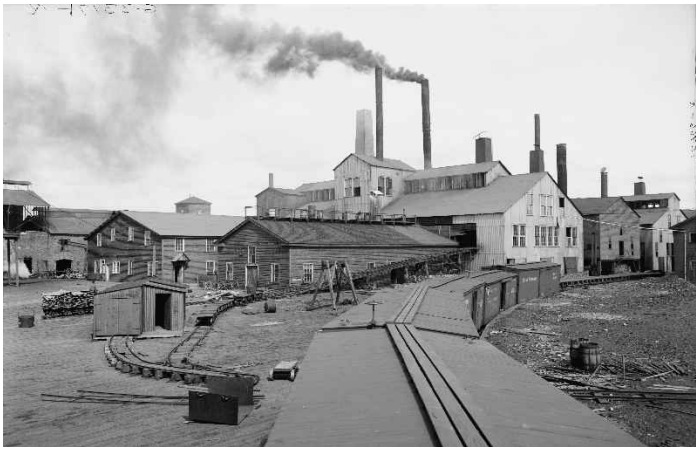
SITE INVESTIGATION REPORT

ABANDONED MINING WASTES – TORCH LAKE NON-SUPERFUND SITE
JULIO PROPERTIES – DOLLAR BAY
HOUGHTON COUNTY, MICHIGAN
SITE ID# 31000098



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APRIL 2024

PREPARED FOR:

EGLE

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
REMEDIATION AND REDEVELOPMENT DIVISION
CALUMET FIELD OFFICE

Mannik Smith GROUP

EXECUTIVE SUMMARY

The Mannik & Smith Group, Inc. (MSG) has prepared this Site Investigation (SI) Report as part of the Abandoned Mining Wastes – Torch Lake non-Superfund Site (Project) EGLE Abandoned Mining Waste (Site ID: 31000098). This report summarizes Michigan Department of Environment, Great Lakes, and Energy (EGLE) investigations completed in the Julio Properties – Dollar Bay area (the Site) in Dollar Bay, Houghton County, Michigan. The SI was prepared in accordance with the *Indefinite Scope Indefinite Delivery (ISID) Discretionary Proposal for FS and Remedial Action Activities* (24 February 2016) as amended, prepared by MSG in response to a request from the EGLE, Remediation and Redevelopment Division (RRD), Calumet Field Office under MSG's 2015 Environmental Services ISID Contract Number 00538 with the State of Michigan.

The Project is characterized by the risks posed by chemical containers and residues historically discarded in or near Torch Lake and along the north shoreline of the Portage Canal. These concerns are distinct and separate from the risks historically addressed under the U.S. Environmental Protection Agency's (EPA's) Superfund program. The RRD Superfund Section (SFS) has stated that the EPA defines the Torch Lake Superfund Site as the upper six inches (in.) of stamp sand and slag in certain areas of Houghton County and any soil cap and vegetative cover applied to such areas.

The remaining concerns at Torch Lake, the Portage Canal, and the surrounding areas identified by EGLE include known or suspected impacts to groundwater, surface water, sediments, and upland media that were not addressed under the Superfund program. Environmental impacts that were evaluated as part of the SI were assessed under the guidance of the following objectives:

- Investigate and document unidentified, significant in-lake and/or terrestrial sources of contamination including polychlorinated biphenyls (PCBs);
- Investigate and document bulk disposal areas, including made lands, stamp sand deposits, slag dumps, and landfills; and,
- Investigate and document industrial ruins including coal storage areas, underground storage tanks (USTs), asbestos containing materials (ACM), residual process materials (RPM), and any other waste materials identified during investigations.

Environmental impairments within Torch Lake and along the shorelines from Lake Linden to the Portage Lake Lift Bridge resulting from historical mining era industrial operations:

- Present potential exposure risk to human and ecological receptors;
- Limit the recovery of the Torch Lake and Portage Canal ecosystems;
- Create uncertainty over safe and beneficial reuse of the land; and,
- Delay delisting of Torch Lake as an Area of Concern (AOC) under the Great Lakes Water Quality Agreement due to Beneficial Use Impairments (BUIs) related to restrictions on fish and wildlife consumption because of the on-going presence of PCBs and mercury in fish and degradation of benthos because of metals contaminated sediments.

As such, the investigation was largely driven by documented observations of abandoned containers and/or other waste and debris locations in the lake and in upland areas, supported by documented historic operations.

Taking into account the specific objectives outlined above, the principal goal of this portion of the Project was to support a comprehensive management approach that will guide EGLE's decision making process in addressing potential human health and environmental risks present in the Julio Properties – Dollar Bay portion of the Quincy Mining Company Portage Operations Area (QMCP). The primary focus of the Project is to ascertain the source, nature, and

extent of contaminants (including PCBs) in all affected environmental media (soil, groundwater, surface water, and sediments) within the Project study area, including the Julio Properties – Dollar Bay area.

This SI Report assimilates information from multiple data sources into a logical and thorough narrative focused on the Julio Properties – Dollar Bay that consist of two non-contiguous parcels in Dollar Bay along the north shoreline of the Portage Canal. The parcels are:

- Julio Company/Former Amoco Bulk Fuel Terminal (48721 6th Street); and,
- Julio Marine (48735 Main Street).

The locations of the parcels are depicted on ***Figure 1-1****, Project Location Map*.

The findings presented herein were developed using the conclusions derived from historical operations research, investigation and response activities, and the investigation of data gaps or known or suspected impacts to groundwater, surface water, sediments, and upland media in and around the north side of the Portage Canal in Dollar Bay.

