestack, stamp sands, and other mining-era building ruins (**Figure 4a**).

3.5.2 Review of Existing Site Information

Contaminants in stamp sand deposits at Mason Sands were addressed during previous U.S. EPA remedial efforts via the placement of a vegetative cover along the shoreline portion of the property as part of the Torch Lake NPL Site remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

MDEQ has reported that the hull of the beached dredge at the Mason Sands AOI was painted with a mixture of lampblack and red lead paint. In addition, the smokestack ruins on site contain high arsenic levels.

A review of existing documentation revealed that the current property owner, Lakeshore Estates, completed and submitted a Category A Baseline Environmental Assessment (BEA) to MDEQ in

April 1997. In addition, Osceola Township, while contemplating developing a historical interpretive park at the site, completed and submitted a Category A BEA to MDEQ in July 1998 for a 6.87-acre area of the Mason Sands. No significant findings were identified from the BEAs.

Review of existing site documentation indicated that the U.S. Department of Health and Human Services (DHHS) completed a health consultation for Torch Lake (March 23, 1998) that concluded that the “Mason Sands do not pose an urgent public health hazard under current conditions”.

3.5.3 Summary of Field Activities

WESTON START and U.S. EPA FIELDS teams conducted the AA at AOI 10 including a visual assessment, XRF screening of suspicious materials, a reconnaissance of newly exposed stamp sand deposits, and sample collection for laboratory analytical verification. On September 6, 2007, the WESTON START team assessed buildings and ruins, and on September 12, 2007, the U.S. EPA FIELDS teams conducted assessments along the shoreline.

AOI 10 contains exposed foundation materials, debris, empty drums, slag, coal, and exposed stamp sands. These materials were largely encountered to the north of the beached dredge on the east side of M-26 (**Figure 4a**). Piles of stamp sands and/or slag of various colors, including gray, red, black, green, and tan, were observed during the AA.

Other site features that were documented during the AA include:

- Several breaches were evident in the perimeter fence, and the access gate does not lock properly;
- Vandalism and trespassing were evident in all site areas;
- Empty drums were stored on site;
- A small concrete building was observed near the Quincy Mining Company Leach Plant building ruins that may contain a UST as evidenced by a one-inch stick-up located inside the building, a petroleum odor that was noted by WESTON START, and a “No Smoking” sign painted on the outside of the building;
- A former transformer pad was observed near the Quincy Mining Company Leach Plant building ruins;

- Additional pipes were observed at the north-central portion of the Quincy Mining Company Leach Plant building ruins, indicating the potential for additional USTs and ASTs on site.

3.5.4 Summary of XRF Results

The U.S. EPA FIELDS team screened 25 locations on September 12, 2007, along the shoreline between Mason and Tamarack City with an XRF unit (**Table 5**), and collected five samples for laboratory analytical verification. No suspicious material was observed beyond stamp sands during the AA. Therefore, U.S. EPA FIELDS performed XRF screening every one quarter mile along the shoreline. Two locations along the shoreline exhibited arsenic concentrations greater than RDCC (TM-S1-02, and TM-S1-05), and one of the two locations (TM-S1-05) also contained lead concentrations greater than RDCC (**Figure 4b**).

WESTON START personnel screened twelve locations within the building ruins with an XRF unit and collected two samples for laboratory analytical verification on September 6, 2007. XRF screening yielded concentrations of metals greater than RDCC at five locations. Three locations contained arsenic at concentrations greater than RDCC (MasonB-3, MasonB-10, and MasonB-13), two locations contained lead at concentrations greater than RDCC (MasonB-6 and Mason B-10), and one location contained copper at a concentration greater than RDCC (MasonB-12). Location MasonB-6 was on a gray slag pile approximately five feet in diameter and 10 inches tall. Location MasonB-10 was a small, green-stained stamp sand/slag pile inside the Quincy Mining Company Leach Plant building ruins. Location MasonB-12 was a green-stained, rocky soil area located within one of the round structures observed within the Quincy Mining Company Leach Plant building ruins. Samples were collected and submitted for laboratory analysis for locations MasonB-6 and MasonB-10.

3.5.5 Summary of Laboratory Results

Samples were collected for laboratory analysis from five of the 25 locations screened with an XRF by the U.S. EPA FIELDS along the shoreline between Mason and Tamarack City and two of the 12 locations screened within the building ruins in Mason by WESTON START. A summary of the analytical results is presented below:

- As determined by laboratory analysis, no metals concentrations exceeded RDCC in samples collected at three of the five locations screened by U.S. EPA FIELDS (MS-S1-12, TM-S1-02, and TM-S2-02). No metals concentrations exceeded RDCC at these locations during XRF screening, either, with the exception of arsenic at location TM-S1-02. Arsenic concentrations in sample TM-S1-02 were determined to be 0.35 mg/kg by laboratory analysis and 8 mg/kg by XRF screening.
- Laboratory results for the sample collected at location MS-S1-13 exhibited arsenic concentrations greater than RDCC, however arsenic concentrations were less than RDCC during XRF screening at this location.
- Laboratory results for the sample collected at location TM-S1-05 exhibited arsenic and lead concentrations greater than RDCC, and concentrations of arsenic and lead were also greater than RDCC during XRF screening of the location where the sample was collected. It should be noted that there is a significant difference between arsenic and zinc results in this sample as determined by the different methods. Arsenic concentrations were measured as 9.8 mg/kg by laboratory analysis, and 72 mg/kg by XRF. Zinc concentrations were measured as 9,100 mg/kg by laboratory analysis, and 1,513 mg/kg by XRF.
- Laboratory and XRF screening results for location MasonB-6 identified concentrations of lead greater than RDCC. Concentrations of lead as determined by the laboratory were nearly twice as high (1,100 mg/kg) as that determined by XRF (553 mg/kg). Sample MasonB-6 was collected from coarse stamp sand/slag material that was heterogeneous in nature. This may explain the difference in the results of the two types of instrumentation.
- Laboratory results for the sample collected at location MasonB-10 indicated that all metal concentrations were less than RDCC. However, concentrations of arsenic and lead, as determined by XRF, exceeded RDCC.

PCBs were analyzed in seven samples collected at AOI 10: Mason XRF6, collected as screening location MasonB-6; Mason XRF10, collected at screening location MasonB-10; and samples MS S1-12, MS S1-13, TM S1-02, TM S1-05, and TM S2-02 collected at screening locations of the same names. PCBs were not detected in the samples collected at AOI 10.

3.6 AOI 18 – BUILDING IN MASON

3.6.1 Site Description

The Building in Mason, which was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts, constitutes a new AOI (**Figure 4a**). The former use of this building is unknown at this time; however, it is assumed that its use was related to mining-era operations. This property is located on the west side of highway M-26 in the town of Mason

near the Mason Sands. The property contains a dilapidated building, exposed foundation materials, debris, empty drums, and old potentially asbestos-wrapped piping.

3.6.2 Review of Existing Site Information

WESTON START did not identify any existing documents pertaining to AOI 18.

3.6.3 Summary of Field Activities

WESTON START personnel performed the AA of the Building in Mason on September 6, 2007. There was evidence of trespassing and vandalism. Approximately 50 feet of piping wrapped with potential ACM was located on the western interior of the building. Damaged pipe wrap was also present in piles on the floor along the western interior of the building. Roofing material expected to contain asbestos was observed on the second level of the building. No materials expected to contain elevated concentrations of metals were observed; therefore, no XRF screening was conducted.

3.6.4 Summary of XRF Results

No XRF screening was conducted at AOI 18 during the AA.

3.6.5 Summary of Laboratory Results

No laboratory samples were collected at AOI 18 during the AA.

3.7 AOI 19 – FORMER C&H LEACH PLANT AND HUBBELL STAMP SANDS

3.7.1 Site Description

AOI 19 includes the Former C&H Leach Plant and a shoreline area known as the Hubbell Stamp Sands (**Figure 5a**). The C&H Leach Plant is located in the area of the Burcar Construction yard. The U.S. EPA FIELDS and WESTON START teams were denied access to the C&H Leach Plant.

3.7.2 Review of Existing Site Information

The C&H Leach Plant, located in the area of the Burcar Construction yard, was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts, and constitutes a new AOI based on mining-era operations at the property.

Available site information included results of sampling performed on the property on August 9, 2007, by MDEQ. **Attachment D** contains a figure showing the approximate MDEQ sampling and screening locations, and a table summarizing the XRF and laboratory analytical results. The sampling and screening results indicated the presence of arsenic, copper, lead, antimony, and iron at concentrations greater than RDCC.

3.7.3 Summary of Field Activity

U.S. EPA FIELDS performed reconnaissance and XRF screening along the shoreline of the Hubbell Stamp Sands portion of AOI 19 on September 12, 2007.

3.7.4 Summary of XRF Results

U.S. EPA FIELDS screened 18 locations with the XRF unit (**Table 6**) and one sample was collected and submitted for verification via laboratory analysis (HUB-S1-13). Two locations that were screened with an XRF unit exhibited arsenic concentrations greater than RDCC (HUB-S1-08 and HUB-S1-10) (**Figure 5b**).

3.7.5 Summary of Laboratory Results

One of the 17 locations screened by XRF, HUB-S1-12, was also sampled for verification via laboratory analysis. As determined by laboratory analysis, no metals concentrations exceeded RDCC in this sample. These results are consistent with XRF screening results at the same location.

No PCBs were detected in sample HUB-S1-12.

3.8 AOI 20 – TAMARACK CITY STAMP MILL

3.8.1 Site Description

The Tamarack City Stamp Mill (AOI 20) is located in Tamarack City, Houghton County, Michigan. Specifically, the site is located in Section 13 of Osceola Township, Township 55 North and Range 33 West (**Figure 6**). AOI 20 is bounded by Highway M-26 to the north/northwest, a park to the west/southwest, Spruce Road to the south and east, Sixth Street to the northeast, and is surrounded by residential property. Torch Lake is located to the southeast and east of AOI 20.

The property, known previously as the Ahmeek Mining Company Stamp Mill, or Ahmeek Regrind, was used for the processing of copper-containing ores from approximately 1906 to 1968. The Ahmeek Mining Company installed eight steam-powered stamp units on top of large concrete foundations. The stamp units were used to extract copper ore from mine rock. Additionally, chemicals may have been used to assist with the process of separating the copper from the mine rock. It has also been reported and confirmed through aerial photography that waste material from the stamping process (stamp sand) was deposited into Torch Lake.

Remnants of the former copper stamping mill, including concrete foundations and structures, as well as stamp sand and demolition debris, remain at AOI 20. Due to the historical significance of copper mining in the Keweenaw Peninsula, and the area where AOI 20 is located, the Tamarack City Stamp Mill is considered an asset, and is targeted for historical preservation and potential use as an interpretive center for tourists.

The following hazards, related to the Tamarack City Stamp Mill, exist at the site:

- Historical demolition activities at AOI 20 have resulted in the deposition of building debris, including massive concrete structures, metal debris, and rubble on the former mill floor and surrounding grade;
- The abandoned nature of the facility has resulted in the disposal of household and solid wastes at various locations of the property; and
- Surface soil samples collected from the site identified several locations where chemical concentrations exceeded RDCC and Particulate Soil Inhalation Criteria (PSIC).

3.8.2 Review of Existing Site Information

The following information was gathered from reviewing U.S. EPA and MDEQ files related to the Tamarack City Stamp Mill:

- **2001 BEA:** Upper Peninsula Engineers and Architects (UPEA) conducted a BEA on behalf of Osceola Township in fall 2001. Samples collected during the BEA were analyzed for inorganic content and a combination of VOCs, SVOCs, polycyclic aromatic hydrocarbons (PAHs), and/or PCBs/pesticides. The BEA included five surficial soil samples, three of which were within the site boundaries. Two of the three on-site locations exceeded RDCC and/or PSIC.
- **2001 BFRA:** MDEQ conducted a BFRA that included collection of 25 surficial soil samples; 53 analyses by XRF; 10 soil borings; and six groundwater samples from temporary monitoring wells. Samples collected for laboratory analysis were analyzed for VOCs, SVOCs, inorganic parameters, and PCB/pesticides. Six of the surface soil sampling locations contained concentrations of arsenic, lead and/or benzo(a)pyrene that exceeded RDCC. No exceedances of either RDCC or PSIC were noted in the subsurface soil samples. Five of the 19 XRF readings collected for soils exceeded RDCC and/or PSIC. Many of the 44 XRF readings collected for site structures exceeded RDCC and/or PSIC. Samples collected from five of the six temporary monitoring wells exceeded Part 201 Groundwater/Surface Water Interface (GSI) and/or Residential and Commercial I Drinking Water criteria.
- **2005 WESTON Data Review:** WESTON conducted a review of the BEA and BFRA to evaluate the threats posed by conditions at the site (*Technical Memorandum – Tamarack City Stamp Mill Site Analytical Data Review and Evaluation*, WESTON, March 2005). Based on the data review, it was evident that surface soils and standing structures were the main media of concern at AOI 20. This determination was based on contaminant concentrations at the surface above RDCC and PSIC.
- **2005 Biddable Specifications Package:** WESTON prepared biddable specifications in 2005 on behalf of MDEQ to address the site hazards (*Project Manual Interim Response – Hazard Mitigation*, WESTON, August 2005). However, due to funding constraints, hazard mitigation measures have not been implemented.

Because sufficient information about AOI 20 was available in the MDEQ and U.S. EPA files, no additional AA field work was conducted at this AOI.

3.9 AOI 21 – HUBBELL BEACH AND SLAG DUMP

3.9.1 Site Description

There are two areas associated with AOI 21: Hubbell Beach and the Hubbell Slag Dump (**Figure 6**). The Hubbell Beach area, which is part of a Township Park that includes a boat launch, docks, and a playground, was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts. The area constitutes a new AOI based on MDEQ reports of industrial and household dumping on the lake bottom adjacent to the beach, and direct discharge of residential sewage from local homes via piping to the northeast lobe of the stamp sand beach. The Hubbell Slag Dump and surrounding area, located adjacent to the Hubbell Beach, was addressed during previous U.S. EPA remedial efforts via the placement of a vegetative cover.

3.9.2 Review of Existing Site Information

Hubbell Beach

The Hubbell Beach area was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts. WESTON START did not identify any existing information pertaining to the Hubbell Beach portion of AOI 21.

Hubbell Slag Dump

The Hubbell Slag Dump and surrounding area, located adjacent to the Hubbell Beach, was addressed during previous U.S. EPA remedial efforts via the placement of a vegetative cover as part of the Torch Lake NPL Site remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

Review of existing information also indicated that the U.S. DHHS completed a health consultation for Torch Lake (March 23, 1998) that concluded that the “Hubbell Slag area should

be further evaluated before any residential development is carried out there to determine the extent and appropriate treatment of the elevated lead and arsenic concentrations in the soil.”

3.9.3 Summary of Field Activities

WESTON START performed the AA at the Hubbell Beach and Slag Dump (AOI 21) on September 11, 2007. Black staining was present on the Hubbell Beach and WESTON START observed stamp sands migrating out from under the cap at the Hubbell Slag Dump. The black staining on the beach was approximately ten-feet in length, less than 1/5 inch in thickness, contained no odor, and appeared to be transitory in nature (washed up organic and/or broken up rock material).

3.9.4 Summary of XRF Results

Three locations on the shoreline were screened with an Innov-X 4000 XP/Auto XRF: the black staining on the beach, a pile of soil near the beach, and exposed stamp sands flowing out from under the cap at the former slag dump (HubbellB-2, HubbellB-3, and HubbellB-4, respectively) (**Figure 6**). No metals concentrations exceeded RDCC criteria (**Table 7**).

3.9.5 Summary of Laboratory Results

No laboratory analytical samples were collected at AOI 21.

3.10 AOI 22 – HUBBELL DOCKS, MINERAL BUILDING, AND C&H SMELTER

3.10.1 Site Description

There are three parcels associated with AOI 22: the Hubbell Dock, the Mineral Building, and the C&H Smelter (**Figure 7a**). Each parcel is described individually below.

Hubbell Dock

The Hubbell Dock property consists of approximately three to four acres of vacant land that contains surface debris such as scrap metal, wood, some fire brick, minor amounts of stamp sand, and coal pieces which are approximately one to two inches in diameter (NRCS, U.S. EPA, and MDEQ site inspections, 2002). The coal pieces comprise approximately 60% to 70% of the

on-site debris. The most prominent feature on the property is a massive, solid concrete retaining wall approximately 900 feet long and four feet thick running along the edge of Torch Lake. The concrete wall is speculated to be the remnant of a platform or building foundation that was intended for the unloading of coal from ships which were docked at a historical wooden dock built directly adjacent to the wall. All that remains of the dock are several wooden pilings protruding just above the surface of the water.

Mineral Building

The Mineral Building and associated property contains a dilapidated building, debris, empty drums, ash, newer construction-related debris, slag, and stamp sands. Railroad rails that run into the second story of the building were likely used for dumping loads into large concrete bins located inside.

C&H Smelter

The location of the former C&H Smelter is now an operating industrial facility and an AA was not undertaken at the site.

3.10.2 Review of Existing Site Information

There are three parcels associated with AOI 22 that were addressed during previous U.S. EPA remedial efforts: the Hubbell Dock, the Mineral Building, and the C&H Smelter. Each parcel is addressed individually below.

Hubbell Dock

Historically, the Hubbell Dock property was used for receiving coal from ships in the early part of the twentieth century. The coal was needed to generate power for area milling and smelting operations such as the C&H Smelter. In 1993, the Hubbell Dock property was purchased by Buchanen Forest Products, Inc., for use as a timber loading dock. In summer 1993, a large commercial vessel (approximately 500 feet long) entered Torch Lake and tied up alongside the former coal dock to take on a large load of timber for transport to Canada. This was the only attempt at timber shipping from the property by its current owner that U.S. EPA is aware of and

the owner does not anticipate any future attempts at shipping timber in a similar way because it proved to be cost prohibitive (conversation with Ken Buchanen, 2002).