Due to the sizeable nature of the QMCP, this SI Report has been organized to present organizational and procedural steps that were common to the investigation in the first four sections of the document. Following these discussions that are broadly applicable to the Project as a whole, the SI Report transitions to a presentation of detailed findings specific to the Julio Properties – Dollar Bay within the QMCP. Remaining subareas addressed as part of the Project within the QMCP footprint are discussed in other SI reports. The SI Report then closes with a comprehensive summary of conclusions and recommendations. The following provides a brief overview of the SI Report's organization.

Section 1 of this SI Report defines the overall objectives and the organizational structure of the Project. Section 2 provides Project background information and its significance as it relates to each of the Site parcels. Section 3 provides a summary of the stepwise approach used to evaluate historical operational and analytical data, and its incorporation into the field procedures and sample collection activities prescribed in the Sampling and Analysis Plan (SAP) for the Project. Section 4 includes a summary of the relevant exposure criteria and pathways used to evaluate the analytical findings from the investigation. Section 5 through Section 7 provide detailed findings reports of the study areas included in the Julio Properties – Dollar Bay portion of the QMCP. Section 8 includes a summary of conclusions and recommendations. Section 9 includes references utilized in the development of this SI Report.

The submittal of the Julio Properties – Dollar Bay SI Report marks a significant milestone in the assessment of environmental impairments within the Portage Canal and industrial areas along the shoreline caused by historical mining and industrial operations not addressed under the EPA Superfund Program.

Environmental impacts at the Julio Properties – Dollar Bay are generally characterized by detections of organic and inorganic contaminants in soil, sediment, groundwater, and pore water; repercussions of mining era operations in the region. The following provides a summary of findings derived from the assessment of the Julio Properties – Dollar Bay with respect to the goals and objectives for the Project relative to the EGLE criteria at the time of Project completion:

- Terrestrial sources of contamination are present in the form of inorganic chemicals of concern (COCs), semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), and asbestos in the study area. Light non-aqueous phase liquid (LNAPL) was identified within 50 feet of the Portage Canal;

- In-lake sources of contamination in the form of inorganic COCs and SVOCs in the study area sediments and inorganic COCs in some areas of pore water. The detection of SVOCs in sediment may be indicative of a terrestrial source area;

- No in-lake or terrestrial uncharacterized waste deposits were identified in the study area;

- PCBs exceeded EGLE Residential and Nonresidential Direct Contact Criteria (DCC) in a surface soil sample at Julio Marine. No groundwater, pore water, or sediment samples analyzed for PCBs exceeded criteria or screening values in the study area; and,

- ACM was identified at numerous locations at Julio Marine. Four of the five ACM samples were friable and exposed to the elements.

The following is an outline of options for managing potential exposure risks at the Julio Properties – Dollar Bay and the Portage Canal:

- Section 20107a of Part 201 of Michigan's Natural Resources and Environmental Protection Act, being Public Act (PA) 451 of 1994, as amended (NREPA) describes the duties of owners or operators of a Facility, regardless of their liability, including: prevent unacceptable exposures, prevent exacerbation, and take reasonable precautions against the foreseeable actions of third parties. Some exceptions may apply; in any case, owners and operators of contaminated properties should become familiar with Section 20107a and the associated Rules.

- Future property users could conduct a risk assessment based on current and anticipated future land-use to help identify remedial goals for properties where potential risks may be present. Assessment based on current and future land-use contributes to the beneficial and safe re-use and potential redevelopment of any given property by clarifying applicability of regulatory statutes, as traditional property zoning (residential versus nonresidential) is generally undefined in the study area.

- Once property-specific exposure risks have been evaluated, remedial objectives can be established with appropriate land use restrictions that minimize or eliminate potential exposure risks. These land-use restrictions, or administrative controls, could be employed to ensure that exposures are reliably restricted by a restrictive covenant, institutional control, or other mechanism allowed for under Part 201.

- By copy of this SI Report, the Project findings were provided to the Remediation and Redevelopment Division Superfund Section (RRD SFS) which is responsible for monitoring EPA's remedy for the Torch Lake Superfund Site. RRD SFS should evaluate whether any remedy modifications are necessary in the Portage Canal and Dollar Bay or terrestrial areas previously addressed by EPA in light of the additional information provided by the Project.

- EGLE should continue to provide new study data to governmental stakeholders responsible for implementation and monitoring EPA's remedy for the terrestrial and in-lake portion of the Torch Lake Superfund Site so they can determine if any remedy modifications are necessary in light of the additional information provided by the Project. Responsible stakeholders should verify that administrative controls for areas that have been previously remediated by the EPA have been employed to ensure that EPA's selected remedy is performing as designed and those institutional controls, where required, have been recorded and are being enforced.

- Additionally, EGLE should continue to provide new study data to property owners and governmental stakeholders responsible for assessing potential public health impacts and making recommendations to the public, property owners, and other state agencies.

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1. INTRODUCTION

The Mannik & Smith Group, Inc. (MSG) has prepared this Site Investigation (SI) Report as part of the Abandoned Mining Wastes – Torch Lake non-Superfund Site (Project) EGLE Abandoned Mining Waste (Site ID: 31000098). This SI Report summarizes Michigan Department of Environment, Great Lakes, and Energy (EGLE) investigations completed in the Julio Properties – Dollar Bay area (the Site) in Dollar Bay, Houghton County, Michigan.