The Hubbell Dock was previously evaluated by U.S. EPA and a No Action Alternative was selected. WESTON START reviewed a November 22, 2002, memorandum prepared by the U.S. EPA Remedial Project Manager that documented the No Action Alternative. In summary, the memorandum indicated that the Torch Lake NPL cleanup remedy primarily addresses the negative ecological effects on area water bodies as a result of more than a century of copper mining, milling, and smelting activities in the area. The most significant ecological effect is the degradation of the benthic community in area water bodies as a result of past and current metal and particulate-matter surface water loadings from mining wastes, including stamp sand, located on land along and near area water bodies. Benthic communities include lake-bottom dwelling organisms that are a very important part of a complex food web in lakes. The U.S. EPA cleanup decision for terrestrial portions of the site is documented in the September 30, 1992, U.S.EPA ROD.

From 1998 through 2000, during the design and construction phases of the Hubbell/Tamarack portion of the NPL project, NRCS and U.S. EPA evaluated the need for cover material at the Hubbell Dock property. At that time, the USDA-NRCS determined, and U.S. EPA concurred, that the concrete dock wall was highly stable and would be more than adequate to prevent wave erosion from affecting the land behind it. In addition, the NRCS did not observe any wind erosion and/or surface water erosion into Torch Lake from the coal dock property at that time.

However, in 2002, U.S. EPA and USDA-NRCS re-examined the need for cover material at the coal dock property. Additional site inspections were conducted on July 24, 2002, by USDA-NRCS personnel, and on October 8, 2002, by USDA-NRCS, U.S. EPA, and MDEQ personnel. Results of these site inspections include:

- July 2002 Site Inspection – USDA-NRCS noted the general composition and relatively large size of surface debris on site, including coal, and concluded that the surface debris would not likely be subject to wind erosion. In addition, USDA-NRCS advanced soil borings through the debris throughout the site and observed native soil within six to ten inches of the ground surface. However, USDA-NRCS also noted surface runoff channels on site that could potentially carry contamination into Torch Lake.

- October 2002 Site Inspection – USDA-NRCS, U.S. EPA, and MDEQ evaluated the surface runoff channels more carefully and concluded that surface water runoff from the property did not enter Torch Lake. In addition, the agencies confirmed the presence of only a thin layer of surface debris, composed mainly of coal pieces and only minor amounts of stamp sand. MDEQ collected and analyzed two soil samples from the coal dock property during the inspection, and results indicated that no significant contamination was present in site surface soils. Based on the observations and sampling results, the agencies concluded that the volume of waste material present in site surface soils is not significant enough to be a considerable contaminant source to Torch Lake.

Based on the information above, U.S. EPA concluded that the potential for the Hubbell Dock property to contribute to the degradation of the benthic community in Torch Lake was not high enough to justify taking a Superfund remedial action at the property consistent with the 1992 ROD. In addition, given the limited volume of waste material on the coal dock property and the fact that no significant contamination was detected in the two soil samples collected by MDEQ, U.S. EPA decided not to pursue institutional controls on the property.

Mineral Building

Soil contamination at the Mineral Building and surrounding area was addressed during previous U.S. EPA remedial efforts via the placement of a vegetative cover along the shoreline portion of the property as part of the Torch Lake NPL Site remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

During the remedial action, the land surface of the property between the Mineral Building and U.S. EPA-covered shoreline area was not covered. Based on a September 2007 telephone conversation between WESTON START and representatives for the current property owner, the rationale for not covering this area could not be ascertained. Review of existing information also indicated that the current property owner completed and submitted a Category S BEA to MDEQ in May 2000. No significant findings were documented in the partial copy of the BEA that was available for review.

C&H Smelter

The C&H Smelter and surrounding area was addressed during previous U.S. EPA remedial efforts via the placement of a vegetative cover along the shoreline portion of the property as part of the Torch Lake NPL Site remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

The remainder of this area is currently an operating industrial facility. WESTON START did not identify any existing information pertaining to the unremediated portion of AOI 22.

3.10.3 Summary of Field Activities

Hubbell Dock

The Hubbell Dock area was not accessed during the AA.

Mineral Building

WESTON START performed the AA at the Mineral Building on September 7, 2007. The AA was limited to select areas of the interior of the building, as the first story of the building was locked and the majority of the second story was unsafe to traverse. The concrete bins observed inside the building were stained green and blue on their interior walls. Similar discoloration had been observed on copper- and lead-based material previously screened during the AA.

Stained and potentially contaminated materials that were present in the building included light-colored soil, red-stained stamp sands, gray stamp sands, gray slag, white powder, brown-stained soil, ash, and yellow-stained soil. The red-stained stamp sand area was located near a small concrete vault east of the building. Other features that were documented during the AA include:

- Poor site security;

- Empty drums;
- Potential roofing ACM scattered on the property in a 100-foot radius of the building in all directions;
- Numerous debris piles;
- Evidence of household-waste dumping;
- Building paint that is likely lead-based;
- A concrete vault on the east side of the building that contains water and metal debris or a drum;
- A pipe exiting the south side of the building that is wrapped with insulation that may be ACM, and additional wrapped piping in the first story of the building that may be ACM;
- A small, red sandstone building located east of the Mineral Building that had one open door and a pile of white powder inside (MineralB-9, exceeds RDCC for arsenic) and white ceiling tiles and brackets;
- A large drainage ditch discharging to Torch Lake;
- Three large-diameter pipes (approximately 12-inches) at the shoreline that appear to be discharging from the Mineral Building;
- Piles of railroad tiles near the shoreline; and
- A large pile of green brick just south of the property boundary.

C&H Smelter

Access was not obtained and no AA took place at the former C&H Smelter as it is now an operating industrial facility.

3.10.4 Summary of XRF Results

Hubbell Dock

No XRF screening was conducted at the Hubbell Dock.

Mineral Building

Ten locations inside the building were screened with an Innov-X 4000 XP/Auto XRF (**Table 8**). Eight locations exhibited metal concentrations greater than RDCC (**Figure 7b**). Metal exceedances included iron, copper, arsenic, antimony, and lead. Screening locations MineralB-5, MineralB-6, and Mineral B-7 were located in red-stained stamp sand near a small concrete

vault east of the Mineral Building. This area, estimated to be 163 square feet, contained numerous metals above RDCC. Screening location MineralB-11 was ash-like in nature, and concentrations of copper, arsenic, and lead exceeded RDCC. Screening location MineralB-9, located inside the small, red sandstone building east of the Mineral Building, contained a pile of white powder with a concentration of arsenic greater than RDCC.

C&H Smelter

No XRF screening was conducted at the former C&H Smelter property.

3.10.5 Summary of Laboratory Results

Mineral Building

Samples were collected for laboratory analysis at two of the ten locations screened by XRF (MineralB-6 and MineralB-11):

- As determined by the laboratory, soil at location MineralB-6 contained copper, arsenic, and lead at concentrations greater than RDCC. These were the same metals that exhibited concentrations greater than RDCC during XRF screening in the field. However, the concentration of iron also exceeded RDCC during XRF screening.
- As determined by the laboratory, soil at location MineralB-11 contained arsenic concentrations greater than RDCC. However, XRF screening indicated that concentrations of arsenic, copper, and lead exceeded RDCC. Concentrations of metals were lower in the laboratory results than the XRF screening results, however at the same order of magnitude. The different results may be due to inaccuracies associated with the capabilities of the XRF screening method for samples containing many metals or the heterogeneous nature of many of the samples collected during the AA.

PCBs were analyzed in two samples from AOI 22: Mineral XRF6, collected from screening location MineralB-6; and Mineral XRF11, collected from screening location MineralB-11. All results were less than RDCC.

3.11 AOI 12 – LAKE LINDEN SANDS

3.11.1 Site Description

The Lake Linden Sands AOI (AOI 12) is comprised of the Lake Linden Recreation Park (LLRP) and the Houghton County Historical Museum, in Lake Linden, Houghton County, Michigan

(Figure 8a). The LLRP is a publicly owned recreational area located at the north end of Torch Lake at M-26, in a delisted portion of the Torch lake NPL Site. The LLRP and the Houghton County Historical Museum encompass the former locations of the Lake Linden Reclamation Plant, the Lake Linden Leach Plant, the Calumet Stamp Mill, and the Municipal Dump.

The Former Calumet Stamp Mill is now the Houghton County Historic Museum. A portion of the site has been redeveloped to incorporate historic buildings and equipment into the museum. The portion of the property not modified contains exposed foundation materials from the Former Calumet Stamp Mill facility, debris, empty drums, slag, coal, piles of railroad tiles, and exposed stamp sands.

The entire Lake Linden Sands AOI is associated with historic mine waste in the form of stamp sands and mining-era industrial waste. As part of the Torch Lake NPL Site remedy, stamp sands were capped along the entire Torch Lake shoreline up to the water's edge. The low lake levels experienced in the area during 2007 (lake levels are down one to two feet) have exposed stamp sands and other potential waste material that were previously submerged.

3.11.2 Review of Existing Site Information

MDEQ and U.S. EPA visited the Lake Linden Sands site during the week of June 18, 2007 as part of the Five Year Review Inspection and Site Visit. While on site, they observed and subsequently sampled clayey material located on the shoreline in the LLRP. Analytical results indicated the following contaminants were present in the sample:

- PCBs – 12 mg/kg;
- TAL metals –antimony (600 mg/kg), arsenic (45 mg/kg), barium (120,000 mg/kg), copper (81,000 mg/kg), and lead (78,000 mg/kg). Concentrations of these metals exceeded RDCC. Concentrations of barium, cadmium, chromium, lead, and selenium were high enough that MDEQ suspected the material sampled may be considered a hazardous waste under 40 CFR 261.24.

MDEQ presented a report of analytical data to U.S. EPA documenting recognized environmental concerns at the site on July 25, 2007.

U.S. EPA tasked WESTON under the START Contract to mobilize to the site on July 25, 2007, to investigate the concerns presented by MDEQ. On July 26, 2007, WESTON START collected

two samples of the white, clayey substance located west of the LLRP swimming beach to confirm the findings of the MDEQ investigation. On July 30 and 31, 2007, WESTON START set up a 100-foot by 100-foot sampling grid along the shoreline at the LLRP and collected soil samples within each grid. More than 70 soil samples were collected. Two water samples, one surface water sample from a tributary to Torch Lake and one groundwater sample on the beach, were also collected on July 26, 2007. Analytical results are summarized in **Attachment E**.

During reconnaissance, an additional area along the shoreline beyond the lead-contaminated area discovered by MDEQ, was delineated. This area, designated the arsenic area, was a discolored area approximately 250 feet north of the marina near the shoreline. Two additional samples were collected at 0-3 inches below ground surface (bgs) and 18 inches bgs at this location. The concentration of arsenic in the surface sample was 65 mg/kg and in the subsurface sample was less than the detection limit.

On August 5, 2007, U.S. EPA tasked WESTON under the START Contract to mobilize to the site to perform oversight during the U.S. EPA removal of soil at both the lead- and arsenic-contaminated areas (**Attachment E**). Approximately 1,000 cubic yards (CY) of soil were excavated from the lead-contaminated area and 10 CY from the arsenic-contaminated area.

On August 7, 2007, as part of the removal action, WESTON START utilized the U.S. EPA research vessel Mudpuppy to collect eight sediment samples from the bottom of Torch Lake near the deposit of “clayey” material sampled earlier. Sampling locations and results are presented in **Attachment E**.

3.11.3 Summary of Field Activities

WESTON START performed reconnaissance and XRF screening activities at the Former Calumet Stamp Mill portion of AOI 12 on September 10, 2007. U.S. EPA FIELDS performed reconnaissance and XRF screening of exposed stamp sands along the northern portions of Torch Lake within AOI 12 on September 12, 2007 in areas not assessed during the U.S. EPA emergency response action.

3.11.4 Summary of XRF Results

U.S. EPA FIELDS screened six locations of exposed stamp sands along the northern portions of the Lake Linden Sands with an Innov-X 4000 XP/Auto XRF (LL-2-1 through LL-2-6). None of the locations contained metals concentrations greater than RDCC (**Table 9**).

WESTON START screened four locations at the Former Calumet Stamp Mill with an Innov-X 4000 XP/Auto XRF. Screening locations included stamp sands (CalumetB-15), black-stained soil (CalumetB-16), and a coal pile (CalumetB-17). The black-stained soil exhibited lead concentrations greater than RDCC (**Table 9**). **Figure 8a** shows the area of black-stained soil, and a sample of the material was submitted to the laboratory for confirmation analysis.

3.11.5 Summary of Laboratory Results

A sample was collected for laboratory analysis of metals at one of the four locations screened with an XRF by WESTON START during the AA (CalumetB-16). Laboratory results indicated that concentrations of arsenic and lead in the sample were greater than RDCC. Only the concentration of lead exceeded RDCC during XRF screening. Both lead and arsenic concentrations were significantly greater as a result of laboratory analysis than XRF screening. Again, this is likely due to the variation between the analytical methods and the heterogeneous nature of the soils in the area.

PCBs were analyzed in one sample from AOI 12; CalumetXRF-16, from screening location CalumetB-16. All results were non-detect.

3.12 AOI 23 – C&H POWER PLANT

3.12.1 Site Description

The C&H Power Plant AOI, also known as the Former Calumet & Hecla Power Plant, is a 14-acre property that contains a dilapidated power plant building (C&H Power Plant), exposed foundation materials (Former Hecla Stamp Mill), debris, empty drums, ASTs, slag, and exposed stamp sands (**Figure 8a**). The property was part of a large copper ore processing facility that was in operation for more than a century.

3.12.2 Review of Existing Site Information

In 1999, Coleman Engineering Company (Coleman) performed a Phase I Environmental Assessment (Phase I) at the C&H Power Plant AOI. The Phase I investigation provided the following information about the property:

- Coal ash identified in a pile south and east of the site building (extent not defined) exceeded the MDEQ Default Type A Clean-up Criteria for metals;
- Drums were identified on site – Coleman recommended that drum contents be identified and disposed of properly;
- Refractory bricks were identified on site – all brick was considered a hazard as it may contain high levels of metals;
- PCB-laden switches, cranes, and other electrical switching devices were likely to be present on site;
- Coleman recommended sampling around the Still House and Filter House to rule out the presence of hazardous substances, including flotation and leaching process chemicals, and boiler treatment chemicals;
- Evidence of several excavations of unknown origin was identified around the power plant. Coleman suggested that waste material may have been dumped in these areas and recommended further investigation;
- The basement of a site building was flooded and considered hazardous – Coleman recommended pumping, sampling, and disposal of water in the basement;
- Coleman recommended further investigation and sampling of waste and debris piles;
- Coleman suggested that bags of copper concentrate may be releasing contents to the environment and warrant further investigation;
- Historic data indicated that a spill of 27,000 gallons of cupric ammonium carbonate was discharged to Torch Lake in 1972;
- Residual coal was identified in a coal silo on site; and
- The condemned site building was identified as “Dangerous and Unsafe” and Coleman recommended that the building be razed and the debris properly disposed.

In 1999, Coleman also performed a Phase II Environmental Assessment (Phase II) at the site. The main focus of the Phase II was to sample the ash pile found south and east of the C&H Power Plant. Concentrations of arsenic, barium, chromium, copper, lead, selenium, silver, and zinc exceeded MDEQ Default Type A Clean-up Criteria (statewide default background criteria).

On August 8 and August 10, 2007, MDEQ collected a total of two samples of sediment at the C&H Power Plant. One sample was analyzed for metals and base-neutral acids (BNA), the other for PCBs. No results exceeded RDCC.

3.12.3 Summary of Field Activities

WESTON START performed reconnaissance and XRF screening activities at the C&H Power Plant AOI on September 5, 2007. The owner of the property was present during the AA within the building and provided information to WESTON START personnel regarding the site. The property owner stated that all ACM was removed from the building with the exception of the roofing material. In addition, the property owner stated that the transformers located on the west side of building had been removed and soil sampling verification occurred following their removal. The owner refused to allow sample collection during the AA, but did permit real-time screening with the XRF unit.

Other features that were documented inside the C&H Power Plant building during the AA include:

- Roofing ACM;
- Suspect lead-based paint;
- Light ballasts that likely contain PCBs and mercury;
- Piles of coal;
- Piles of debris;
- A large piece of equipment on the eastern side of the building that contains an oil gauge and possibly oil;
- A drum containing tar-like material located in the south-central portion of the building; and
- Three additional drums in the flooded basement where an obvious sheen was located; one drum was submerged and the other two drums appeared to be floating.

Additional site reconnaissance at the C&H Power Plant provided the following information:

- A storm drain runs along the east side of the property along M-26;
- A former transformer pad is located on the east side of the building;
- An AST is located south of the building (more recent origin, gauge showed empty);
- There is evidence of trespassing and vandalism on site;

- There is evidence of household-waste dumping on site;
- There is evidence of recreational use near the shoreline;
- Exposed stamp sands are present along the southern edge of the property;
- The majority of the shoreline is lined with rock/brick debris and rip-rap;
- “No Trespassing” and “Keep Out” signs are posted on the northern shoreline and amongst building ruins along the shoreline; however, a walking trail is also present;
- Nearby buried utilities had recently been flagged perpendicular to M-26 between M-26 and the south side of the Mineral Building (AOI 22);
- A three-inch polyvinyl chloride (PVC) stick-up pipe was identified at the southeast of the site building; and
- There are recreational areas located north and south of the site boundaries along the shoreline, including at a residence south of the site.

3.12.4 Summary of XRF Results

WESTON START screened 13 locations with an Innov-X 4000 XP/Auto XRF (**Table 10**). Seven locations had concentrations of the following metals greater than RDCC (**Figure 8b**):

- Lead (locations C&H-XRF5, C&H-XRF7, and C&H-XRF13);
- Arsenic (locations C&H-XRF3 and C&H-XRF11);
- Copper (locations C&H-XRF7, C&H-XRF12, and C&H-XRF13); and
- Iron (location C&H-XRF6).

XRF screening at locations C&H-XRF7 and C&H-XRF12 was conducted inside bags labeled “Copper Concentrate”. Screening location C&H-XRF7 was part of a pile of bags approximately 30 feet long by 10 feet wide and location C&H-XRF12 was within a pile of bags located on a pallet (four feet by eight feet) along the shoreline.

3.12.5 Summary of Laboratory Results

No laboratory analytical samples were collected at this AOI.

3.13 AOI 24 – BACKWATER AREA OF TORCH LAKE

3.13.1 Site Description

The Backwater Area of Torch Lake is a newly identified AOI and includes the surface water and exposed stamp sands along the western, northern, and eastern shoreline areas that were not part

of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts (**Figure 9a**).