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This SI Report assimilates information from multiple data sources into a logical and thorough narrative focused on two non-contiguous Site parcels in Dollar Bay along the north shoreline of the Portage Canal. The parcels are:

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- Julio Marine (48735 Main Street).

The locations of the parcels are depicted on ***Figure 1-1, Project Location Map***.

This Site is within the former Quincy Mining Company (QMC) copper mining and processing operations which includes copper processing facilities in Dollar Bay (former smelter and wire mill), and the Ripley Waterfront (Quincy Smelting Works and associated supporting industries along Portage Lake and the Portage Canal). This area is defined by EGLE as the QMC Portage Operations Area (QMCP). The findings presented herein were developed using the conclusions derived from historical operations research, investigation activities, and the investigation of data gaps or known or suspected impacts to groundwater, surface water, sediments, and upland media in and around the north side of the Portage Canal in Dollar Bay.

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1.1 PROBLEM DEFINITION

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Taking into account the specific objectives outlined above, the principal goal of this portion of the Project was to support a comprehensive management approach that will guide EGLE's decision making process in addressing potential human health and environmental risks present in the Julio Properties – Dollar Bay portion of QMCP. The primary focus of the Project is to ascertain the source, nature, and extent of contaminants (including PCBs) in all affected environmental media (soil, groundwater, surface water, and sediments) within the Project study area, including the Site parcels that consist of former mining era industrial areas in Dollar Bay along the north shoreline of the Portage Canal. Due to the varying nature of historical operations at the Site parcels, each parcel was treated as a subarea as part of this SI work.

The locations of the subareas are depicted on ***Figure 1-2, Area Features Map Julio Properties – Dollar Bay***.

1.2 PROJECT ORGANIZATION

Performance of the work required that both the Project team and the Project structure were focused and deliberate. The phased approach of the work required that data was processed and reported between team members to facilitate the next phase of work. The following subsections describe the Project team and the Project structure, as it relates to management and implementation.

Project Team

The Project was developed and implemented by EGLE, building on the existing partnerships and stakeholder engagement in the local community. Field activities were completed by EGLE's Geological Services Section (GSS) (formerly the Geological Services Unit) and MSG. Analytical services were provided by EGLE's Environmental Laboratory or approved laboratories within the Contract Laboratory program.

Project Structure

The Project area is located along the shoreline and in Torch Lake and the Portage Canal, Houghton County, Michigan and copper processing facilities in Dollar Bay (former smelter and wire mill), Ripley Waterfront (Quincy Smelting Works and associated supporting industries along Portage Lake and the Portage Canal), the 270+ acre Centennial Mine, and other areas congruent with the Torch Lake Superfund Site where the response action has been limited to the application of vegetative cover or eliminating the area from further consideration.

Due to the complex nature and geographic expanse, RRD subdivided the Project into study areas based on past use and known issues. Dividing the regional operations into smaller manageable study areas allowed for prioritization of the proposed investigative approach, while also establishing a phased process for assessing environmental concerns regionally.

The aforementioned subareas that comprise the Julio Properties – Dollar Bay and major historical industrial operations within each subarea addressed in this SI Report are depicted on ***Figure 1-2, Area Features Map Julio Properties – Dollar Bay*** and described further in Section 2.

2. PROJECT DESCRIPTION

Hard rock mining operations were prevalent throughout Houghton and Keweenaw Counties for nearly a century, primarily spanning an era between the mid-1800s and the mid-1900s. As mining activities declined in the region, a majority of the mine holdings, including surface and underground operations were abandoned, scrapped, and remnants otherwise left in-place. The following subsections summarize both the operational and investigative history within the QMCP while also presenting the underlying rationale for the performance of the investigative activities.

2.1 SITE LOCATION AND DESCRIPTION

As previously discussed, the QMCP encompasses the former QMC copper mining and processing operations along the north shoreline of the Portage Canal on the south side of Highway M-26 from Dollar Bay, Michigan to the Portage Lake Lift Bridge in Hancock, Michigan. The QMCP consists of approximately 320 acres of land, much of which is made-lands, extending approximately 4.5 miles along the shoreline of the Portage Canal and incorporates multiple parcels and property owners. Residential (single-family residences)/commercial/vacant, undeveloped forested lands, industrial (capped made lands) properties, and the Portage Canal border the QMCP. Due to the varying nature of historical operations within the QMCP, the SI was organized by subareas within the footprint that have been subject to or associated with historic mining practices. In the case of this report, specific to the Julio Properties in Dollar Bay.

2.1.1 Portage Canal

The subareas described in Section 1 are located along the shoreline of the Portage Canal in Dollar Bay. Each of these former industrial operations relied on the waters of the Portage Canal for shipping, process water, and/or waste discharge. In addition, the communities established around these industrial facilities also used the lake for similar purposes, historically discharging sewage and other wastes into the lake.

One of the goals of the SI was to assess the potential presence of abandoned containers and wastes on the bottom of the Portage Canal in the QMCP and to more fully characterize the nature and extent of potential on-land contaminant sources. The evaluation of potential PCB sources and areas of PCB contamination in and around the Portage Canal were an integral component of the SI that will support the long-term protection and rehabilitation of the interconnected waterways.

2.2 SITE BACKGROUND

This Section provides an overview of the historical industrial operations, the local topography, geology, and hydrogeology, and past investigations and response actions in the QMCP and specifically, the Site parcels.