3.13.2 Review of Existing Site Information

The southern shoreline of the Backwater Area of Torch Lake was remediated by U.S. EPA via the placement of a vegetative cover as part of the Torch Lake NPL Site remedy. The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

WESTON START did not identify any existing information pertaining to the unremediated areas.

3.13.3 Summary of Field Activities

U.S. EPA FIELDS performed reconnaissance and XRF screening of exposed stamp sands along the northern portions of Torch Lake on September 12, 2007 (**Figure 9b**).

3.13.4 Summary of XRF Results

U.S. EPA FIELDS screened four locations along the northern portions of Torch Lake with an Innov-X 4000 XP/Auto XRF (**Table 11**). One screening location, LL-2-8, exhibited arsenic concentrations in soil greater than RDCC (**Figure 9b**).

3.13.5 Summary of Laboratory Results

A sample was collected for laboratory analysis at one of the four locations screened by U.S. EPA FIELDS (LL-S2-8). As determined by laboratory analysis, all metal concentrations in the sample were below RDCC. However, XRF screening results indicated that the sample contained arsenic at a concentration greater than RDCC (9 mg/kg). Laboratory analysis indicated the sample contained 1.1 mg/kg arsenic.

PCB concentrations in sample Lake Linden S2-8, collected at screening location LL-S2-8, were non-detect.

3.14 AOI 25 – TRAPROCK SLAG DUMP

3.14.1 Site Description

The Traprock Slag Dump is a new AOI and includes open areas with slag boulders and an area, reportedly, previously used for transformer disposal. These areas were not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts (**Figure 9a**).

3.14.2 Review of Existing Site Information

A review of MDEQ file information indicated that on June 23, 2003, the U.S. Army Corps of Engineers (USACE) and the MDEQ RRD conducted a site inspection on the subject property and concluded that “clinker material” containing concentrations of contaminants exceeding Part 201 GRCC for soil was being spread over large portions of the property. Reportedly, the waste was being excavated from the south side of the site, broken up (subsequently increasing its surface area and potential leachability) and spread over an approximately three-acre portion of the site. This waste material was observed in the surface water, wetland, and floodplain portions of the site, as well as other off-site properties. In addition to the waste material on site, inspectors observed that demolition debris had been burned on site and a new pile of debris was being built-up for what appeared to be another burn. The MDEQ RRD staff also noted the presence of numerous five-gallon buckets and drums filled with what appeared to be waste oil. One bucket did not have a lid and had filled with water causing the contents to spill onto the ground. Petroleum stains were present on the ground surface.

3.14.3 Summary of Field Activities

WESTON START personnel performed the AA at the Traprock Slag Dump AOI on September 11, 2007. This AOI includes open areas with slag boulders, slag piles, woody debris, cinders, a former municipal dump, unknown green/blue salt, and stamp sands.

3.14.4 Summary of XRF Results

WESTON START screened 10 locations with an Innov-X 4000 XP/Auto XRF (**Table 12**). One location, TraprockB-10, a stamp sand area, contained arsenic concentrations greater than RDCC (**Figure 9b**). No other metals were detected at concentrations greater than RDCC. WESTON START presented a green/blue, crystalline sand sample, TraprockB-14, to MDEQ for further analysis per the U.S. EPA OSC's request.

3.14.5 Summary of Laboratory Results

Samples were collected and submitted for laboratory analytical verification from two of the 10 XRF screening locations, TraprockB-10 and TraprockB-8. Neither sample submitted for laboratory analysis exhibited metal concentrations greater than RDCC. These results are consistent with the XRF screening results for the same locations.

Samples were collected for PCB analysis at AOI 25 screening locations TraprockB-8 and TraprockB-12. All results were non-detect.

3.15 AOI 26 – BOOTJACK STAMP SANDS

3.15.1 Site Description

According to MDEQ, re-handling of stamp sand in the Lake Linden area resulted in a large accumulation of stamp sand deposits at the head of Torch Lake (**Figure 9a**). This area was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts and constitutes a new AOI based on the presence of stamp sand.

3.15.2 Review of Existing Site Information

WESTON START did not identify any existing information pertaining to AOI 26.

3.15.3 Summary of Field Activities

WESTON START personnel performed the AA at AOI 26 on September 11, 2007. The site was comprised of wooded and grassy areas and lesser areas with exposed stamp sands. No large piles or accumulations of stamp sands were observed.

3.15.4 Summary of XRF Results

WESTON START screened two locations with an Innov-X 4000 XP/Auto XRF (**Table 13**). No metals were detected at concentrations greater than RDCC.

3.15.5 Summary of Laboratory Results

A sample was collected and submitted for laboratory verification analysis from one location, BootjackB-17. This sample was not screened with an XRF because it was raining heavily during the AA. No metals concentrations were detected greater than RDCC at BootjackB-17.

A sample was also collected for PCB analysis at location BootjackB-17. All results were non-detect.

3.16 AOI 14 – GAY STAMP SANDS

3.16.1 Site Description

Copper mining activities conducted between 1890 and 1920 in the Village of Gay, Keweenaw County, Michigan resulted in the generation of approximately 37.3 million CY (mcy) of stamp sand that was placed in or along Lake Superior near the Village of Gay. A byproduct of copper extraction, stamp sand contains heavy metals at concentrations that may pose a risk to aquatic organisms. Herein, the definition of the Gay Stamp Sands site (AOI 14) includes the following features (**Figure 10a**):

- The original stamp sand deposit (original deposit) located near the former Village of Gay, Michigan copper stamping mill (former Gay mill); and
- Approximately 5.3 miles of shoreline that begins at the original deposit and continues southerly to the Traverse River harbor breakwall. This stretch of shoreline has been covered by stamp sand due to migration from the original deposit.

It is estimated that the original deposit is receding at a rate of 8.0 meters per year (26.0 feet per year).

Currently, widespread reuse for road traction, as well as recreational and construction use of the stamp sand occurs throughout the Keweenaw Peninsula. It is also expected that the migrating stamp sand will eventually bypass the Traverse River harbor and deposit on the currently

unaffected beach south of the breakwall. Beneficial use impairments may include degradation of fish and wildlife habitat, degradation of the benthos, and degradation of aesthetics.

This area was not part of the Torch Lake NPL Site and therefore not part of previous U.S. EPA remedial efforts and constitutes a new AOI based on the presence of stamp sand.

3.16.2 Review of Existing Site Information

As of 2007, several studies were conducted for the Gay Stamp Sands by MDEQ and USACE:

- **2001 USACE Quantification and Fate Study:** In this study, the location and quantity of stamp sand was determined at three sites including the Gay Stamp Sands Site. An analysis of current and historic aerial photography in conjunction with an analysis of bathymetric data was performed to determine the aerial extent of stamp sand migration. The volume of stamp sand in the littoral system and the rate at which the stockpiles erode was determined using similar methods. Lastly, several mitigation alternatives at each study area were presented with the purpose of preventing further movement of the stamp sands. These alternatives included structural solutions such as stone revetments, steel sheet-pile bulkheads and groins, and non-structural approaches such as dredging, capping, and bioengineering as summarized in the *Quantification and Fate of Keweenaw Stamp Sand* (USACE, Detroit District, December 2001).
- **September 2003 MDEQ RRD Pre-remedial Unit of the Superfund Section and the RRD Geological Services Unit (GSU):** MDEQ collected 274 soil samples from the northern deposit area and 24 soil samples from the southern deposit area at the Gay Stamp Sands site. MDEQ also collected 10 groundwater samples from the northern deposit area for analysis of both dissolved and total metals to evaluate the effects of stamp sand on surface water. MDEQ compared the soil and groundwater sampling results to Part 201 criteria and provided a summary in *MDEQ Interoffice Communication* (MDEQ, May 2004). According to MDEQ Interoffice Communication, none of the samples collected from the southern area exceeded the RDCC for any of the metals. One sample out of 274 samples collected from the northern area exceeded RDCC for arsenic. One out of 274 samples collected from the northern area exceeded the generic Commercial/Industrial PSIC for manganese. MDEQ also compared groundwater sampling results for dissolved metals to Part 201 Residential/Commercial I Drinking Water Criteria. Aluminum and manganese were detected above Residential/Commercial I Drinking Water Criteria in several of the samples.
- **2004-2006 WESTON Toxicological Evaluation:** WESTON prepared a Toxicological Evaluation for the Gay stamp sands in response to a request from the MDEQ RRD in 2004 (*Toxicological Evaluation for the Gay, Michigan Stamp Sand* [WESTON, September 2006]). The purpose of the Toxicological Evaluation was to evaluate the potential for exposure to stamp sand contaminants in reuse scenarios, including road traction, recreational, and construction uses. WESTON assessed the effects on human health and aquatic systems in each scenario. The results of the Toxicological Evaluation

indicated the stamp sand re-use scenarios posed acceptable risks to human health, with the exception of consumption of groundwater that has contact with stamp sand. However, WESTON determined that the Gay stamp sands posed an unacceptable risk to aquatic organisms based on the bioassay testing as summarized in the Toxicological Evaluation.

- **2004 MDEQ Geophysical Survey:** MDEQ RRD GSU conducted a geophysical survey to assess the depth and quantity of stamp sand extending from the Traverse River breakwall to approximately 4,500 feet north of the breakwall along the Lake Superior Shoreline. Results are summarized in the *Geophysical Investigation Migrating Stamp Sand* (MDEQ January 2005).
- **2004-2007 WESTON Technical Evaluation (TE):** WESTON conducted a TE in response to a request from the MDEQ RRD in 2004 (*Migrating Stamp Sand Mitigation Plan, Technical Evaluation* [WESTON, March 2007]). The purpose of the TE was to build on the previous migration mitigation study conducted by USACE and develop alternatives to preclude further erosion of the original stamp sand deposit, and ensure the unaffected, clean beach south of the Traverse River harbor breakwall is not contaminated by the southward migration of eroded stamp sand. The TE included the review of existing data; completion of hydrographic and limited topographic surveys; development of alternatives; hydrodynamic modeling analysis; and evaluation of alternatives. The recommended alternative to carry over into final design was the least-cost alternative, which included construction of a revetment at the original deposit and implementation of maintenance dredging.

3.16.3 Summary of Field Activities

WESTON START performed reconnaissance and XRF screening in the historic mining process building ruins at AOI 14 on September 10, 2007. The building ruins contained exposed foundation materials, debris, slag and exposed stamp sands. U.S. EPA FIELDS performed reconnaissance and XRF screening along the shoreline at AOI 14 on September 10, 2007.

Other features that were documented at AOI 14 during the AA include:

- Poor site security;
- Potential roofing ACM present in stockpiles on site; the largest pile is 20 feet by 20 feet by 4 feet;
- Residue from an unknown burned material;
- Evidence of household-waste and other non-mining-related dumping at the site; and
- A structurally compromised chimney stack that may pose a physical hazard.

3.16.4 Summary of XRF Results

WESTON START screened 15 locations in the historic mining process building with an Innov-X 4000 XP/Auto XRF (**Table 14**) and collected three samples for verification via laboratory analysis. All 15 XRF screening locations contained stained material suspected of containing metals. Seven of the 15 screening locations exhibited concentrations of metals greater than RDCC (**Figure 10b**); including seven exceedances for arsenic, four exceedances for copper, two exceedances for silver, one exceedance for lead, and four exceedances for iron. Material exhibiting metal concentrations greater than RDCC included green-stained sands (locations GayB-5, GayB-6, and GayB-11), black-stained soils (locations GayB-8, GayB-14, and GayB-15), and stamp sand (location GayB-12).

U.S. EPA FIELDS screened 38 locations along the shoreline at AOI 14 with an Innov-X 4000 XP/Auto XRF (**Table 14**) and collected one sample for verification via laboratory analysis. No obviously contaminated or stained material was observed during site reconnaissance and screening of stamp sands along the shoreline. Thus, the U.S. EPA FIELDS team screened the stamp sands every one quarter mile along the Gay Stamp Sands shoreline deposit. Three of the 38 samples screened along the shoreline exhibited concentrations of arsenic greater than RDCC (**Figure 10c**) (locations GAY-S1-07, GAY-S1-21, and GAY-S1-30).

3.16.5 Summary of Laboratory Results

Three of the 15 WESTON START historic mining building XRF screening locations were verified via laboratory analysis (GayB-6, GayB-11 and GayB-14):

- Laboratory results for the sample collected at location GayB-6 indicated the sample contained copper and arsenic at concentrations greater than RDCC. XRF screening of this location exhibited copper, arsenic, and silver concentrations greater than RDCC. The silver concentration at location GayB-6 determined during XRF screening was approximately ten times greater than the laboratory analytical result.
- Laboratory results for the sample collected at location GayB-11 indicated the sample contained copper and arsenic at concentrations greater than RDCC. XRF screening of the soil yielded similar results.

- Laboratory results for the sample collected at location GayB-14 indicated the sample contained concentrations of arsenic and lead greater than RDCC. XRF screening of the soil yielded similar results.

WESTON START also collected samples for PCB analysis at locations GayB-6, GayB-11, and GayB-14. All results were non-detect.

One of the 38 locations screened with an XRF along the shoreline by the U.S. EPA FIELDS team was verified via laboratory analysis (GAY-S1-21). Laboratory results indicated that no metals were present in the sample at concentrations that exceeded RDCC. According to results of XRF screening at location Gay-S1-21, arsenic concentrations exceeded RDCC. The concentration of arsenic as determined by XRF screening was 9 mg/kg, and as determined by laboratory analysis was 0.67 mg/kg.

The U.S. EPA FIELDS team also collected a sample for PCB analysis at location Gay-S1-21. All results were non-detect.

3.17 WESTERN SHORELINE OF TORCH LAKE

3.17.1 Site Description

Multiple areas along the western shoreline of Torch Lake are composed of stamp sand deposits. Historically, these stamp sand deposits have been present as sediments on the lake bottom. Currently, they are present as beach sand due to lake level regression.

3.17.2 Review of Existing Site Information

The planned U.S. EPA remedial activities are summarized in the Torch Lake NPL Site ROD, and a summary of the completed Torch Lake remedial action is provided in the *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan* (U.S. EPA, 2005). A comprehensive Remedial Action Completion Report is being compiled by the U.S. EPA Remedial Program at this time. Therefore, the extent of remediation of these mining-waste deposits via the placement of the vegetative cover is not restated here.

Data collected by the Superfund Section of the MDEQ RRD during 2004 show concentrations of metals above RDCC in submerged sediments.

3.17.3 Summary of Field Activities

All field activity summaries for the sites along the western shoreline of Torch Lake, including XRF and laboratory results and visual observations, are included in the AOI discussions in Sections 3.1 through 3.16.

3.18 AOI 27 – DRUMS ON LAKE BOTTOM

3.18.1 Site Description

Drums have been observed on the bottom of Torch Lake and on land at multiple locations, and drum pieces have been observed at various shore locations. It has been long suspected that the drums are associated with historical copper mining operations surrounding Torch Lake.

3.18.2 Review of Existing Site Information

From 1989 through 1991, U.S. EPA conducted underwater and on-shore investigations to evaluate the quantity and contents of drums encountered within Operable Unit 1 (western shoreline of Torch Lake) of the Torch Lake NPL Site. The investigations targeted four areas as follows:

- Area 1 – Former C&H Smelter south of Lake Linden near the Hubbell Docks
- Area 2 – Former Ahmeek Mill Site (Tamarack City Stamp Mill Site)
- Area 3 - Southwest end of the Hubbell Stamp Sands in Tamarack City
- Area 4 – Former Quincy Mill near the Mason Stamp Sands

The U.S. EPA investigations consisted of geophysical surveys, remote-operated vehicle (ROV) surveys, underwater dives, and drum sampling of both underwater and on-shore drums. Results of the drum sampling events indicated drum contents ranged from F listed hazardous waste (for on-shore drums) to smelter slag that was determined to be non-hazardous. A letter dated July 25, 1990 from U.S. EPA to the Michigan Department of Health indicated sample results from underwater drums identified a number of tentatively identified compounds (TICs), but no

specific chemicals of concern could be confirmed. Further, the letter indicated that underwater drums that were filmed appeared to have been breached and therefore flooded.

Subsequent to the U.S. EPA investigations, the U.S. EPA issued an Administrative Order on Consent to a Respondent Group to perform specific drum search, removal, and disposal activities for drums located along the western shoreline of Torch Lake in the four previously identified target areas (Areas 1 through 4) as summarized in the *Final Drum Removal Report, Torch Lake Drum Removal* (Geraghty & Miller, March 1992). In summer 1991, the Respondent Group conducted a side sound navigation and ranging (SONAR) scan (SSS) of the five mile reach of the western shoreline of Torch Lake between Lake Linden and the former Quincy Mining Property near the Mason Stamp Sands. The SSS indicated Areas 1 and 4 should be targeted for an ROV survey. The subsequent ROV survey conducted by the Respondent Group indicated many underwater drums were encountered in Area 1 but no drums were encountered in Area 4. Further, the ROV survey indicated many of the drums encountered in Area 1 were empty or contained inert materials such as slag or wood.

The Respondent Group conducted underwater dives to confirm the contents of drums as encountered previously during the ROV survey. The underwater dives confirmed 808 empty drums and 20 drums containing unknown contents in and near Area 1. Empty drums and those deemed to contain inert material such as sediment or slag were left in place.

The effort of the Respondent Group resulted in the following:

- Removal, overpacking, and disposal of 83 drums from on-land locations;
- Removal, overpacking, and disposal of 20 submerged drums from two shallow locations; and
- Out of the 103 drums removed, 97 contained non-hazardous waste, four contained characteristically hazardous waste, and two contained F-listed waste.

In June 2007, MDEQ conducted a SSS of the lake bottom in the vicinity of the Hubbell Docks (vicinity of previous Area 1) and areas to the northeast in Torch Lake. The purpose of this work was to provide the specific locations of the areas of drum disposal on the lake bottom to assist the MDEQ Water Bureau (WB) in collecting sediment samples from these areas; and therefore potentially identify a source of PCB contamination in Torch Lake.

While many drums and drum areas were identified during the 2007 MDEQ SSS, many of the identified drums may have been previously investigated and deemed empty or contents inert during the 1991 Respondent Group investigation. Specifically, the 1991 Respondent Group investigation identified 742 empty drums (left in place) in the vicinity of the Hubbell Docks where much of the MDEQ SSS focused.

The Superfund Section of the MDEQ RRD is in the process of preparing a summary report for the June 2007 SSS. MDEQ WB is in the process of preparing a summary report for the sediment sampling conducted in the drum disposal areas.

SECTION 4 FINDINGS AND RECOMMENDATIONS

As previously discussed, the purpose of the Torch Lake AA was to determine if imminent and substantial threats existed and to make recommendations on further assessment. A comprehensive assessment of all environmental hazards known to affect historical industrial properties and structures was not within the scope of the AA. Furthermore, it should be noted that many of the potential environmental issues have been evaluated previously by the MDEQ and the U.S. EPA Remedial Branch.

The following are the recommendations by AOI:

AOI 7 - Quincy Smelter

Previous investigations have shown that hazards exist inside the fenceline at the Quincy Smelter in the form of dilapidated, unstable structures and friable asbestos. Structural conditions on site and proposed stabilization remedies, including cost estimates, are described in detail in three evaluations performed in 2004: *Structural Stabilization Work for Asbestos Abatement at the Quincy Smelter Site* (U.P. Engineers and Architects, December 2004), *Structural Stabilization Report for the Quincy Smelter Site* (Metcalf and Eddy, December 2004) and the *Quincy Smelter Asbestos Abatement Assessment* (WESTON, 2004). Concerns and recommendations, including cost estimates, for the abatement of asbestos-containing materials on site are addressed in the *Quincy Smelter Asbestos Abatement Assessment* (WESTON, 2004). Recommendations by site structure are provided below. These recommendations should be implemented in conjunction with a final redevelopment plan.

- **Reverberatory Furnace Smokestack** – The stack superstructure is heavily deteriorated, and in a dangerous condition. The stack support system is heavily corroded and not providing support. The stack should be stabilized or demolished. This structure does not contain friable asbestos, but does present a safety concern that must be addressed prior to asbestos abatement at the site.
- **Building Number 2, Dockside Warehouse** - This is a two-story wood timber structure. Portions of this building require stabilization, including bracing the bottom of the second floor hoisting shed at the east end, and removing a portion of the collapsed roof of the east side shed to allow access to six unknown drums and any other

FINDINGS AND RECOMMENDATIONS

potentially hazardous materials. This building contains ACM in poor condition in the form of pipe insulation (on piping and in bulk storage), pipe insulation debris, and baseboard seam insulation. ACM debris is present in areas of bulk ACM storage. The ACM should be removed.

- **Building Number 3, Laboratory/Assay House** - This single-story wooden farm building has lap siding, a corrugated metal roof with gable ends, and an exterior brick chimney on the west wall. Portions of this building require stabilization, including the top of the brick chimney and the top of the steel chimney and roof braces, and repair is required of the pushed-in and rotted wall at the south side of the lower shed. The building contains ACM in poor condition in the form of pipe insulation in the basement and pipe insulation debris and thermal heat shields on the first floor. The ACM should be removed.
- **Building Number 6, Reverberatory Furnace Building** - This is a large two-story sandstone structure. The building has major burn damage and was determined to be unsafe for further inspection in December 2004. Portions of this building require stabilization, including the chimney stack and existing catwalks. In addition, all rusted-through roofing metal, cupola windows, and any other loose overhead materials should be removed and loose steel wall panels should be reattached. A complete inspection of ACM was not conducted in 2004 due to building conditions, however the *Asbestos Survey Report, Quincy Smelter Facility* (ATC Associates, Inc, June 2004) documented ACM in the form of pipe insulation and duct wrap throughout the building that was in poor condition and should be removed.
- **Building Number 7, Reverberatory Furnace Building** - This large, clear-span, post-and-beam structure has a roof and sides of corrugated metal and major burn damage. This building was determined to be unsafe for further inspection in December 2004. Portions of this building require stabilization including miscellaneous masonry and a three-foot diameter boiler pipe on the north half of building. In addition, all loose and rusted-through roofing metal, cupola windows, and other loose overhead materials should be removed on the north side of the building and all loose stone lintel along the walls of the building should be repaired and the stone window lintel in southwest corner rebuilt. A complete inspection of ACM was not conducted in 2004 due to building conditions, however the *Asbestos Survey Report, Quincy Smelter Facility* (ATC Associates, Inc, June 2004) documented ACM in the form of pipe insulation throughout the building that was in poor condition and should be removed.
- **Slag and Stamp Sand** – The nature and extent of slag and stamp sand should be delineated on site. Additional sampling and an evaluation of remediation techniques is recommended for the large on-site slag pile and stamp sand that covers the site.

AOI 15 - Properties Adjacent to Quincy Smelter

It is recommended that the nature and extent of contamination at the former Houghton County Gas & Coke Plant, including two dilapidated structures, slag, coal, a tar vault, ASTs, and

exposed stamp sand and tar along the Portage Waterway shoreline be evaluated and a cleanup approach developed.

AOI 16 - Dollar Bay Wire Mill

Access was denied to this operating boat storage yard. A portion of this AOI was addressed via gravel capping as part of the Torch Lake NPL Remedy. No further action is recommended.

AOI 17 - Dollar Bay Well Field

No further action is recommended.

AOI 10 - Mason Sands

No further action is recommended based on current use.

AOI 18 - Building in Mason

It is recommended that the MDEQ issue a due care letter to the property owners regarding the unrestricted access to the building and the potential presence of ACM.

AOI 19 - Former C&H Leach Plant and Hubbell Stamp Sands

Access was denied to the Former C&H Leach Plant which is currently an operating construction company storage yard. Based on MDEQ sampling at the site, it is recommended that access to the property be obtained to further assess the nature and extent of potential contamination.

No further action is recommended for the Hubbell Stamp Sands.

AOI 20 - Tamarack City Stamp Mill

No further action is recommended based on current use. It is recommended that the exposed soil/stamp sand areas be covered and the concrete rubble and debris piles be managed if the property is to become an interpretive center.

AOI 21 - Hubbell Beach and Slag Dump

It is recommended that an underwater investigation be performed to further explore lake bottom debris, the previously installed vegetative cap be repaired, and the MDEQ reported discharge of residential sewage be further assessed.

AOI 22 - Hubbell Docks, Mineral Building, and C&H Smelter

No further action is recommended.

AOI 12 - Lake Linden Sands

It is recommended that the source of the lead sludge removed from the exposed beach area be evaluated.

No further action is recommended for the other areas of the Lake Linden Sands included in the AA.

AOI 23 - C&H Power Plant

It is recommended that the sludge and water in the basement and the drums in the basement be characterized to determine proper management; the bags of copper concentrate near the shoreline be removed; the soil data collected after the removal of transformers containing PCBs be reviewed and additional soil sampling be conducted if necessary; the MDEQ issue the owner a due care letter to complete removal of ACM; and lead-based paint be addressed prior to any demolition or re-construction activities.

AOI 24 - Backwater Area of Torch Lake

No further action is recommended.

AOI 25 – Traprock Slag Dump

It is recommended that the MDEQ reports of improper transformer disposal be further assessed.

AOI 26 - Bootjack Stamp Sands

No further action is recommended.

AOI 14 - Gay Stamp Sands

Based on MDEQ's findings that the stamp sand deposit poses beneficial use impairments including degradation of fish and wildlife habitat, degradation of the benthos, and degradation of aesthetics, it is recommended that remedial measures to prevent the further migration of the stamp sand be considered. It is also recommended that building ruins, exposed foundation materials, debris, and the potential ACM be addressed or public access restricted.

AOI 27 - Drums on Lake Bottom

It is recommended that a thorough assessment of existing information pertaining to drum investigations, removals, and the pending MDEQ drum study be evaluated to determine if additional action is warranted.

Western Shoreline of Torch Lake – Various Areas of Concern

It is recommended that an updated Health Consultation be completed for the various areas of investigation along the western shoreline of Torch Lake.

The DHHS completed a Health Consultation for Torch Lake (March 23, 1998) that concluded that “based on the information available, none of the Torch Lake Area Brownfield properties pose an urgent public health hazard under current conditions. Several of the properties would pose public health hazards under long-term exposure from the metals in the soil, and are also under consideration for future residential development”.

The DHHS recommended further evaluation of the Hubbell Slag and Quincy Smelter areas before any residential development is carried forward to determine the extent and appropriate management of the elevated lead and arsenic concentrations in the soil. In addition, the DHHS recommended that new environmental data or information concerning the future use of these properties may require future health consultations.

SECTION 5 REFERENCES

- Archimede, PhD, P.A. and Martin, G. June 2002. *The Quincy Mining Company Smelting Works, 1898, Historical Land Use Survey Project.*
- ATC Associates, Inc. June 2004. *Asbestos Survey Report, Quincy Smelter Facility.*
- Department of Natural Resources, Michigan Water Resource Commission Bureau of Water Management. February 1973. *An Evaluation of a Cupric Ammonium Carbonate Spill into Torch Lake, Houghton County, Michigan. September 29, 1972.*
- Donohue & Associates, Inc. June 1989. *Final Work Plan, Torch Lake Remedial Investigation/Feasibility Study, Houghton County, Michigan. Volume 1A, Revision 1.*
- Flaga, C. January 1998. Michigan Department of Environmental Quality Interoffice Communication. *Reevaluation of Torch Lake Stamp Sands.*
- Franklin Township and Keweenaw National Historical Park. February 2003. *Critical Safety and Preservation Needs Assessment, Quincy Mining Company Smelting Works.*
- Franklin Township and Keweenaw National Historical Park. February 2003. *Stabilization Plan, Quincy Mining Company Smelting Works.*
- Geraghty & Miller, Inc. March 1992. *Final Drum Removal Report. Torch Lake Drum Removal Houghton County, Michigan.*
- K& J Enterprises. July 1998. *Baseline Environmental Assessment Conducted Pursuant to Section 20126(1)(c) Of 1994 PA 451, Part 201 as Amended and the Rules Promulgated Pursuant Thereunder for Proposed Osceola Township Historical, Interpretive Park Site, Houghton County, Michigan.*
- Keranen, A. December 1995. Site Inspection at the Julio Scrap Yard, Ripley, Michigan Notes.
- Lakeshore Estate Associates, Inc. April 1997. *Baseline Environmental Assessment Conducted Pursuant to Section 20126(1)(c) Of 1994 PA 451, Part 201 as Amended and the Rules Promulgated Pursuant Thereunder for Mason, Osceola Township (M-26, Houghton County, Michigan.*
- Leddy, PhD, D., et al. August 1986. *Torch Lake Study. A Project Completion Report Prepared for the Michigan Department of Natural Resources.*
- MACTEC Engineering and Consulting of Michigan, Inc. May 2007. *Monitoring Report, Torch Lake Superfund Site, Houghton, Michigan.*

- Meninc, Inc. March 2000. *Baseline Environmental Assessment Conducted Pursuant to Section 20126(1)(c) Of 1994 PA 451, Part 201 as Amended and the Rules Promulgated Pursuant Thereunder for Former Power Station and Copper Ore Processing Facilities, Torch Lake Township, Houghton County, Michigan.*
- Metcalf and Eddy. December 2004. *Structural Stabilization Report for the Quincy Smelter Site, Franklin Township, Michigan.*
- MDEQ (Michigan Department of Environmental Quality). January 1996. *Environmental Laboratory Report. Joint AQD, ERD, and WMD Inspection on December 4, 1995 at the Julio Construction Company, Ripley, Michigan.*
- MDEQ. November 2002. *Environmental Laboratory Report. Traprock Slag Site Sediment Sampling Event, November 14, 2002.*
- MDEQ. February 2004. *Notice to Property Owners Russell Wilder and Barbara Wilder. Subject: Traprock Slag, Schoolcraft Township, Houghton County, Site ID# 31000066.*
- MDEQ. March 2004. *Letter to Russell Wilder. Subject: Traprock Slag, Houghton County.*
- MDEQ. August 2007. *Environmental Laboratory Report. Ahmeek Re grind, Calumet Lake, and Medaguzzo Power Plant Sampling Event, August 8-10, 2007.*
- MDEQ. April 2007. *Historical Photos of Ripley, Michigan Area and three additional aerial photos. – Remediation & Redevelopment Division – Program Support Section – Geological Services Unit.*
- MDEQ. November 2002. *Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property, Hancock, Michigan. Remediation and Redevelopment Division Superfund Section.*
- Padovani, S. November 2002. *Memorandum to the Region 5 United States Environmental Protection Agency. Subject: No Action at the Coal Dock Property located at the Hubbell/Tamarack Portion of the Torch Lake Superfund Site, Houghton County, Michigan.*
- Silver Shores Enterprises, Inc. May 2000. *Baseline Environmental Assessment Conducted Pursuant to Section 20126(1)(c) Of 1994 PA 451, Part 201 as Amended and the Rules Promulgated Pursuant Thereunder for Hubbell (M-26), Houghton County, Michigan.*
- SQS, Inc. November 2001. SQS, Inc. Proposal Number I-428. *Proposal to Conduct a Phase II Environmental Site Assessment: Hancock to Ripley Railroad Right-of-Way, Houghton County, Michigan.*
- MDNR (State of Michigan Department of Natural Resources). April 1988. *Laboratory Report for 2 PCB samples taken at Julio Marine and Salvage, Ripley, Michigan.*

- MDNR Environmental Response Division. April 1988. *Activity Report for Mark Petrie for the dates 4/1/88-4/4/88 and 4/5/88-4/12/88*, and 16 photos of Julio Marine Salvage, Ripley, Michigan.
- DHHS (U.S. Department of Health and Human Services). March 1998. *Health Consultation. Torch Lake. Hubbell, Houghton County, Michigan.*
- DHHS. November 2006. *Health Consultation. Review of Activity-Based Sampling on the Hancock/Ripley Trail.*
- Upper Peninsula Engineers and Architects. December 2004. *Structural Stabilization Work for the Asbestos Abatement at the Quincy Smelter Site, Franklin Township, Michigan.*
- Weston Solutions, Inc. December 2004. Quincy Smelter Asbestos Abatement Assessment, Franklin Township, Houghton County, Michigan.
- U.S. EPA. July 25, 1990. *Letter from Robert J. Bowden, Chief, Emergency and Enforcement Response Branch, U.S. EPA to John L. Hesse, Principal Investigator, Michigan Department of Health.* RE: Response to June 15, 1990 letter regarding the drums in Torch Lake.
- U.S. EPA. September 23, 2005. *Superfund Preliminary Site Closeout Report, Final Remedial Action for Torch Lake Superfund Site, Houghton County, Michigan.*

TABLES

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MGP-1	MGP-1	MGP-18	MGP-19
			Sampling Date	09/12/07	09/12/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	Laboratory	XRF	XRF
			Sample Number/ Location	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	7,086	NT	2,110	4,424
Chromium	18	790,000	mg/kg	<LOD	2.1 J*	<LOD	<LOD
Manganese	440	25,000	mg/kg	449	370	283	399
Iron	12,000	160,000	mg/kg	62,106	NT	31,061	46,796
Cobalt	6.8	2,600	mg/kg	804	13 J	<LOD	481
Nickel	20	40,000	mg/kg	<LOD	18 J	<LOD	<LOD
Copper	32	20,000	mg/kg	1,052	1,500 J	242	2,017
Zinc	47	170,000	mg/kg	102	93	111	47
Arsenic	5.8	7.6	mg/kg	<LOD	14 J	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	NT	<LOD	<LOD
Rubidium	--	--	mg/kg	22	NT	26	17
Strontium	--	330,000	mg/kg	88	<230	58	79
Zirconium	--	--	mg/kg	124	NT	55	68
Molybdenum	--	2,600	mg/kg	<LOD	NT	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	2.8 J	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	NT	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	NT	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	NT	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	NT	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	0.50	<LOD	<LOD
Lead	21	400	mg/kg	53	64 J	50	56
Aluminum	6,900	50,000	mg/kg	NT	2,300 J	NT	NT
Beryllium	--	410	mg/kg	NT	<4.5 J	NT	NT
Lithium	9.8	4,200	mg/kg	NT	4.50	NT	NT

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MGP-20	MGP-21	MGP-21	MGP-TAR
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	Laboratory	XRF	XRF
			Sample Number/ Location	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	2,899	NT	2,117	<LOD
Chromium	18	790,000	mg/kg	<LOD	35	<LOD	<LOD
Manganese	440	25,000	mg/kg	378	250	325	<LOD
Iron	12,000	160,000	mg/kg	25,377	NT	43,776	1,627
Cobalt	6.8	2,600	mg/kg	310	7.50	382	<LOD
Nickel	20	40,000	mg/kg	191	13	<LOD	<LOD
Copper	32	20,000	mg/kg	242	650	599	2,683
Zinc	47	170,000	mg/kg	88	100 J	125	33
Arsenic	5.8	7.6	mg/kg	<LOD	12	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	NT	<LOD	<LOD
Rubidium	--	--	mg/kg	39	NT	33	<LOD
Strontium	--	330,000	mg/kg	121	<240	141	16
Zirconium	--	--	mg/kg	141	NT	95	21
Molybdenum	--	2,600	mg/kg	<LOD	NT	<LOD	25
Silver	1	2,500	mg/kg	<LOD	1.10	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	NT	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	NT	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	NT	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	NT	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	0.20	<LOD	<LOD
Lead	21	400	mg/kg	99	61	72	<LOD
Aluminum	6,900	50,000	mg/kg	NT	7,600 J	NT	NT
Beryllium	--	410	mg/kg	NT	<4.8	NT	NT
Lithium	9.8	4,200	mg/kg	NT	6.60	NT	NT

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MGP-TAR	MGP-23	MGP-24	MGP-25
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	Laboratory	XRF	XRF	XRF
			Sample Number/ Location	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	NT	6,387	2,276	7,481
Chromium	18	790,000	mg/kg	<9	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	16	704	275	<LOD
Iron	12,000	160,000	mg/kg	NT	98,579	28,130	59,594
Cobalt	6.8	2,600	mg/kg	0.5 *	1,060	416	<LOD
Nickel	20	40,000	mg/kg	1.5 *	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	350	1,791	755	517
Zinc	47	170,000	mg/kg	7.9 J*	882	75	175
Arsenic	5.8	7.6	mg/kg	1.00	<LOD	<LOD	38
Selenium	0.41	2,600	mg/kg	NT	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	NT	29	45	22
Strontium	--	330,000	mg/kg	<230	106	100	1,682
Zirconium	--	--	mg/kg	NT	129	104	222
Molybdenum	--	2,600	mg/kg	NT	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	0.67	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	NT	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	NT	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	NT	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	NT	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	0.030	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	4.2 *	2,037	36	298
Aluminum	6,900	50,000	mg/kg	720 J	NT	NT	NT
Beryllium	--	410	mg/kg	<4.5	NT	NT	NT
Lithium	9.8	4,200	mg/kg	<0.90	NT	NT	NT