2.2.1 Site History

Copper mining was extensive in the Keweenaw and formed the backbone of the regional economy and society. Copper ore milling and smelting operations were conducted from the mid-1860s to the 1960s, including the importation, reprocessing, and smelting of various scrap metals in the later years of operation. Consistent with past industrial practices, Torch Lake and the Portage Canal served as dumping grounds for virtually all mining industry related wastes, including tailings, slag, and various chemicals.

Based on a review of Sanborn Fire Insurance maps, prior QMCP land uses consisted of a combination of industrial operations including, but not limited to, foundry, machining, coal and coke handling, bulk fuel handling, and boiler works. Simultaneously with industrial development, made lands were created as indicated by the approximate 1865

shoreline depicted on ***Figure 1-2, Area Features Map Julio Properties – Dollar Bay***. This is of importance as to the nature of the underlying fill material relative to the current areas of environmental interest.

Review of EGLE file information identified subareas of the QMCP footprint that have been subject to or associated with historic mining practices. Due to the varying nature of historical land uses, the following list provides an overview of known historic operations based on available Sanborn Maps and/or other resources for each of the Julio Properties – Dollar Bay subareas identified on ***Figure 1-2, Area Features Map Julio Properties – Dollar Bay.***

- Julio Company/Former Amoco Bulk Fuel Terminal – This area was not identified on available Sanborn Maps; however, according to Monette's Dollar Bay, Michigan, Fifty-Fourth of a Local History Series (Monette, 2000), Dollar Bay Terminal Company erected three 840,000 gallon welded steel gasoline storage tanks onsite in May of 1945. Three additional tanks were added to the site, which increased storage for kerosene, diesel fuel, and three grades of gasoline. In May 1984, the owner/operator Amoco Oil Company closed the facility, selling the property to Julio Contracting Company of Ripley. Other historic land use and/or mining operations are unknown. The current usage of the area is unknown, although it appears to be inactive. There is one building at the north corner on the property that includes a garage. Semi-tractor trailers, heavy equipment, fuel tanks of varying sizes, and construction material are staged throughout the property.

- Julio Marine – This area was identified as Tamarack and Osceola Copper Manufacturing Company on the 1907 Sanborn Map. It was the location of John A. Roebling's Sons Copper Manufacturing and Foley Copper Products Company Copper Wire Mill in 1928 and 1949, respectively. The property includes portions of the former wire mill operations. Many mining-era buildings, some that appear to be used for boat storage, are present in the central portion of the property. Additional boats, heavy equipment, and other vehicles are located north of the property buildings. Abandoned containers with unknown contents, fuel tanks of various sizes, including a tanker trailer along the shoreline, are also observed both inside and outside of property buildings.

A summary of historical findings is presented in ***Table 2-1, Summary of Historic Operations***.

Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS 2004) indicate that the vegetated cap in Dollar Bay was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. A portion of the subject vegetated cap was constructed on the Julio Marine parcel as part of the remedial actions. The capped areas are subject to an on-going EGLE operation and maintenance plan. The approximate limits of capping are depicted on ***Figure 1-2, Area Features Map Julio Properties – Dollar Bay***.

2.2.2 Topography and Local Geology

The Site parcels are located along the north shore of the Portage Canal in Dollar Bay, Osceola Township, Houghton County, Michigan. The shoreline in this area was historically characterized by industrial operations that included copper smelting, a wire mill, and other related operations.

At a mean elevation of approximately 600 feet (ft) Above Mean Sea Level (AMSL) at the shoreline of the Portage Canal, the land gently slopes upward to the north from the shoreline to an approximate elevation of 630 ft AMSL along Highway M-26. The vicinity of Highway M-26 is characterized by the community of Dollar Bay which features residential and commercial developments that are generally located to the west of a small inlet of the Portage Canal, Dollar Bay. Beyond this centrally developed area, the grade continues to increase towards the north, away from the canal, reaching elevations up to 1,200 ft AMSL along Highway U.S. 41. Numerous residential properties are scattered across the hillside along rural roads that connect the upper and lower highways.

Julio Properties – Dollar Bay is located within the Lake Superior Basin and the Keweenaw Peninsula Watershed. There are small creeks and streams that discharge to the Portage Canal near Dollar Bay. The largest is the Gooseneck Creek which discharges to the designated wetland area located northeast of Dollar Bay.

According to the *Soil Survey of Houghton County Area, Michigan* issued in October 1991 by the United States Department of Agriculture (USDA) – Soil Conservation Service (SCS), the near surface geology closer to the shore of the Portage Canal near the Julio Properties – Dollar Bay Site generally consists of soils that have been covered by fill. Areas of sand are more predominant within the community of Dollar Bay.

- For soils at the Site parcels, the USDA generally describes the soils as being in "…areas that have been covered with fill. In some areas the upper one to two feet of the original soil material has been removed for use as topsoil. The texture ranges from sand to clay loam. In most areas the soils are somewhat excessively drained to moderately well drained, but in some areas they are somewhat poorly drained or poorly drained. Many of these areas are old copper mill sites and contain numerous foundations and abandoned railroad grades."

- For soils located in areas within the developed community of Dollar Bay, the USDA generally describes the soils as "deep, nearly level and gently sloping soils on knolls and broad plains." The soils are somewhat excessively to excessively drained. The soils are typically comprised of about 1 inch of black, partially decomposed forest littler on the surface and include surface layers that are reddish gray or brown sand in thickness of 3 to 6 inches. Subsoils are typically dark reddish sands and dark brown gravelly coarse sands.