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MGP-26	MGP-26	JulioScrap-3	JulioScrap-4
			Sampling Date	09/10/07	09/10/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	Laboratory	XRF	XRF	XRF
			Sample Number/ Location	Former Houghton County Gas & Coke Site	Former Houghton County Gas & Coke Site	Julio Marine and Salvage	Julio Marine and Salvage
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	NT	<LOD	8,145	4,462
Chromium	18	790,000	mg/kg	59	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	930	912	317	463
Iron	12,000	160,000	mg/kg	NT	158,330	43,768	60,853
Cobalt	6.8	2,600	mg/kg	17	1,399	543	504
Nickel	20	40,000	mg/kg	45	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	1,100	553	692	680
Zinc	47	170,000	mg/kg	4,300 J	2,390	62	89
Arsenic	5.8	7.6	mg/kg	17	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	NT	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	NT	22	31	62
Strontium	--	330,000	mg/kg	<280	74	164	123
Zirconium	--	--	mg/kg	NT	72	195	102
Molybdenum	--	2,600	mg/kg	NT	<LOD	16	<LOD
Silver	1	2,500	mg/kg	1.20	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	NT	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	NT	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	NT	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	NT	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	0.46	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	310	221	25	92
Aluminum	6,900	50,000	mg/kg	6,700 J	NT	NT	NT
Beryllium	--	410	mg/kg	<5.6	NT	NT	NT
Lithium	9.8	4,200	mg/kg	3.90	NT	NT	NT

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	JulioScrap-5	Mickelson-6	Mickelson-6	Mickelson-7
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	Laboratory	XRF	XRF
			Sample Number/ Location	Julio Marine and Salvage	Mickelsen Property	Mickelsen Property	Mickelsen Property
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	10,627	NT	33,745	<LOD
Chromium	18	790,000	mg/kg	<LOD	980 J	<LOD	<LOD
Manganese	440	25,000	mg/kg	983	650	670	364
Iron	12,000	160,000	mg/kg	111,398	NT	84,565	10,817
Cobalt	6.8	2,600	mg/kg	1,072	16 J	833	176
Nickel	20	40,000	mg/kg	<LOD	180 J	<LOD	<LOD
Copper	32	20,000	mg/kg	1,161	490 J	79	491
Zinc	47	170,000	mg/kg	80	43	47	94
Arsenic	5.8	7.6	mg/kg	<LOD	14 J	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	NT	<LOD	<LOD
Rubidium	--	--	mg/kg	31	NT	29	17
Strontium	--	330,000	mg/kg	100	<200	169	91
Zirconium	--	--	mg/kg	137	NT	131	64
Molybdenum	--	2,600	mg/kg	<LOD	NT	<LOD	16
Silver	1	2,500	mg/kg	<LOD	0.51 J	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	NT	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	NT	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	NT	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	NT	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	0.015	<LOD	<LOD
Lead	21	400	mg/kg	54	25 J	<LOD	35
Aluminum	6,900	50,000	mg/kg	NT	7,800 J	NT	NT
Beryllium	--	410	mg/kg	NT	0.73 J *	NT	NT
Lithium	9.8	4,200	mg/kg	NT	4.00	NT	NT

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	JulioCon-13	HockingsB-20	JulioSalvage-15	JulioSalvage-16
			Sampling Date	09/12/07	09/07/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF
			Sample Number/ Location	Julio Contracting	Hockings Property	Julio Property	Julio Property
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	8,714	19,192	8,386	14,545
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	408	495	802	1,323
Iron	12,000	160,000	mg/kg	30,655	98,119	59,616	104,577
Cobalt	6.8	2,600	mg/kg	301	<LOD	546	999
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	570	1,409	1,653	2,020
Zinc	47	170,000	mg/kg	34	59	72	84
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	17	41	18	21
Strontium	--	330,000	mg/kg	75	94	96	509
Zirconium	--	--	mg/kg	82	250	101	131
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	226	<LOD	102
Cadmium	1.2	550	mg/kg	<LOD	131	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	20	17	<LOD	41
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT

**Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	H&Ymarina-17	H&Ymarina-18	H&Ymarina-19	H&Ymarina-19
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	Laboratory	XRF
			Sample Number/ Location	H&Y Marina	H&Y Marina	H&Y Marina	H&Y Marina
Units	mg/kg	mg/kg	mg/kg	mg/kg			
Metals							
Titanium	--	--	mg/kg	17,859	26,959	NT	<LOD
Chromium	18	790,000	mg/kg	<LOD	<LOD	460 J	<LOD
Manganese	440	25,000	mg/kg	1,576	1,698	5,500	12,993
Iron	12,000	160,000	mg/kg	109,446	118,890	NT	1,106,298
Cobalt	6.8	2,600	mg/kg	<LOD	1,033	37 J	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	250 J	<LOD
Copper	32	20,000	mg/kg	2,002	956	470 J	241
Zinc	47	170,000	mg/kg	99	89	83	<LOD
Arsenic	5.8	7.6	mg/kg	21	<LOD	30 J	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	NT	<LOD
Rubidium	--	--	mg/kg	55	15	NT	49
Strontium	--	330,000	mg/kg	296	100	<170	<LOD
Zirconium	--	--	mg/kg	164	176	NT	26
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	NT	34
Silver	1	2,500	mg/kg	86	<LOD	0.38 J	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	NT	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	NT	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	NT	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	NT	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	0.0099 *	<LOD
Lead	21	400	mg/kg	27	<LOD	440 J	340
Aluminum	6,900	50,000	mg/kg	NT	NT	1,800 J	NT
Beryllium	--	410	mg/kg	NT	NT	<3.4 J	NT
Lithium	9.8	4,200	mg/kg	NT	NT	0.74	NT

Table 1 - AOI 15 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 10 - September 12, 2007

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J - Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory results are on a dry weight basis.

MGP – Manufactured Gas Plant

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"--" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitation limits

<– Less than

**Table 2 - PCB Sampling Results
Torch Lake Area Assessment
September 6 - September 12, 2007**

Parameter	Regulatory Criteria		Sample Name	MGPB-1		MGP-TAR		MGP - XRF21		MGP - XRF26		Michelson B-6	
			Sampling Date	09/11/07		09/10/07		09/10/07		09/10/07		09/12/07	
			Sample Matrix	Soil		Tar		Soil		Soil		Soil	
			Sample Location	AOI 15		AOI 15		AOI 15		AOI 15		AOI 15	
	Part 201 SDBL	Part 201 RDCC	Units	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
PCBs													
Aroclor 1016	NA	NA	µg/Kg-dry	ND _J	79	ND	330	ND _J	80	ND _J	97	ND _J	42
Aroclor 1221	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Aroclor 1232	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Aroclor 1242	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Aroclor 1248	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Aroclor 1254	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Aroclor 1260	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Aroclor 1262	NA	NA	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42
Total PCBs	NA	4,000	µg/Kg-dry	ND	79	ND	330	ND _J	80	ND	97	ND	42

NOTES:

Results in shaded boxes exceed the Part 201 Residential Direct Contact Criteria.

AOI -Area of Investigation

_J - Data qualified as estimated based on data validation.

NA - Not available

ND - Not detected above laboratory reporting limit

Part 201-SDBL - Part 201 Statewide Default Background Level

Part 201-RDCC - Part 201 Residential Direct Contact Criteria

PCB - Polychlorinated Biphenyl

RL = laboratory reporting limit

µg/kg-dry - micrograms per kilogram dry weight

* - analyte detected below laboratory quantitation limit

**Table 2 - PCB Sampling Results
Torch Lake Area Assessment
September 6 - September 12, 2007**

Parameter	Regulatory Criteria		Sample Name	H&Y Marina B-19		Mason XRF 6		Mason XRF 10		MS S1-12		MS S1-13		TM S1-2	
			Sampling Date	09/12/07		09/06/07		09/06/07		09/12/07		09/12/07		09/12/07	
			Sample Matrix	Soil		Soil		Soil		Soil		Soil		Soil	
			Sample Location	AOI 15		AOI 10		AOI 10		AOI 10		AOI 10		AOI 10	
Part 201 SDBL	Part 201 RDCC	Units	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	
PCBs															
Aroclor 1016	NA	NA	µg/Kg-dry	ND	36	ND _J	39	ND _J	35	ND _J	42	ND _J	37	ND _J	35
Aroclor 1221	NA	NA	µg/Kg-dry	ND	36	ND	39	ND	35	ND	42	ND	37	ND	35
Aroclor 1232	NA	NA	µg/Kg-dry	ND	36	ND	39	ND	35	ND	42	ND	37	ND	35
Aroclor 1242	NA	NA	µg/Kg-dry	ND	36	ND	39	ND	35	ND	42	ND	37	ND	35
Aroclor 1248	NA	NA	µg/Kg-dry	ND	36	ND	39	ND	35	ND	42	ND	37	ND	35
Aroclor 1254	NA	NA	µg/Kg-dry	ND	36	ND	39	ND	35	ND	42	ND	37	ND	35
Aroclor 1260	NA	NA	µg/Kg-dry	ND	36	ND	39	ND	35	ND	42	ND	37	ND	35
Aroclor 1262	NA	NA	µg/Kg-dry	11 *	36	ND	39	ND	35	ND	42	ND	37	ND	35
Total PCBs	NA	4,000	µg/Kg-dry	11 *	36	ND	39	ND	35	ND	42	ND	37	ND	35

NOTES:

Results in shaded boxes exceed the Part 201 Residential Direct Contact Criteria.

AOI -Area of Investigation

J - Data qualified as estimated based on data validation.

NA - Not available

ND - Not detected above laboratory reporting limit

Part 201-SDBL - Part 201 Statewide Default Background Level

Part 201-RDCC - Part 201 Residential Direct Contact Criteria

PCB - Polychlorinated Biphenyl

RL = laboratory reporting limit

µg/kg-dry - micrograms per kilogram dry weight

* - analyte detected below laboratory quantitation limit

**Table 2 - PCB Sampling Results
Torch Lake Area Assessment
September 6 - September 12, 2007**

Parameter	Regulatory Criteria		Sample Name	TM S1-5		TM S2-2		Hub S1-12		Mineral XRF 6		Mineral XRF 11	
			Sampling Date	09/12/07		09/12/07		09/12/07		09/07/07		09/07/07	
			Sample Matrix	Soil		Soil		Soil		Soil		Soil	
			Sample Location	AOI 10		AOI 10		AOI 19		AOI 22		AOI 22	
	Part 201 SDBL	Part 201 RDCC	Units	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL
PCBs													
Aroclor 1016	NA	NA	µg/Kg-dry	ND _J	37	ND _J	38	ND _J	35	ND _J	70	ND _J	68
Aroclor 1221	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	ND	68
Aroclor 1232	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	ND	68
Aroclor 1242	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	ND	68
Aroclor 1248	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	ND	68
Aroclor 1254	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	ND	68
Aroclor 1260	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	ND	68
Aroclor 1262	NA	NA	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	24 *	68
Total PCBs	NA	4,000	µg/Kg-dry	ND	37	ND	38	ND	35	ND	70	24 *	68

NOTES:

Results in shaded boxes exceed the Part 201 Residential Direct Contact Criteria.

AOI -Area of Investigation

J - Data qualified as estimated based on data validation.

NA - Not available

ND - Not detected above laboratory reporting limit

Part 201-SDBL - Part 201 Statewide Default Background Level

Part 201-RDCC - Part 201 Residential Direct Contact Criteria

PCB - Polychlorinated Biphenyl

RL = laboratory reporting limit

µg/kg-dry - micrograms per kilogram dry weight

* - analyte detected below laboratory quantitation limit

**Table 2 - PCB Sampling Results
Torch Lake Area Assessment
September 6 - September 12, 2007**

Parameter	Regulatory Criteria		Sample Name	Calumet XRF 16		Lake Linden S2 - 8		Traprock B-8		Traprock B-12		Bootjack B-17	
			Sampling Date	09/07/07		09/12/07		09/11/07		09/11/07		09/11/07	
			Sample Matrix	Soil		Soil		Soil		Soil		Soil	
			Sample Location	AOI 12		AOI 24		AOI 25		AOI 25		AOI 26	
Part 201 SDBL	Part 201 RDCC	Units	Result	RL	Result	RL	Result	RL	Result	RL	Result	RL	
PCBs													
Aroclor 1016	NA	NA	µg/Kg-dry	ND _J	57	ND _J	43	ND _J	37	ND _J	35	ND _J	87
Aroclor 1221	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Aroclor 1232	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Aroclor 1242	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Aroclor 1248	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Aroclor 1254	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Aroclor 1260	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Aroclor 1262	NA	NA	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87
Total PCBs	NA	4,000	µg/Kg-dry	ND _J	57	ND	43	ND	37	ND	35	ND	87

NOTES:

Results in shaded boxes exceed the Part 201 Residential Direct Contact Criteria.

AOI -Area of Investigation

J - Data qualified as estimated based on data validation.

NA - Not available

ND - Not detected above laboratory reporting limit

Part 201-SDBL - Part 201 Statewide Default Background Level

Part 201-RDCC - Part 201 Residential Direct Contact Criteria

PCB - Polychlorinated Biphenyl

RL = laboratory reporting limit

µg/kg-dry - micrograms per kilogram dry weight

* - analyte detected below laboratory quantitation limit

**Table 2 - PCB Sampling Results
Torch Lake Area Assessment
September 6 - September 12, 2007**

Parameter	Regulatory Criteria		Sample Name	Gay B - XRF6		Gay B - XRF11		Gay B - XRF14		Gay S1-21	
			Sampling Date	09/10/07		09/10/07		09/10/07		09/10/07	
			Sample Matrix	Soil		Soil		Soil		Soil	
			Sample Location	AOI 14		AOI 14		AOI 14		AOI 14	
	Part 201 SDBL	Part 201 RDCC	Units	Result	RL	Result	RL	Result	RL	Result	RL
PCBs											
Aroclor 1016	NA	NA	µg/Kg-dry	ND _J	74	ND _J	76	ND _J	75	ND _J	34
Aroclor 1221	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Aroclor 1232	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Aroclor 1242	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Aroclor 1248	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Aroclor 1254	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Aroclor 1260	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Aroclor 1262	NA	NA	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34
Total PCBs	NA	4,000	µg/Kg-dry	ND	74	ND	76	ND	75	ND	34

NOTES:

Results in shaded boxes exceed the Part 201 Residential Direct Contact Criteria.

AOI -Area of Investigation

J - Data qualified as estimated based on data validation.

NA - Not available

ND - Not detected above laboratory reporting limit

Part 201-SDBL - Part 201 Statewide Default Background Level

Part 201-RDCC - Part 201 Residential Direct Contact Criteria

PCB - Polychlorinated Biphenyl

RL = laboratory reporting limit

µg/kg-dry - micrograms per kilogram dry weight

* - analyte detected below laboratory quantitation limit

**Table 3 - Summary of Select Analytical Results for MGP-Tar Sample
Torch Lake Area Assessment
September 10, 2007**

Parameter	Regulatory Criteria		Sample Name	MGP - TAR	
			Sampling Date	09/10/07	
			Sample Matrix	Tar	
			Sample Location	AOI No. 15	
	Part 201 SDBL	Part 201 RDCC	Units	Result	RL
SVOCs (Method SW8270C)					
2-Methylnaphthalene	NA	8,100,000	µg/Kg	3,600,000	960,000
Acenaphthene	NA	41,000,000	µg/Kg	400,000 *	960,000
Acenaphthylene	NA	1,600,000	µg/Kg	4,900,000	960,000
Anthracene	NA	230,000,000	µg/Kg	3,200,000	960,000
Benzo(a)anthracene	NA	20,000	µg/Kg	2,500,000	960,000
Benzo(a)pyrene	NA	2,000	µg/Kg	2,400,000	960,000
Benzo(b)fluoranthene	NA	20,000	µg/Kg	2,400,000	960,000
Benzo(g,h,i)perylene	NA	2,500,000	µg/Kg	1,400,000	960,000
Benzo(k)fluoranthene	NA	200,000	µg/Kg	1,100,000	960,000
Chrysene	NA	2,000,000	µg/Kg	1,800,000	960,000
Dibenz(a,h)anthracene	NA	2,000	µg/Kg	270,000 *	960,000
Fluoranthene	NA	46,000,000	µg/Kg	7,400,000	960,000
Fluorene	NA	27,000,000	µg/Kg	3,000,000	960,000
Indeno(1,2,3-cd)pyrene	NA	20,000	µg/Kg	1,200,000	960,000
Naphthalene	NA	16,000,000	µg/Kg	21,000,000	960,000
Phenanthrene	NA	1,600,000	µg/Kg	11,000,000	960,000
Pyrene	NA	29,000,000	µg/Kg	7,900,000	960,000
VOCs (Method SW8260B)					
1,2,3-Trimethylbenzene	NA	NA	µg/Kg	92,000 * J	200,000
1,2,4-Trimethylbenzene	NA	110,000	µg/Kg	260,000 J	200,000
1,3,5-Trimethylbenzene	NA	94,000	µg/Kg	100,000 * J	200,000
2-Methylnaphthalene	NA	8,100,000	µg/Kg	3,200,000 J	1,000,000
Acetone	NA	23,000,000	µg/Kg	630,000 * J	10,000,000
Benzene	NA	180,000	µg/Kg	1,200,000 J	120,000
Ethylbenzene	NA	140,000	µg/Kg	80,000 * J	200,000
m,p-Xylene	NA	NA	µg/Kg	520,000 J	400,000
Naphthalene	NA	16,000,000	µg/Kg	29,000,000 J	1,000,000
o-Xylene	NA	NA	µg/Kg	210,000 J	200,000
Styrene	NA	400,000	µg/Kg	210,000 J	200,000
Toluene	NA	250,000	µg/Kg	640,000 J	200,000
Xylenes, Total	NA	150,000	µg/Kg	730,000 J	600,000
Cyanide (Method SW9012A)					
Cyanide, Total	390	12	mg/kg	3.5	0.12

**Table 3 - Summary of Select Analytical Results for MGP-Tar Sample
Torch Lake Area Assessment
September 10, 2007**

NOTES:

Results in shaded boxes exceed the Part 201 Residential Direct Contact Criteria.

Only VOCs detected are listed in table.

J - qualified as estimated due to surrogate spike recovery outside of the laboratory generated quality control limits.

MDEQ - Michigan Department of Environmental Quality

mg/kg - milligrams per kilogram

NA - Not available or not applicable

Part 201-SDBL - Part 201 Statewide Default Background Level

Part 201-RDCC - Part 201 Residential Direct Contact Criteria

RL - laboratory reporting limit

SVOCs - semi-volatile organic compounds

VOCs - volatile organic compounds

µg/kg - micrograms per kilogram

* - analyte detected below quantitation limits

**Table 4 - AOI 17 XRF Screening Results
Torch Lake Area Assessment
September 7 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	DollarB-18	DollarB-19	DollarBay-11	DollarBay-12
			Sampling Date	09/07/07	09/07/07	09/12/07	09/12/07
			Sample Type	XRF	XRF	XRF	XRF
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Number/ Location	Dollar Bay Area	Dollar Bay Area	Dollar Bay Area	Dollar Bay Area
			Units	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Titanium	--	--	mg/kg	8,754	27,668	2,289	4,978
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Iron	12,000	160,000	mg/kg	1,111	268,568	5,386	69,559
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD	956
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	159
Copper	32	20,000	mg/kg	31	14,327	1,249	53,702
Zinc	47	170,000	mg/kg	<LOD	<LOD	24	1,251
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	33	166
Selenium	0.41	2,600	mg/kg	7	<LOD	<LOD	10
Rubidium	--	--	mg/kg	11	26	7	<LOD
Strontium	--	330,000	mg/kg	53	359	106	163
Zirconium	--	--	mg/kg	242	565	69	54
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	25	<LOD
Silver	1	2,500	mg/kg	<LOD	275	<LOD	233
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	60	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	73	51	<LOD

**Table 4 - AOI 17 XRF Screening Results
Torch Lake Area Assessment
September 7 - September 12, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"--" – Not listed in MDEQ Part 201 Tables

< – Less than

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MasonB-2	MasonB-3	MasonB-4	MasonB-5
			Sampling Date	09/06/07	09/06/07	09/06/07	09/06/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF
			Sample Number/ Location	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins
			Units	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Titanium	--	--	mg/kg	4,079	4,987	4,800	12,135
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	<LOD	<LOD	298
Iron	12,000	160,000	mg/kg	46,859	49,950	23,910	77,839
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	125	312	<LOD	2,548
Zinc	47	170,000	mg/kg	99	63	38	39
Arsenic	5.8	7.6	mg/kg	<LOD	23	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	45	37	95	31
Strontium	--	330,000	mg/kg	352	218	45	100
Zirconium	--	--	mg/kg	113	114	210	91
Molybdenum	--	2,600	mg/kg	10	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	35	48	13	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MasonB-6	MasonB-6	MasonB-7	MasonB-8	MasonB-9
			Sampling Date	09/06/07	09/06/07	09/06/07	09/06/07	09/06/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	Laboratory	XRF	XRF	XRF	XRF
			Sample Number/ Location	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	NT	3,184	<LOD	1,076	18,070
Chromium	18	790,000	mg/kg	8.2 *	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	790	242	<LOD	171	329
Iron	12,000	160,000	mg/kg	NT	29,414	3,713	5,935	83,544
Cobalt	6.8	2,600	mg/kg	17	<LOD	<LOD	<LOD	<LOD
Nickel	20	40,000	mg/kg	31	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	1,900	870	<LOD	274	1,613
Zinc	47	170,000	mg/kg	110 J	69	<LOD	<LOD	<LOD
Arsenic	5.8	7.6	mg/kg	6.70	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	NT	16	8	47	19
Strontium	--	330,000	mg/kg	<240	124	116	19	126
Zirconium	--	--	mg/kg	NT	62	17	62	120
Molybdenum	--	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	5.30	<LOD	<LOD	<LOD	118
Cadmium	1.2	550	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	0.51	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	1,100	553	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	16,000 J	NT	NT	NT	NT
Beryllium	--	410	mg/kg	0.75 *	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	7.10	NT	NT	NT	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MasonB-10	MasonB-10	MasonB-11	MasonB-12	MasonB-13
			Sampling Date	09/06/07	09/06/07	09/06/07	09/06/07	09/06/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	Laboratory	XRF	XRF	XRF	XRF
			Sample Number/ Location	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins	Mason Area Ruins
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			
Metals								
Titanium	--	--	mg/kg	NT	9,762	16,491	13,242	3,289
Chromium	18	790,000	mg/kg	10	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	520	349	349	<LOD	<LOD
Iron	12,000	160,000	mg/kg	NT	78,750	79,205	158,600	48,334
Cobalt	6.8	2,600	mg/kg	17	<LOD	<LOD	<LOD	<LOD
Nickel	20	40,000	mg/kg	32	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	19,000	12,703	3,216	275,954	4,559
Zinc	47	170,000	mg/kg	110 J	<LOD	103	<LOD	<LOD
Arsenic	5.8	7.6	mg/kg	1.70	74	<LOD	<LOD	18
Selenium	0.41	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	NT	20	21	<LOD	6
Strontium	--	330,000	mg/kg	<180	117	111	215	32
Zirconium	--	--	mg/kg	NT	79	119	71	25
Molybdenum	--	2,600	mg/kg	NT	<LOD	<LOD	<LOD	9
Silver	1	2,500	mg/kg	5.40	<LOD	96	145	<LOD
Cadmium	1.2	550	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	0.12	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	200	477	206	78	108
Aluminum	6,900	50,000	mg/kg	21,000 J	NT	NT	NT	NT
Beryllium	--	410	mg/kg	<3.6	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	3.40	NT	NT	NT	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MS-S1-01	MS-S1-02i	MS-S1-03	MS-S1-04	MS-S1-05	MS-S1-06
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Mason Sands	Mason Sands	Mason Sands	Mason Sands	Mason Sands	Mason Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals									
Titanium	--	--	mg/kg	9,020	2,748	4,244	5,253	8,832	7,753
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	673	<LOD	390	405	620	562
Iron	12,000	160,000	mg/kg	65,574	124,634	28,043	38,834	60,693	54,495
Cobalt	6.8	2,600	mg/kg	807	902	414	499	527	528
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	3,022	155	959	950	1,394	401
Zinc	47	170,000	mg/kg	89	26	37	51	74	56
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	23	13	39	25	20	19
Strontium	--	330,000	mg/kg	117	569	64	69	119	95
Zirconium	--	--	mg/kg	114	77	87	91	98	112
Molybdenum	--	2,600	mg/kg	<LOD	11	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	81	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	552	<LOD	636
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	39	12	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MS-S1-07	MS-S1-08	MS-S1-10	MS-S1-11	MS-S1-12	MS-S1-12
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	Laboratory	XRF
			Sample Number/ Location	Mason Sands	Mason Sands	Mason Sands	Mason Sands	Mason Sands	Mason Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals									
Titanium	--	--	mg/kg	8,075	7,600	1,815	6,873	NT	3,420
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	7.1 *	<LOD
Manganese	440	25,000	mg/kg	537	650	88	490	240	231
Iron	12,000	160,000	mg/kg	60,173	53,806	8,961	68,885	NT	21,704
Cobalt	6.8	2,600	mg/kg	627	430	<LOD	818	7.70	249
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	14	<LOD
Copper	32	20,000	mg/kg	684	825	<LOD	2,544	230	190
Zinc	47	170,000	mg/kg	55	65	17	92	60	39
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<0.98	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Rubidium	--	--	mg/kg	22	19	62	24	NT	35
Strontium	--	330,000	mg/kg	110	131	60	115	<250	63
Zirconium	--	--	mg/kg	93	100	158	98	NT	95
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	8	14	NT	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	0.37	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	77	NT	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Barium	75	37,000	mg/kg	834	<LOD	<LOD	<LOD	NT	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	0.022	<LOD
Lead	21	400	mg/kg	<LOD	<LOD	9	12	6.7 *	10
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	9,700	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT	<4.9	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	3.10	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MS-S1-13	MS-S1-13	MS-S1-14	MS-S1-15	MS-S1-16	MS-S1-17
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	Laboratory	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Mason Sands	Mason Sands	Mason Sands	Mason Sands	Mason Sands	Mason Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals									
Titanium	--	--	mg/kg	NT	9,907	9,489	5,359	10,639	8,516
Chromium	18	790,000	mg/kg	18	<LOD	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	550	945	687	568	719	530
Iron	12,000	160,000	mg/kg	NT	72,837	58,136	43,971	55,191	51,550
Cobalt	6.8	2,600	mg/kg	18	838	532	<LOD	641	591
Nickel	20	40,000	mg/kg	31	<LOD	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	2,500	2,044	622	379	343	294
Zinc	47	170,000	mg/kg	170	132	77	44	58	58
Arsenic	5.8	7.6	mg/kg	8.60	<LOD	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	NT	25	18	16	22	23
Strontium	--	330,000	mg/kg	<210	100	105	90	109	101
Zirconium	--	--	mg/kg	NT	111	95	83	126	95
Molybdenum	--	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	3.10	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	NT	<LOD	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	NT	<LOD	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	NT	<LOD	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	NT	<LOD	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	0.28	<LOD	<LOD	<LOD	16	<LOD
Lead	21	400	mg/kg	200	140	<LOD	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	23,000	NT	NT	NT	NT	NT
Beryllium	--	410	mg/kg	<4.2	NT	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	7.60	NT	NT	NT	NT	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MS-S1-18	MS-S1-19	TM-S2-01	TM-S1-01	TM-S1-02	TM-S1-02
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	Laboratory	XRF
			Sample Number/ Location	Mason Sands	Mason Sands	Mason Sands	Tamarack Sands	Tamarack Sands	Tamarack Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals									
Titanium	--	--	mg/kg	5,198	7,794	8,849	1,453	NT	7,837
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	14 J	<LOD
Manganese	440	25,000	mg/kg	368	615	768	<LOD	430	762
Iron	12,000	160,000	mg/kg	36,248	53,693	65,748	15,030	NT	59,685
Cobalt	6.8	2,600	mg/kg	<LOD	503	629	178	15 J	725
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	24 J	<LOD
Copper	32	20,000	mg/kg	153	191	2,373	107	2,700 J	2,334
Zinc	47	170,000	mg/kg	37	76	62	12	59	76
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	0.35 J *	8
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Rubidium	--	--	mg/kg	50	25	25	36	NT	41
Strontium	--	330,000	mg/kg	109	103	115	66	<170	135
Zirconium	--	--	mg/kg	123	91	109	64	NT	116
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	9	NT	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	1.2 J	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD
Barium	75	37,000	mg/kg	<LOD	584	<LOD	<LOD	NT	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	0.038	<LOD
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	11	8 J	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	19,000 J	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT	<3.3 J	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	7.10	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	TM-S1-03	TM-S1-04	TM-S1-05	TM-S1-05
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	Laboratory	XRF
			Sample Number/ Location	Tamarack Sands	Tamarack Sands	Tamarack Sands	Tamarack Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Titanium	--	--	mg/kg	9,285	2,597	NT	4,493
Chromium	18	790,000	mg/kg	<LOD	<LOD	20	<LOD
Manganese	440	25,000	mg/kg	881	265	530	475
Iron	12,000	160,000	mg/kg	69,920	27,233	NT	62,659
Cobalt	6.8	2,600	mg/kg	752	410	21	677
Nickel	20	40,000	mg/kg	<LOD	<LOD	30	<LOD
Copper	32	20,000	mg/kg	2,560	158	9,100	1,513
Zinc	47	170,000	mg/kg	92	76	100	107
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	9.80	72
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	NT	<LOD
Rubidium	--	--	mg/kg	19	62	NT	24
Strontium	--	330,000	mg/kg	84	98	<270	107
Zirconium	--	--	mg/kg	104	189	NT	89
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	NT	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	2.40	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	NT	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	NT	428
Antimony	--	180	mg/kg	<LOD	<LOD	NT	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	NT	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	0.22	<LOD
Lead	21	400	mg/kg	<LOD	42	530	631
Aluminum	6,900	50,000	mg/kg	NT	NT	20,000	NT
Beryllium	--	410	mg/kg	NT	NT	0.58 *	NT
Lithium	9.8	4,200	mg/kg	NT	NT	5.00	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	TM-S2-02	TAM-2-2
			Sampling Date	09/12/07	09/12/07
			Sample Matrix	Soil	Soil
			Sample Type	Laboratory	XRF
			Sample Number/ Location	Tamarack Sands	Tamarack Sands
			Units	mg/kg	mg/kg
Metals					
Titanium	--	--	mg/kg	NT	6,088
Chromium	18	790,000	mg/kg	19	<LOD
Manganese	440	25,000	mg/kg	670	187
Iron	12,000	160,000	mg/kg	NT	45,530
Cobalt	6.8	2,600	mg/kg	25	<LOD
Nickel	20	40,000	mg/kg	34	<LOD
Copper	32	20,000	mg/kg	2,000	1,602
Zinc	47	170,000	mg/kg	87	47
Arsenic	5.8	7.6	mg/kg	1.20	<LOD
Selenium	0.41	2,600	mg/kg	NT	<LOD
Rubidium	--	--	mg/kg	NT	15
Strontium	--	330,000	mg/kg	<210	78
Zirconium	--	--	mg/kg	NT	97
Molybdenum	--	2,600	mg/kg	NT	<LOD
Silver	1	2,500	mg/kg	1.40	<LOD
Cadmium	1.2	550	mg/kg	NT	<LOD
Tin	--	--	mg/kg	NT	<LOD
Antimony	--	180	mg/kg	NT	<LOD
Barium	75	37,000	mg/kg	NT	<LOD
Mercury	0.13	160	mg/kg	0.044	<LOD
Lead	21	400	mg/kg	7.3 *	<LOD
Aluminum	6,900	50,000	mg/kg	27,000	NT
Beryllium	--	410	mg/kg	<4.3	NT
Lithium	9.8	4,200	mg/kg	6.30	NT

**Table 5 - AOI 10 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 6, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J - Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory sample results are on a dry weight basis.

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"--" – Not listed in MDEQ Part 201 Tables

< – Less than

* – Analyte detected below quantitation limits

**Table 6 - AOI 19 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	HUB-S1-01	HUB-S1-02	HUB-S1-03	HUB-S1-04	HUB-S1-05
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	2,461	5,025	7,446	3,877	3,766
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	84	465	553	293	279
Iron	12,000	160,000	mg/kg	8,074	42,706	56,880	38,684	34,038
Cobalt	6.8	2,600	mg/kg	118	585	455	628	416
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	<LOD	826	619	672	714
Zinc	47	170,000	mg/kg	14	59	64	43	58
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	55	26	4	37	51
Strontium	--	330,000	mg/kg	56	69	124	147	135
Zirconium	--	--	mg/kg	163	145	118	236	345
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	96	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Mecury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT

**Table 6 - AOI 19 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	HUB-S1-06	HUB-S1-07	HUB-S1-08	HUB-S1-09	HUB-S1-10
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	6,963	10,489	9,657	5,822	5,293
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	623	777	723	452	391
Iron	12,000	160,000	mg/kg	64,695	78,284	81,746	51,145	43,730
Cobalt	6.8	2,600	mg/kg	964	1,041	684	713	589
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	454	1,602	1,783	479	601
Zinc	47	170,000	mg/kg	71	91	100	57	59
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	10	<LOD	9
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	9	9	10	24	15
Strontium	--	330,000	mg/kg	290	115	103	108	81
Zirconium	--	--	mg/kg	137	151	172	163	143
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT

**Table 6 - AOI 19 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	HUB-S1-12	HUB-S1-12	HUB-S1-13	HUB-S1-14	HUB-S1-15
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	Laboratory	XRF	XRF	XRF	XRF
			Sample Number/ Location	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	NT	9,496	9,739	7,684	7,893
Chromium	18	790,000	mg/kg	24	<LOD	<LOD	269	<LOD
Manganese	440	25,000	mg/kg	320	744	665	480	549
Iron	12,000	160,000	mg/kg	NT	77,280	70,417	56,128	58,659
Cobalt	6.8	2,600	mg/kg	21	802	858	748	709
Nickel	20	40,000	mg/kg	39	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	6,000	2,996	448	315	488
Zinc	47	170,000	mg/kg	95	104	72	55	53
Arsenic	5.8	7.6	mg/kg	4.80	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	NT	17	12	13	13
Strontium	--	330,000	mg/kg	<220	115	200	290	246
Zirconium	--	--	mg/kg	NT	157	156	123	122
Molybdenum	--	2,600	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	0.99	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	NT	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	0.0036 *	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	11	12	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	15,000	NT	NT	NT	NT
Beryllium	--	410	mg/kg	<4.5	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	12	NT	NT	NT	NT

**Table 6 - AOI 19 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	HUB-S1-16	HUB-S1-17	HB-2-1	HB-2-2
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF
			Sample Number/ Location	Hubbell Sands	Hubbell Sands	Hubbell Sands	Hubbell Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Titanium	--	--	mg/kg	4,791	8,147	3,296	<LOD
Chromium	18	790,000	mg/kg	199	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	393	547	<LOD	<LOD
Iron	12,000	160,000	mg/kg	39,215	58,558	28,668	14,982
Cobalt	6.8	2,600	mg/kg	551	823	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	707	422	1,481	1,080
Zinc	47	170,000	mg/kg	61	56	29	18
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	33	14	60	55
Strontium	--	330,000	mg/kg	112	186	150	97
Zirconium	--	--	mg/kg	126	140	203	151
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	65	<LOD
Tin	--	--	mg/kg	86	86	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT

Table 6 - AOI 19 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory sample results are on a dry weight basis.