- Additional sandy soils located near Highway M-26 within the developed community of Dollar Bay are described by the USDA as "very deep, nearly level moderately well drained soil on broad plains and in small depressions. Typically the surface layer is very dark gray sand about 1 inch thick and includes subsoil that is brown and reddish yellow loose sand.

According to the map Quaternary Geology of Michigan (compiled in 1982 by W.R. Farrand and published by the Michigan Geological Survey), the near surface fill material and sands are underlain by native soils described as "lacustrine sand and gravel." The bedrock in the area of the Site consists of Jacobsville Sandstone described as red, brown, and white quartzose sandstone according to the *Bedrock Geology of Michigan* (R.L. Milstein, 1987).

Soil observations during the SI activities indicate that the subsurface at the Site parcels are generally comprised of sand and gravel to 3 feet (ft) below ground surface underlain by fine to medium brown sand to the end of boring which was typically 5 to 9 ft below ground surface. In areas without topsoil or fill material, surface soils were generally observed as fine to coarse brown sand, saturated between 2 and 7 ft below ground surface (bgs).

2.2.3 Local Hydrogeology

According to EGLE's Water Well Viewer, drinking water in the area is obtained entirely from groundwater sources. The community of Dollar Bay is served by two municipal wells located at the end of Horner Street in Dollar Bay. The municipal wells are 44 feet and 64 feet deep and were constructed in 1958 and 1979, respectively. Two municipal wells that were both 100 feet deep were located at the former Quincy Smelting Works in Ripley, west of Dollar Bay. Three additional municipal wells located approximately 1 mile southwest of the Project area on the south shore of Portage Lake provide drinking water to approximately 7,500 residents of the City of Houghton. Residential wells are used to provide water to the remainder of the population within the four-mile radius of the Site, while the Michigan American Water Company operates public water supply wells outside of the four-mile search radius. Please note that the search results are not a detailed representation of every potential groundwater receptor, nor did the search include a comprehensive assessment of water service in Dollar Bay.

As noted in the preceding subsection, several small streams drain to Portage Lake/Portage Canal near the Site parcels. The Portage Canal and the Keweenaw Waterway connect to Lake Superior.

During the SI activities, saturated soil conditions were generally encountered between depths of 2 ft and 7 ft bgs. However, some borings did not encounter groundwater at depths up to 5 ft bgs where refusal was encountered.

2.2.4 Groundwater Conditions

Groundwater was encountered at the Julio Marine property area in unconfined sand units at varying depths, ranging from approximately two (2) to seven (7) ft bgs. Static water levels measured prior to groundwater sampling in October 2019 ranged from one (1) to five (5) ft below top of casing (TOC). To assess the groundwater flow potential direction and velocity for the Site, GSS converted static water levels to top of groundwater elevations which were used to generate groundwater contours for the October 2019 event. Groundwater surface elevations and contours for the November 2021 monitoring event are depicted on ***Figure 6-3*** *Groundwater Analytical Results (Julio Marine).*

Groundwater velocity for select monitoring events was calculated using Darcy's equation:

$V_{gw} = Ki/n$

Where: V_{gw} = groundwater velocity
K = average hydraulic conductivity in feet per day (ft/day)
i = horizontal hydraulic gradient in feet per foot (ft/ft)
n = effective porosity

A hydraulic conductivity value of 2.8 ft/day and an effective porosity of 30% (0.3) were used for the purpose of determining groundwater velocity. These values are estimated and are based on values for fine grained sand taken from *Groundwater* (Freeze and Cherry, 1979).

The groundwater surface elevations for MW-12 (603.48) and MW-8 (603.18) as measured on October 16, 2019, were used to determine the horizontal hydraulic gradient of 0.00057 between the two wells. As a result, groundwater flow velocity was calculated to be 0.00532 ft/day (1.94 feet per year) to the south.

2.2.5 Overview of Regulatory Investigations and Response Actions

The Project area, including the lands and waterways throughout the Keweenaw Peninsula, were the location of copper milling and beneficiation activities beginning in circa 1868. The environmental legacy resulting from over 100 years of mining led to Torch Lake and its western shoreline, and surrounding water bodies and former mining era industrial properties throughout Houghton County to be designated as a Superfund site by the EPA Torch Lake Superfund Site and Torch Lake as a Great Lakes Area of Concern by the U.S. government (in consultation with the States) under the Great Lakes Water Quality Agreement Torch Lake AOC. The EPA undertook cleanup activities to address some of the byproducts of the mining industry while others were not addressed or left to recover through natural processes. Through a series of studies EPA concluded the Torch Lake Superfund Site posed actual or threatened releases of hazardous substances that may present an imminent and substantial endangerment to public health, welfare, or the environment. Given the complexity of the region wide issue, the EPA's 1992 Record of Decision (ROD) divided the Torch Lake Site into three Operable Units (OUs):

- OU 1 includes surface tailings, drums, and slag pile/beach on the western shore of Torch Lake. These tailing piles include stamp sands in Lake Linden, Hubbell/Tamarack City, and Mason, while a slag pile/beach is located in Hubbell;
- OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Canal, and other water bodies; and,

- OU 3 includes tailings and slag deposits located in the north entry of Lake Superior, Michigan Smelter, Quincy Smelter, Calumet Lake, Isle-Royale, Boston Pond, and Grosse-Point.