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"-" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitative limits

< – Less than

**Table 7 - AOI 21 XRF Screening Results
Torch Lake Area Assessment
September 11, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	HubbellB-2	HubbellB-3	HubbellB-4
			Sampling Date	09/11/07	09/11/07	09/11/07
			Sample Matrix	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF
			Sample Number/ Location	Hubbell Beach	Hubbell Beach	Hubbell Slag Dump
			Units	mg/kg	mg/kg	mg/kg
Metals						
Titanium	--	--	mg/kg	19,379	1,799	4,164
Chromium	18	790,000	mg/kg	<LOD	<LOD	1,324
Manganese	440	25,000	mg/kg	372	<LOD	406
Iron	12,000	160,000	mg/kg	106,633	7,972	65,302
Cobalt	6.8	2,600	mg/kg	1,653	<LOD	731
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	57	260	3,994
Zinc	47	170,000	mg/kg	<LOD	41	1,301
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	37	51	28
Strontium	--	330,000	mg/kg	53	51	191
Zirconium	--	--	mg/kg	1,054	112	192
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	76
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	218
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	59	223

**Table 7 - AOI 21 XRF Screening Results
Torch Lake Area Assessment
September 11, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J - Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"-" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitative limits

< – Less than

**Table 8 - AOI 22 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MineralB-4	MineralB-5	MineralB-6	MineralB-6	MineralB-7
			Sampling Date	09/07/07	09/07/07	09/07/07	09/07/07	09/07/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	Laboratory	XRF	XRF
			Sample Number/ Location	Mineral Building	Mineral Building	Mineral Building	Mineral Building	Mineral Building
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	<LOD	<LOD	NT	25,083	<LOD
Chromium	18	790,000	mg/kg	<LOD	4,016	56	2,559	7,850
Manganese	440	25,000	mg/kg	431	<LOD	73	<LOD	<LOD
Iron	12,000	160,000	mg/kg	3,342	544,540	NT	230,173	455,401
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	48	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	540	2,744	2,113
Copper	32	20,000	mg/kg	3,071	266,155	44,000 J	840,928	769,382
Zinc	47	170,000	mg/kg	962	154,989	5,400	15,367	261,353
Arsenic	5.8	7.6	mg/kg	<LOD	1,958	230	1,120	2,505
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	NT	<LOD	<LOD
Rubidium	--	--	mg/kg	15	<LOD	NT	<LOD	<LOD
Strontium	--	330,000	mg/kg	82	192	<160	254	320
Zirconium	--	--	mg/kg	111	63	NT	107	82
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	NT	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	9.00	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	NT	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	5,571	NT	16,434	12,713
Antimony	--	180	mg/kg	<LOD	<LOD	NT	<LOD	438
Barium	75	37,000	mg/kg	<LOD	<LOD	NT	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	0.022	<LOD	<LOD
Lead	21	400	mg/kg	41	3,489	1,900	13,208	8,782
Aluminum	6,900	50,000	mg/kg	NT	NT	3,200 J	NT	NT
Beryllium	--	410	mg/kg	NT	NT	<3.2	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	<0.64	NT	NT

**Table 8 - AOI 22 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	MineralB-8	MineralB-9	MineralB-10	MineralB-11	MineralB-11
			Sampling Date	09/07/07	09/07/07	09/07/07	09/07/07	09/07/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	Laboratory	XRF
			Sample Number/ Location	Mineral Building	Mineral Building	Mineral Building	Mineral Building	Mineral Building
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	1,168	1,790	2,496	NT	6,729
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	6.9 *	259
Manganese	440	25,000	mg/kg	<LOD	<LOD	247	180	1,018
Iron	12,000	160,000	mg/kg	8,453	17,512	21,836	NT	39,749
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD	6.90	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	24	<LOD
Copper	32	20,000	mg/kg	643	7,253	2,276	17,000	24,251
Zinc	47	170,000	mg/kg	173	221	254	490 J	550
Arsenic	5.8	7.6	mg/kg	17	37	22	52	66
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	NT	<LOD
Rubidium	--	--	mg/kg	14	39	25	NT	57
Strontium	--	330,000	mg/kg	93	91	45	<180	88
Zirconium	--	--	mg/kg	31	167	79	NT	214
Molybdenum	--	2,600	mg/kg	9	<LOD	<LOD	NT	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	5.00	63
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	NT	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	NT	<LOD
Antimony	--	180	mg/kg	56	<LOD	<LOD	NT	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	NT	<LOD
Mecury	0.13	160	mg/kg	<LOD	<LOD	<LOD	0.10	<LOD
Lead	21	400	mg/kg	27	126	122	280	401
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	6,200 J	NT
Beryllium	--	410	mg/kg	NT	NT	NT	0.5 *	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	4.70	NT

**Table 8 - AOI 22 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	MineralB-12	MineralB-13
			09/07/07	09/07/07
			Soil	Soil
			XRF	XRF
			Mineral Building	Mineral Building
			mg/kg	mg/kg
Metals				
Titanium	--	--	14,342	<LOD
Chromium	18	790,000	291	<LOD
Manganese	440	25,000	359	1,034
Iron	12,000	160,000	77,669	5,702
Cobalt	6.8	2,600	<LOD	<LOD
Nickel	20	40,000	<LOD	<LOD
Copper	32	20,000	1,075	3,442
Zinc	47	170,000	102	203
Arsenic	5.8	7.6	<LOD	20
Selenium	0.41	2,600	<LOD	<LOD
Rubidium	--	--	25	5
Strontium	--	330,000	311	143
Zirconium	--	--	165	30
Molybdenum	--	2,600	<LOD	<LOD
Silver	1	2,500	153	<LOD
Cadmium	1.2	550	<LOD	<LOD
Tin	--	--	<LOD	<LOD
Antimony	--	180	<LOD	<LOD
Barium	75	37,000	<LOD	<LOD
Mercury	0.13	160	<LOD	<LOD
Lead	21	400	<LOD	78
Aluminum	6,900	50,000	NT	NT
Beryllium	--	410	NT	NT
Lithium	9.8	4,200	NT	NT

**Table 8 - AOI 22 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J - Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory sample results are on a dry weight basis.

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"-" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitative limits

< – Less than

**Table 9 - AOI 12 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	CalumetB-14	CalumetB-15	CalumetB-16	CalumetB-16
			Sampling Date	09/07/07	09/07/07	09/07/07	09/07/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	Laboratory	XRF
			Sample Number/ Location	Calumet Stamp Mill	Calumet Stamp Mill	Calumet Stamp Mill	Calumet Stamp Mill
			Units	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Titanium	--	--	mg/kg	<LOD	13,818	NT	2,640
Chromium	18	790,000	mg/kg	<LOD	<LOD	28	<LOD
Manganese	440	25,000	mg/kg	<LOD	537	740	<LOD
Iron	12,000	160,000	mg/kg	5,497	88,591	NT	28,908
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	18	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	49	<LOD
Copper	32	20,000	mg/kg	345	1,120	10,000	4,023
Zinc	47	170,000	mg/kg	56	47	420 J	181
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	36	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	NT	<LOD
Rubidium	--	--	mg/kg	37	<LOD	NT	25
Strontium	--	330,000	mg/kg	53	43	<340	82
Zirconium	--	--	mg/kg	84	136	NT	89
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	NT	<LOD
Silver	1	2,500	mg/kg	<LOD	146	2.40	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	NT	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	NT	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	NT	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	NT	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	0.23	<LOD
Lead	21	400	mg/kg	<LOD	<LOD	1,100	432
Aluminum	6,900	50,000	mg/kg	NT	NT	13,000 J	NT
Beryllium	--	410	mg/kg	NT	NT	1.6 *	NT
Lithium	9.8	4,200	mg/kg	NT	NT	9.70	NT

**Table 9 - AOI 12 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7 - September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	CalumetB-17	LL-2-1	LL-2-2	LL-2-3
			Sampling Date	09/07/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF
			Sample Number/ Location	Calumet Stamp Mill	Lake Linden Sands	Lake Linden Sands	Lake Linden Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg
Metals							
Titanium	--	--	mg/kg	8,754	7,278	4,031	2,329
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	337	186	<LOD
Iron	12,000	160,000	mg/kg	<LOD	52,636	39,717	25,152
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD	207
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	31	733	401	823
Zinc	47	170,000	mg/kg	<LOD	73	44	36
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	7	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	11	25	21	47
Strontium	--	330,000	mg/kg	53	107	111	77
Zirconium	--	--	mg/kg	242	164	152	190
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	55	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	86	86
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	60	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	17	<LOD	11
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT

**Table 9 - AOI 12 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7 - September 12, 2007**

Part 201 SDBL	Part 201 RDCC	Sample Name	LL-2-4	LL-2-5	LL-2-6
		Sampling Date	09/12/07	09/12/07	09/12/07
		Sample Matrix	Soil	Soil	Soil
		Sample Type	XRF	XRF	XRF
		Sample Number/ Location	Lake Linden Sands	Lake Linden Sands	Lake Linden Sands
		Units	mg/kg	mg/kg	mg/kg
--	--	mg/kg	5,142	3,672	3,554
18	790,000	mg/kg	188	<LOD	<LOD
440	25,000	mg/kg	<LOD	<LOD	<LOD
12,000	160,000	mg/kg	33,165	32,626	28,402
6.8	2,600	mg/kg	<LOD	<LOD	<LOD
20	40,000	mg/kg	<LOD	<LOD	<LOD
32	20,000	mg/kg	2,384	517	646
47	170,000	mg/kg	60	49	36
5.8	7.6	mg/kg	<LOD	<LOD	<LOD
0.41	2,600	mg/kg	<LOD	<LOD	<LOD
--	--	mg/kg	64	36	50
--	330,000	mg/kg	63	88	132
--	--	mg/kg	301	195	279
--	2,600	mg/kg	<LOD	<LOD	<LOD
1	2,500	mg/kg	100	<LOD	<LOD
1.2	550	mg/kg	58	89	68
--	--	mg/kg	<LOD	<LOD	<LOD
--	180	mg/kg	<LOD	<LOD	<LOD
75	37,000	mg/kg	<LOD	<LOD	<LOD
0.13	160	mg/kg	<LOD	<LOD	<LOD
21	400	mg/kg	17	<LOD	<LOD
6,900	50,000	mg/kg	NT	NT	NT
--	410	mg/kg	NT	NT	NT
9.8	4,200	mg/kg	NT	NT	NT

Table 9 - AOI 12 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 7 - September 12, 2007

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J - Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"-" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitative limits

< – Less than

**Table 10 - AOI 23 XRF Screening Results
Torch Lake Area Assessment
September 5, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	C&H-XRF3	C&H-XRF4	C&H-XRF5	C&H-XRF6	C&H-XRF7
			Sampling Date	09/05/07	09/05/07	09/05/07	09/05/07	09/05/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	C&H Power Plant	C&H Power Plant	C&H Power Plant	C&H Power Plant	C&H Power Plant
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	<LOD	<LOD	4,219	10,355	<LOD
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Iron	12,000	160,000	mg/kg	4,793	406	3,956	628,850	6,609
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	<LOD	<LOD	<LOD	143	47,378
Zinc	47	170,000	mg/kg	272	158	244	72	488
Arsenic	5.8	7.6	mg/kg	21	<LOD	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	<LOD	<LOD	<LOD	57	38
Strontium	--	330,000	mg/kg	564	464	401	553	761
Zirconium	--	--	mg/kg	<LOD	<LOD	<LOD	119	54
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	32
Silver	1	2,500	mg/kg	60	62	<LOD	<LOD	105
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	80
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	122	<LOD	2,674	190	562

**Table 10 - AOI 23 XRF Screening Results
Torch Lake Area Assessment
September 5, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	C&H-XRF8	C&H-XRF9	C&H-XRF10	C&H-XRF11	C&H-XRF12
			Sampling Date	09/05/07	09/05/07	09/05/07	09/05/07	09/05/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	C&H Power Plant	C&H Power Plant	C&H Power Plant	C&H Power Plant	C&H Power Plant
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	6,373	<LOD	3,956	2,872	<LOD
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	<LOD	<LOD	271	<LOD
Iron	12,000	160,000	mg/kg	31,046	20,614	35,219	25,719	3,528
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Nickel	20	4,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	302	39	4,605	161	357,508
Zinc	47	170,000	mg/kg	33	<LOD	61	60	<LOD
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	13	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	33	26	76	57	<LOD
Strontium	NA	330,000	mg/kg	564	83	110	192	63
Zirconium	--	--	mg/kg	162	52	382	157	<LOD
Molybdenum	NA	2,600	mg/kg	12	<LOD	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	113	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	66	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Antimony	NA	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	30	<LOD	22	13	121

**Table 10 - AOI 23 XRF Screening Results
Torch Lake Area Assessment
September 5, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	C&H-XRF13	C&H-XRF14	C&H-XRF15
			Sampling Date	09/05/07	09/05/07	09/05/07
			Sample Matrix	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF
			Sample Number/ Location	C&H Power Plant	C&H Power Plant	C&H Power Plant
			Units	mg/kg	mg/kg	mg/kg
Metals						
Titanium	--	--	mg/kg	<LOD	3,082	1,505
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	<LOD	<LOD
Iron	12,000	160,000	mg/kg	46,303	10,542	13,184
Cobalt	6.8	2,600	mg/kg	<LOD	<LOD	<LOD
Nickel	20	4,000	mg/kg	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	2,735,217	274	5,377
Zinc	47	170,000	mg/kg	<LOD	19	<LOD
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	<LOD	62	64
Strontium	NA	330,000	mg/kg	146	55	22
Zirconium	--	--	mg/kg	104	221	131
Molybdenum	NA	2,600	mg/kg	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD
Antimony	NA	180	mg/kg	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	518	15	<LOD

**Table 10 - AOI 23 XRF Screening Results
Torch Lake Area Assessment
September 5, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"-" – Not listed in MDEQ Part 201 Tables

< – Less than

**Table 11 - AOI 24 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	LL-2-7	LL-S2-8	LL-2-8	LL-2'-8	LL-2-9
			Sampling Date	09/12/07	09/12/07	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	Laboratory	XRF	XRF	XRF
			Sample Number/ Location	Torch Lake Backwater Area	Torch Lake Backwater Area	Torch Lake Backwater Area	Torch Lake Backwater Area	Torch Lake Backwater Area
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals								
Titanium	--	--	mg/kg	3,393	NT	1,605	2,255	4,855
Chromium	18	790,000	mg/kg	<LOD	20 J	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	<LOD	350	<LOD	<LOD	<LOD
Iron	12,000	160,000	mg/kg	25,196	NT	20,383	21,498	34,617
Cobalt	6.8	2,600	mg/kg	<LOD	14 J	<LOD	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	34 J	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	623	2,100 J	4,620	602	7,731
Zinc	47	170,000	mg/kg	31	130	29	41	<LOD
Arsenic	5.8	7.6	mg/kg	<LOD	1.1 J *	9	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	NT	<LOD	<LOD	<LOD
Rubidium	--	--	mg/kg	48	NT	38	42	58
Strontium	--	330,000	mg/kg	106	<270	71	109	120
Zirconium	--	--	mg/kg	288	NT	249	270	277
Molybdenum	--	2,600	mg/kg	<LOD	NT	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	1.3 J	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	57	NT	<LOD	51	<LOD
Tin	--	--	mg/kg	<LOD	NT	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	NT	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	NT	<LOD	<LOD	<LOD
Mecury	0.13	160	mg/kg	<LOD	0.029	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	6.9 J *	13	8	16
Aluminum	6,900	50,000	mg/kg	NT	11,000 J	NT	NT	NT
Beryllium	--	410	mg/kg	NT	0.94 J *	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	6.00	NT	NT	NT

Table 11 - AOI 24 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 12, 2007

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000)

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory sample results are on a dry weight basis.

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

U.S. EPA – United States Environmental Protection Agency

XRF – X-Ray Fluorescence

"--" – Not listed in MDEQ Part 201 Tables

J - Data qualified as estimated based on data validation

* - Analyte detected below quantitation limits

< – Less than

**Table 12 - AOI 25 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 11, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	TraprockB-5	TraprockB-6	TraprockB-7	TraprockB-8	TraprockB-8	TraprockB-9
			Sampling Date	09/11/07	09/11/07	09/11/07	09/11/07	09/11/07	09/11/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	Laboratory	XRF	XRF
			Sample Number/ Location	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg			
Metals									
Titanium	--	--	mg/kg	3,995	8,194	<LOD	NT	2,505	3,559
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	4.5 J *	<LOD	<LOD
Manganese	440	25,000	mg/kg	262	1,362	<LOD	390	217	<LOD
Iron	12,000	160,000	mg/kg	31,322	79,835	6,214	NT	10,175	11,147
Cobalt	6.8	2,600	mg/kg	578	924	173	9.4 J	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	30 J	<LOD	<LOD
Copper	32	20,000	mg/kg	2,619	288	382	360 J	148	223
Zinc	47	170,000	mg/kg	66	388	34	95	70	82
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	4.6 J	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Rubidium	--	--	mg/kg	75	11	5	NT	44	16
Strontium	--	330,000	mg/kg	86	169	27	<250	116	505
Zirconium	--	--	mg/kg	367	92	34	NT	137	188
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	26	NT	<LOD	21
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	1.7 J	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	0.052	<LOD	<LOD
Lead	21	400	mg/kg	<LOD	27	24	48 J	38	90
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	9,800 J	NT	NT
Beryllium	--	410	mg/kg	NT	NT	NT	0.59 J *	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	NT	7.30	NT	NT

**Table 12 - AOI 25 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 11, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	TraprockB-10	TraprockB-11	TraprockB-12	TraprockB-12	TraprockB-13	TraprockB-14
			Sampling Date	09/11/07	09/11/07	09/11/07	09/11/07	09/11/07	09/11/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	Laboratory	XRF	XRF	XRF
			Sample Number/ Location	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump	Traprock Slag Dump
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals									
Titanium	--	--	mg/kg	2,691	12,948	NT	4,282	4,932	<LOD
Chromium	18	790,000	mg/kg	<LOD	<LOD	<11 J	<LOD	<LOD	<LOD
Manganese	440	25,000	mg/kg	219	1,842	17	<LOD	<LOD	288
Iron	12,000	160,000	mg/kg	27,244	82,869	NT	24,745	10,904	2,252
Cobalt	6.8	2,600	mg/kg	393	<LOD	0.44 J *	<LOD	<LOD	<LOD
Nickel	20	40,000	mg/kg	<LOD	<LOD	1.2 J *	<LOD	<LOD	<LOD
Copper	32	20,000	mg/kg	184	446	47 J	98	66	<LOD
Zinc	47	170,000	mg/kg	225	<LOD	14	85	<LOD	<LOD
Arsenic	5.8	7.6	mg/kg	33	<LOD	4.2 J	<LOD	<LOD	<LOD
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	NT	<LOD	<LOD	6
Rubidium	--	--	mg/kg	41	47	NT	86	47	<LOD
Strontium	--	330,000	mg/kg	293	855	440	266	106	43
Zirconium	--	--	mg/kg	155	237	NT	139	316	63
Molybdenum	--	2,600	mg/kg	15	<LOD	NT	<LOD	<LOD	<LOD
Silver	1	2,500	mg/kg	<LOD	118	0.18 J	<LOD	<LOD	<LOD
Cadmium	1.2	550	mg/kg	<LOD	<LOD	NT	<LOD	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	<LOD	NT	<LOD	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	<LOD	NT	<LOD	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	<LOD	NT	<LOD	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	<LOD	0.0047	<LOD	<LOD	<LOD
Lead	21	400	mg/kg	241	<LOD	17 J	192	15	<LOD
Aluminum	6,900	50,000	mg/kg	NT	NT	13,000 J	NT	NT	NT
Beryllium	--	410	mg/kg	NT	NT	1.4 J *	NT	NT	NT
Lithium	9.8	4,200	mg/kg	NT	NT	11	NT	NT	NT

**Table 12 - AOI 25 XRF Screening and Laboratory Analytical Results
Torch Lake Area Assessment
September 11, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000)

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J - Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ - Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory sample results are on a dry weight basis.

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"--" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitation limits

< – Less than

**Table 13 - AOI 26 XRF Screening Results
Torch Lake Area Assessment
September 12, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	BootjackB-15	BootjackB-16	BootjackB-17
			Sampling Date	09/12/07	09/12/07	09/12/07
			Sample Matrix	Soil	Soil	Soil
			Sample Type	XRF	XRF	Laboratory
			Sample Number/ Location	Bootjack Stampsand	Bootjack Stampsand	Bootjack Stampsand
			Units	mg/kg	mg/kg	mg/kg
Metals						
Titanium	--	--	mg/kg	5,830	5,830	NT
Chromium	18	790,000	mg/kg	<LOD	<LOD	<9.9 J
Manganese	440	25,000	mg/kg	740	740	48
Iron	12,000	160,000	mg/kg	52,547	52,547	NT
Cobalt	6.8	2,600	mg/kg	654	654	1.7 J *
Nickel	20	40,000	mg/kg	<LOD	<LOD	5.3 J *
Copper	32	20,000	mg/kg	1,943	1,943	110 J
Zinc	47	170,000	mg/kg	64	64	26
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	1.7 J
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	NT
Rubidium	--	--	mg/kg	24	24	NT
Strontium	--	330,000	mg/kg	165	165	<250
Zirconium	--	--	mg/kg	220	220	NT
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	NT
Silver	1	2,500	mg/kg	<LOD	<LOD	0.064 J *
Cadmium	1.2	550	mg/kg	<LOD	<LOD	NT
Tin	--	--	mg/kg	<LOD	<LOD	NT
Antimony	--	180	mg/kg	<LOD	<LOD	NT
Barium	75	37,000	mg/kg	<LOD	<LOD	NT
Mercury	0.13	160	mg/kg	<LOD	<LOD	0.016
Lead	21	400	mg/kg	<LOD	<LOD	23 J
Aluminum	6,900	50,000	mg/kg	NT	NT	2,600 J
Beryllium	--	410	mg/kg	NT	NT	<5 J
Lithium	9.8	4,200	mg/kg	NT	NT	2.60

**Table 13 - AOI 26 XRF Screening Results
Torch Lake Area Assessment
September 12, 2007**

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).

Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.

AOI - Area of Investigation

J – Data qualified as estimated based on data validation

LOD – Level of Detection for the Innov-X XRF Instrument

MDEQ – Michigan Department of Environmental Quality

mg/kg – Milligrams per kilogram. Laboratory sample results are on a dry weight basis.

NT – Not Tested

Part 201-RDCC – MDEQ Part 201 Residential Direct Contact Criteria

Part 201-SDBL – MDEQ Part 201 Statewide Default Background Level

XRF – X-Ray Fluorescence

"-" – Not listed in MDEQ Part 201 Tables

* – Analyte detected below quantitation limits

< – Less than

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
Torch Lake Site Assessment
September 10, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GayB-2	GayB-3	GayB-4	GayB-5	GayB-6	GayB-6	GayB-7	GayB-8	
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	Laboratory	XRF	XRF	XRF	XRF
			Sample Number/ Location Units	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg	Gay Sands Ruins mg/kg
Metals												
Titanium	--	--	mg/kg	6,743	11,503	11,224	22,214	NT	30,265	7,908	20,461	
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	16	<LOD	<LOD	<LOD	
Manganese	440	25,000	mg/kg	614	625	791	1,323	270	<LOD	844	<LOD	
Iron	12,000	160,000	mg/kg	149,596	84,797	85,090	296,329	NT	368,539	75,486	268,277	
Cobalt	6.8	2,600	mg/kg	1,278	1,078	799	<LOD	13	<LOD	775	<LOD	
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	33	<LOD	<LOD	<LOD	
Copper	32	20,000	mg/kg	1,421	2,586	1,371	450,143	320,000	653,430	9,606	596,985	
Zinc	47	170,000	mg/kg	243	76	94	<LOD	180 J	<LOD	212	<LOD	
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	325	350	409	<LOD	325	
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	21	NT	46	<LOD	34	
Rubidium	--	--	mg/kg	12	<LOD	<LOD	20	NT	21	19	<LOD	
Strontium	--	330,000	mg/kg	95	256	132	166	<230	228	170	153	
Zirconium	--	--	mg/kg	122	144	139	<LOD	NT	<LOD	166	<LOD	
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	<LOD	
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	1,971	220	2,941	111	2,646	
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	<LOD	
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	<LOD	
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	<LOD	
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	<LOD	
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	1.30	<LOD	<LOD	<LOD	
Lead	21	400	mg/kg	88	20	<LOD	95	290	<LOD	144	<LOD	
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	8,200 J	NT	NT	NT	
Beryllium	--	410	mg/kg	NT	NT	NT	NT	0.52 *	NT	NT	NT	
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	3	NT	NT	NT	

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
Torch Lake Site Assessment
September 10, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GayB-9	GayB-11	GayB-11	GayB-12	GayB-13	GayB-14	GayB-14	GayB-15
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	Laboratory	XRF	XRF	XRF	Laboratory	XRF	XRF
			Sample Number/ Location	Gay Sands Ruins	Gay Sands Ruins	Gay Sands Ruins	Gay Sands Ruins	Gay Sands Ruins	Gay Sands Ruins	Gay Sands Ruins	Gay Sands Ruins
Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg		
Metals											
Titanium	--	--	mg/kg	11,513	NT	16,167	14,455	10,290	NT	8,885	6,235
Chromium	18	790,000	mg/kg	<LOD	45	<LOD	<LOD	<LOD	61	<LOD	<LOD
Manganese	440	25,000	mg/kg	995	200	918	782	501	610	660	1,980
Iron	12,000	160,000	mg/kg	92,730	NT	94,199	79,604	59,432	NT	61,926	367,120
Cobalt	6.8	2,600	mg/kg	655	14	<LOD	870	<LOD	12	512	<LOD
Nickel	20	40,000	mg/kg	<LOD	39	<LOD	<LOD	<LOD	31	<LOD	<LOD
Copper	32	20,000	mg/kg	17,720	430,000	286,596	1,624	1,219	990	1,073	1,082
Zinc	47	170,000	mg/kg	372	97 J	<LOD	82	53	14,000 J	10,509	1,258
Arsenic	5.8	7.6	mg/kg	<LOD	670	370	27	<LOD	58	132	46
Selenium	0.41	2,600	mg/kg	<LOD	NT	18	<LOD	<LOD	NT	13	<LOD
Rubidium	--	--	mg/kg	7	NT	<LOD	67	24	NT	28	17
Strontium	--	330,000	mg/kg	167	<240	159	236	182	<200	124	200
Zirconium	--	--	mg/kg	122	NT	<LOD	199	142	NT	103	110
Molybdenum	--	2,600	mg/kg	<LOD	NT	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Silver	1	2,500	mg/kg	148	150	1,127	<LOD	<LOD	0.94	111	<LOD
Cadmium	1.2	550	mg/kg	<LOD	NT	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Tin	--	--	mg/kg	<LOD	NT	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Antimony	--	180	mg/kg	<LOD	NT	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Barium	75	37,000	mg/kg	<LOD	NT	<LOD	<LOD	<LOD	NT	<LOD	<LOD
Mercury	0.13	160	mg/kg	<LOD	0.63	<LOD	<LOD	<LOD	0.026	<LOD	<LOD
Lead	21	400	mg/kg	198	82	<LOD	38	19	850	698	123
Aluminum	6,900	50,000	mg/kg	NT	7,200 J	NT	NT	NT	11,000 J	NT	NT
Beryllium	--	410	mg/kg	NT	0.8 *	NT	NT	NT	<4.1	NT	NT
Lithium	9.8	4,200	mg/kg	NT	2.90	NT	NT	NT	5.00	NT	NT

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
Torch Lake Site Assessment
September 10, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GayB-16	GAY-S1-01	GAY-S1-02	GAY-S1-03	GAY-S1-04	GAY-S1-05	GAY-S1-06	GAY-S1-07	
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Gay Sands Ruins	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals												
Titanium	--	--	mg/kg	10,134	10,171	10,673	9,024	11,671	10,912	<LOD	13,812	
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Manganese	440	25,000	mg/kg	651	577	663	693	769	660	<LOD	617	
Iron	12,000	160,000	mg/kg	74,650	80,898	79,501	67,592	84,928	80,635	78,331	78,670	
Cobalt	6.8	2,600	mg/kg	642	705	681	690	822	834	<LOD	764	
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Copper	32	20,000	mg/kg	1,122	1,504	1,640	1,153	1,237	2,590	3,867	1,750	
Zinc	47	170,000	mg/kg	595	91	100	66	97	111	<LOD	106	
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	11	
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Rubidium	--	--	mg/kg	20	9	10	14	10	9	<LOD	14	
Strontium	--	330,000	mg/kg	155	115	118	153	82	136	169	121	
Zirconium	--	--	mg/kg	105	155	140	129	158	143	<LOD	158	
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	96	<LOD	<LOD	
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Lead	21	400	mg/kg	45	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
Torch Lake Site Assessment
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Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GAY-S1-08	GAY-S1-09	GAY-S1-10	GAY-S1-11	GAY-S1-12	GAY-S1-13	GAY-S1-14	GAY-S1-15	
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals												
Titanium	--	--	mg/kg	8,750	10,213	10,463	11,121	10,560	8,508	9,451	9,974	
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Manganese	440	25,000	mg/kg	547	514	621	787	641	584	623	595	
Iron	12,000	160,000	mg/kg	69,174	75,427	74,525	77,926	73,338	68,150	69,781	69,246	
Cobalt	6.8	2,600	mg/kg	797	793	572	663	961	904	855	857	
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Copper	32	20,000	mg/kg	2,655	1,788	1,438	1,584	1,691	1,378	1,503	1,608	
Zinc	47	170,000	mg/kg	90	89	96	93	68	72	94	68	
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Rubidium	--	--	mg/kg	13	13	9	13	10	14	14	17	
Strontium	--	330,000	mg/kg	160	118	87	113	115	83	128	147	
Zirconium	--	--	mg/kg	131	147	143	158	142	143	143	136	
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	570	<LOD	<LOD	
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
Torch Lake Site Assessment
September 10, 2007**

Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GAY-S1-16	GAY-S1-17	GAY-S1-18	GAY-S1-19	GAY-S1-20	GAY-S1-21	GAY-S1-21	GAY-S1-22	
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF	Laboratory	XRF	XRF	
			Sample Number/ Location	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals												
Titanium	--	--	mg/kg	9,917	10,636	8,842	10,269	11,052	NT	9,116	10,956	
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	19 J	<LOD	<LOD	
Manganese	440	25,000	mg/kg	727	747	648	605	718	300	463	437	
Iron	12,000	160,000	mg/kg	72,488	76,196	77,658	71,544	77,381	NT	67,952	78,651	
Cobalt	6.8	2,600	mg/kg	612	770	787	754	634	18 J	660	968	
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	23 J	<LOD	<LOD	
Copper	32	20,000	mg/kg	1,363	1,498	1,449	1,399	1,822	1,400 J	1,365	4,132	
Zinc	47	170,000	mg/kg	86	69	84	76	90	62 J	76	71	
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	0.67 J *	9	<LOD	
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	
Rubidium	--	--	mg/kg	21	13	14	6	16	NT	11	10	
Strontium	--	330,000	mg/kg	106	108	129	113	103	<210	90	64	
Zirconium	--	--	mg/kg	138	149	156	139	146	NT	147	154	
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	0.8 J	<LOD	<LOD	
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	NT	86	<LOD	
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	NT	<LOD	<LOD	
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	0.0055 *	<LOD	<LOD	
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	1.5 J *	<LOD	<LOD	
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT	15,000 J	NT	NT	
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT	<4.3 J	NT	NT	
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT	5.10	NT	NT	

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
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Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GAY-S1-23i	GAY-S1-24i	GAY-S1-25	GAY-S1-26	GAY-S1-27	GAY-S1-28i	GAY-S1-29	GAY-S1-30	
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals												
Titanium	--	--	mg/kg	10,414	8,978	10,630	10,800	15,367	7,414	11,585	11,931	
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Manganese	440	25,000	mg/kg	585	687	674	747	988	574	553	781	
Iron	12,000	160,000	mg/kg	72,208	80,007	82,089	79,444	99,957	73,580	76,728	81,050	
Cobalt	6.8	2,600	mg/kg	891	1,293	745	885	956	819	609	878	
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Copper	32	20,000	mg/kg	1,028	1,097	2,222	4,484	1,617	2,028	1,828	1,855	
Zinc	47	170,000	mg/kg	76	83	109	99	109	83	86	91	
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	10	
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Rubidium	--	--	mg/kg	6	6	9	10	12	21	18	8	
Strontium	--	330,000	mg/kg	79	101	91	106	111	128	110	89	
Zirconium	--	--	mg/kg	127	138	156	149	183	196	139	160	
Molybdenum	--	2,600	mg/kg	13	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	91	<LOD	<LOD	<LOD	
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Barium	75	37,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
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Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GAY-S1-31	GAY-S1-32	GAY2-001	GAY2-002	GAY2-003	GAY2-004	GAY2-005	GAY2-006	
			Sampling Date	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07	09/10/07
			Sample Matrix	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
			Sample Type	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF	XRF
			Sample Number/ Location	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands	Gay Sands
			Units	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Metals												
Titanium	--	--	mg/kg	11,393	9,286	7,806	8,975	8,622	9,812	10,590	6,915	
Chromium	18	790,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Manganese	440	25,000	mg/kg	740	820	<LOD	<LOD	<LOD	<LOD	232	229	
Iron	12,000	160,000	mg/kg	78,330	77,792	59,779	69,585	71,179	68,757	76,564	54,697	
Cobalt	6.8	2,600	mg/kg	752	681	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Nickel	20	40,000	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Copper	32	20,000	mg/kg	1,628	1,648	1,652	3,124	859	1,176	965	2,509	
Zinc	47	170,000	mg/kg	105	83	<LOD	<LOD	47	77	64	<LOD	
Arsenic	5.8	7.6	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Selenium	0.41	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Rubidium	--	--	mg/kg	13	10	5	<LOD	13	25	25	14	
Strontium	--	330,000	mg/kg	115	106	106	158	75	77	137	71	
Zirconium	--	--	mg/kg	143	152	108	120	149	146	142	131	
Molybdenum	--	2,600	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Silver	1	2,500	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	85	<LOD	
Cadmium	1.2	550	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Tin	--	--	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Antimony	--	180	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Barium	75	37,000	mg/kg	<LOD	607	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Mercury	0.13	160	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Lead	21	400	mg/kg	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	<LOD	
Aluminum	6,900	50,000	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Beryllium	--	410	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	
Lithium	9.8	4,200	mg/kg	NT	NT	NT	NT	NT	NT	NT	NT	

**Table 14 - AOI 14 XRF Screening and Laboratory Analytical Results
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Parameter	Part 201 SDBL	Part 201 RDCC	Sample Name	GAY2-007
			Sampling Date	09/10/07
			Sample Matrix	Soil
			Sample Type	XRF
			Sample Number/ Location	Gay Sands
			Units	mg/kg
Metals				
Titanium	--	--	mg/kg	10,897
Chromium	18	790,000	mg/kg	262
Manganese	440	25,000	mg/kg	<LOD
Iron	12,000	160,000	mg/kg	91,425
Cobalt	6.8	2,600	mg/kg	<LOD
Nickel	20	40,000	mg/kg	<LOD
Copper	32	20,000	mg/kg	1,306
Zinc	47	170,000	mg/kg	47
Arsenic	5.8	7.6	mg/kg	<LOD
Selenium	0.41	2,600	mg/kg	<LOD
Rubidium	--	--	mg/kg	<LOD
Strontium	--	330,000	mg/kg	150
Zirconium	--	--	mg/kg	153
Molybdenum	--	2,600	mg/kg	<LOD
Silver	1	2,500	mg/kg	<LOD
Cadmium	1.2	550	mg/kg	<LOD
Tin	--	--	mg/kg	<LOD
Antimony	--	180	mg/kg	<LOD
Barium	75	37,000	mg/kg	<LOD
Mercury	0.13	160	mg/kg	<LOD
Lead	21	400	mg/kg	15
Aluminum	6,900	50,000	mg/kg	NT
Beryllium	--	410	mg/kg	NT
Lithium	9.8	4,200	mg/kg	NT

NOTES:

Screening conducted utilizing Innov-X-XRF (Model X-4000).
 Results in shaded boxes exceed the MDEQ Part 201 Residential Direct Contact Criteria.
 AOI - Area of Investigation
 J - Data qualified as estimated based on data validation
 LOD - Level of Detection for the Innov-X XRF Instrument
 MDEQ - Michigan Department of Environmental Quality
 mg/kg - Milligrams per kilogram. Laboratory sample results are on a dry weight basis.
 NT - Not Tested
 Part 201-RDCC - MDEQ Part 201 Residential Direct Contact Criteria
 Part 201-SDBL - MDEQ Part 201 Statewide Default Background Level
 XRF - X-Ray Fluorescence
 "--" - Not listed in MDEQ Part 201 Tables
 * - Analyte detected below quantitation limits
 < - Less than