The OU 1 and OU 3 remedy selected and implemented by the EPA required that stamp sands, tailings, and slag piles be covered with soil and vegetation, and that use restrictions be put in place to protect the covered materials' long-term integrity. Through these measures it was concluded that the following Remedial Action Objectives (RAO) would be met:

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

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

- The reduction of stamp sand loading to surface water bodies expected as a result of the remedial action taken at OU 1 and OU 3;
- Ongoing natural sedimentation and detoxification such as that which is occurring in other surface water bodies in the area;
- Institutional programs and practices controlling potential future exposure to site-affected groundwater which are administered at the county and state level; and,
- The long-term monitoring and the five-year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.

The QMCP study area is located within the Torch Lake Superfund Site footprint; however, the properties south of M-26 identified for assessment were not included in the Torch Lake Superfund Site OU1, nor were remedies put in place to mitigate environmental conditions on the properties except as described in Section 2.2.1 above for certain Dollar Bay locations and at the Quincy Smelting Works which was not further investigated during the QMCP SI since environmental concerns at that property are being addressed by other entities. OU2, for which EPA selected a no-action alternative, includes groundwater, surface water, submerged tailings (stamp sands), and sediment that were also investigated.

Numerous environmental investigations and response activities have been completed within the QMCP by state and federal agencies as well as private parties. The investigations were conducted on and along the north shoreline of the Portage Canal with various purposes, often specific to a particular property or investigative focus. Although often referenced in individual reports, a comprehensive approach consolidating the findings of these investigations had not been completed to date.

The data and information derived from these investigations were assimilated and compiled by EGLE and summarized by MSG in a document entitled *Historical Data Review and Compilation Technical Memorandum Abandoned Mining Wastes – Torch Lake Non-Superfund Site – Quincy Mining Company Portage Operations Area* dated August 2018 and discussed further in Section 3. The findings of these investigations and the conclusions derived from the performance of each assessment were selected to assist in the identification of historic areas of contamination or data gaps requiring further assessment.

Response actions completed in the QMCP include the aforementioned capping activities completed by the EPA. “The stabilization and covering of contaminated mine tailings and slag material in areas of Torch Lake or surrounding water bodies also reportedly included the recording of institutional controls, the natural recovery of area water bodies, and long-term monitoring of area water bodies and groundwater (EPA, 2008).” The capped area of the Quincy Smelting Works within the QMCP was delisted from the (National Priorities List) Torch Lake Superfund Site in 2013, while the capped portion of The Torch Lake Superfund Site in Dollar Bay has not been deleted from the NPL. EGLE has taken responsibility for operation and maintenance activities in those areas where remedial actions have been implemented, regardless of listing.

Investigations in the QMCP have identified elevated levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), being predominantly polynuclear aromatics (PNAs), PCBs, and inorganic contaminants. Areas with concerns along the shoreline of the Portage Canal, identified by EGLE and others, include known or suspected impacts to groundwater, surface water, sediments, and upland media that were not addressed under the Superfund program.

3. FIELD PROCEDURES AND SAMPLE COLLECTION

The field procedures and sample collection activities that were implemented in the QMCP were used to evaluate the presence of contaminated environmental media in the industrial areas described in Section 2. This Section describes the phased approach for reviewing and assessing each area and the subsequent field sampling and laboratory analysis that followed.

3.1 PLANNING AND COORDINATION

The assessment and investigation of the QMCP included several steps that served as the foundation for the *Sampling and Analysis Plan for the Abandoned Mining Wastes Torch Lake Non-Superfund Site, Quincy Mining Company Portage Operations Area, Houghton County, Michigan* (SAP) prepared by MSG in August 2018 and periodically amended based on interim SI findings. The following subsections describe the research, mapping, and testing procedures that were utilized during SAP development to ensure that the investigative activities were not redundant and focused on the goals and objectives established by EGLE.

3.1.1 Historical Research and Data Compilation

The implementation of the investigative portion of the SI was closely linked to the collaborative efforts of the Project team, described in Section 1. The review of EGLE file information, including available Sanborn Maps and/or other resources for each area was critical to the development of the SAP since the findings specifically identified the location of facilities and operational areas that were historically subject to or associated with historic mining practices. The following provides a summary of the activities completed by EGLE and summarized by MSG that were used to support SAP development:

- Identification of potential sources of contaminants of concern (COCs), including PCBs, through the evaluation of previously collected data.
- Investigation of resources related to buildings and/or operations of environmental concerns by subarea.
- Completion of mapping activities based on collected historic data, and field inspections noting the location of foundations and building remnants.

A summary of historical findings is presented in *Table 2-1, Summary of Historic Operations*.

3.1.2 Data Compilation Technical Memorandum

As outlined in Section 2, the comprehensive nature of the SI entailed not only a historical operational perspective, but also required that the results of previous investigative activities be incorporated. The evaluation and interpretation of analytical results and findings from previous key investigations was completed to create a baseline understanding of conditions in the QMCP and along the Portage Canal. The incorporation of these findings into the sampling program not only minimized redundancies in data collection, but also created a more comprehensive approach for assessing potential environmental impacts.

The following is a list of the key documents summarized in the *Historical Data Review and Compilation Technical Memorandum Abandoned Mining Wastes – Torch Lake Non-Superfund Site – Quincy Mining Company Portage Operations Area* dated August 2018:

- Michigan Department of Transportation M-DOT M-26, Ripley, Houghton County Hydrogeological Investigation – April 18, 1991. Prepared by M-DOT Geoenvironmental Services Unit Materials & Technology Division.

- 1st Preliminary Report Dollar Bay Wells – March 31, 1995. Prepared by Traverse Engineering Services.

- Letter of Notice Re: Complaint Inspection, Julio Construction Property Adjacent to Keweenaw Canal, Ripley, Houghton County – December 12, 1995. Prepared by Michigan Department of Environmental Quality (MDEQ, now EGLE).

- Phase II Hydrogeological Investigation Report, Houghton County Road Commission Ripley Garage – August 1998. Prepared for Houghton County Road Commission. Prepared by SCA Environmental.

- Brownfield Redevelopment Assessment Report for Hancock/Ripley Trail Property – November 25, 2002. Prepared by MDEQ.

- Summary Report for the Torch Lake Area Assessment, Torch Lake NPL Site and Surrounding Area, Keweenaw Peninsula, Michigan – December 13, 2007. Prepared by Weston Solutions, Inc.

- Letter of Notice Re: Dollar Bay Well Field, Dollar Bay, Houghton County, Site ID: 31000089 – August 4, 2010. Prepared by Department of Natural Resources and Environment (DNRE, now EGLE).

- Baseline Environmental Assessment: Royce Road Marina, Royce Road, Franklin Township, Houghton County, MI 49930 – October 26, 2015. Prepared by TriMedia Environmental & Engineering (TriMedia).

- Correspondence between Horner Flooring Co. Inc. and MDEQ – April 3, 1995.

- Quincy Mining Company Portage, Houghton County, Site ID #31000098, Bathymetric Investigation-Side Scan Sonar– January 9, 2018. Prepared be MDEQ.

In support of developing a comprehensive approach for evaluating risks, the analytical results from the investigations summarized above were compiled and compared to the same regulatory criteria. Consistent with this approach, the same regulatory criteria were used to evaluate the analytical results collected during the SI. The regulatory criteria utilized for evaluating analytical results from surface soil, subsurface soil, groundwater, sediment, surface water, building materials, and waste deposits are discussed in detail in Section 4.

The analytical results from these key investigations were used to characterize the QMCP and contributed to the horizontal and vertical placement of the proposed sampling locations presented in the SAP. Consequently, the review and evaluation of the summarized reports resulted in the preparation of a SAP that built upon existing analytical results and focused on potential risks posed to human health and ecological receptors. In addition, the SI was also guided by the documented observations of drum and/or other debris locations as well as consideration related to historic operations and potential PCB presence.

3.1.3 Offshore Mapping and Procedural Testing

Without available analytical results from surface water and sediment samples, it could not be determined whether contaminants emanating from documented contamination on land were impacting the nearshore aquatic environment of the Portage Canal. The visual confirmation of the underwater targets was a key component to the Project, distinguishing it from previous investigations by eliminating the concept of “blind” sampling and focusing sample locations on specific waste deposits.

Evaluation of these underwater features as part of the SI required the use of advanced technological methods to identify specific targets for sample collection. Completion of these tasks again relied upon the collaborative efforts of the Project team to conduct underwater mapping and video surveillance of the lake bottom.

In 2017, EGLE's GSS conducted a side scan sonar survey of the three investigative lake bottom areas located in the Portage Canal offshore from the communities of Ripley and Dollar Bay. Areas were scanned using a Hummingbird 797c[2] equipped with an external global positioning (GPS) antenna, results were interpreted, and areas where targets were most likely to be present were identified. The intent of the assessment was to collect qualitative data that could be used to develop a plan for more traditional investigation, sampling, and assessment of potential offshore contaminant sources. The side scan sonar images generated by EGLE's GSS are included in ***Appendix A,*** *Side Scan Sonar Imagery.*

The next step of the investigation included visual confirmation of the targets that were identified through the interpretation of the side-scan sonar imagery. EGLE's GSS deployed their Remotely Operated Vehicle (ROV) at select locations to investigate and provide visual evidence of potential drum locations and similar anomalous underwater features. Underwater images and videos obtained from the ROV are included in ***Appendix B,*** *Underwater Videos.*

3.1.4 Sampling and Analysis Plan Development

The development of the SAP for the QMCP was focused on ensuring that it considered relevant historic operational and investigative findings. Identification of buildings and facility operations provided an understanding of potential chemicals and waste streams that may have been used or disposed of on a given property. For example, PCBs are often regarded as an oil or fluid used in electrical generating facilities, but PCBs were also used for their fire retardant properties in electrical cables.

With an understanding of the historical operations, the findings of previous terrestrial analytical data were evaluated. Data was assessed with regard to the historical operations, but also to evaluate whether concentrations of specific COCs were present. If identified, the horizontal and vertical distribution was then evaluated. The evaluation considered whether additional data was needed to further delineate the extent of contamination or evaluate whether a potential source of contamination was contributing to the detection of contaminants. Similarly, the lack of analytical data in the study area, such as any available offshore analytical data, was also considered to determine if data gaps were present.

The risks posed to human health and the environment resulting from historical mining era industrial operations in the QMCP:

- Present potential exposure risk to human and ecological receptors;
- Limit the recovery of the Portage Canal ecosystem; and,
- Create uncertainty over safe and beneficial reuse of the land.

As such, the investigation was largely driven by documented historic operations and potential PCB concentrations in terrestrial portions of the QMCP. The prevailing COCs in the QMCP generally include organic and inorganic contaminants in surface and subsurface soils, groundwater, sediment, surface water, waste, and RPM. In addition, observed waste deposits and building materials were suspected to contain asbestos in addition to organic and inorganic contaminants. As a result, the SAP identified key analytes in environmental media for assessment during the SI. Although PCBs were prescribed for analysis in all environmental media, the selection of remaining analytes were subject to field observations and the judgment of the field teams collecting the samples. The following provides a summary of the target analytes defined in the SAP with respect to the investigated environmental media:

Surface Soils/Waste Deposits (0 to 6 inches bgs)

- Inorganic COCs (Metals and Available Cyanide) by EPA Methods 6010/200.7, 6020/200.8, 7471/245.5, and ASTM D7284;
- VOCs by EPA Method 8260;

- PCBs by EPA Methods 8081/8082;
- SVOCs by EPA Method 8270; and,
- Asbestos by Polarizing Light Microscopy (PLM) – California Air Resource Board (CARB) 435 – 1,000 point count – analytical sensitivity 0.1 percent (%).

Subsurface Soils (> 6 inches bgs)

- Inorganic COCs (Metals and Available Cyanide) by EPA Methods 6010/200.7, 6020/200.8, 7471/245.5, and ASTM D7284;
- VOCs by EPA Method 8260;
- PCBs by EPA Methods 8081/8082; and,
- SVOCs by EPA Method 8270.

Groundwater

- Inorganic COCs (Metals) by EPA Methods 6010/200.7, 6020/200.8, and 7471/245.5;
- VOCs by EPA Method 8260;
- PCBs by EPA Methods 8081/8082; and,
- SVOCs by EPA Method 8270.

Sediment

- Inorganic COCs (Metals) by EPA Methods 6010/200.7, 6020/200.8, and 7471/245; and,
- PCBs by EPA Methods 8081/8082.

Surface Water

- Inorganic COCs (Metals) by EPA Methods 6010/200.7, 6020/200.8, 7471/245.5;
- PCBs by EPA Methods 8081/8082; and,
- SVOCs by EPA Method 8270.

Drums, Containers, Building Materials, Bulk Asbestos, Waste Deposits and Residual Process Materials – Not Associated with Sediment/Depositional Wastes

- Inorganic COCs (Metals) by EPA Methods 6010/200.7, 6020/200.8, 7471/245.5;
- PCBs by EPA Methods 8081/8082;
- Bulk Asbestos by PLM Method 600/R-93/116; and,
- Waste Characteristics by various methods.

Inorganic COCs were selected for analysis based on an assessment of historical exceedances of applicable regulatory criteria. Eleven inorganic COCs and cyanide were initially selected for analyses. The following provides a list of the selected inorganic analytes evaluated during the SI:

- Arsenic
- Barium
- Cadmium
- Chromium
- Copper
- Cyanide
- Lead

- Manganese
- Mercury
- Selenium
- Silver
- Zinc

The species of chromium, trivalent versus hexavalent, was assessed and determined for environmental media during previous investigations in the area. The *Public Health Assessment for Evaluation of Inhalation of Airborne Stamp Sands in the Torch Lake Superfund Site and Surrounding Area* (Michigan Department of Community Health (MDCH), 2014 noted that "one would not expect the hexavalent chromium form to occur in stamp sands because the trivalent chromium is typically the predominant form of chromium in the environment." Therefore, samples analyzed during the SI were not further assessed for hexavalent chromium and regulatory criteria for trivalent chromium were utilized in the subsequent evaluation of data (both historical and current) derived from the QMCP.

3.2 FIELD PROCEDURES AND SAMPLE COLLECTION

Similar to SAP development, the implementation of field activities in the QMCP were conducted in several terrestrial and offshore phases to ensure that sufficient data was available to adequately characterize the potential human health and environmental risks present in each study area. Field sampling activities were generally completed during mobilizations in September 2018.

The following subsections summarize the procedures and methodologies used during the SI.

3.2.1 Potential Physical and Health Hazard Inventory

The evaluation of the QMCP included a physical inspection of the properties within the study area. Field inspections were conducted on properties where written access was granted to EGLE. In the cases where access was not requested based on historic operational and investigative findings, or access was not obtained, property conditions were evaluated from a neighboring property where access was obtained, or public right of way. The inspections included the locating and inventory of historical structures and artifacts associated with the former mining era operations within the QMCP. Each property or subarea was also inspected for potential physical and health hazards. Such hazards included potentially abandoned drums and containers, suspect asbestos containing materials (SACM), stained or oily soils, and similar observed environmental conditions. Potential physical hazards, including waste deposits, metal debris, and similar conditions were also recorded in areas accessed.

The effort included the development of field inspection tables that incorporated photographic documentation and written descriptions of identified features. Reconnaissance activities were completed at all of the properties in the QMCP. A Reconnaissance Log was used to document the general characteristics of the property including the inventory and documentation of mining era features, if any, for each property. The form was also used to document potential physical and health hazards identified on the property that warranted further inspection or sampling to adequately characterize potential risks. Completed Reconnaissance Logs specific to the Site parcels are included in ***Appendix C, Site Inspections – Reconnaissance Logs, Targeted Inspections & Physical Hazards Inventory.***

The findings of the reconnaissance activities were used to facilitate the next phase of inspection. Targeted inspections included revisiting documented hazards and collecting samples to better characterize the perceived risks documented during reconnaissance. It should be noted that targeted inspection activities did not occur in all QMCP subareas due to site inspection reconnaissance evaluation. The following provides a summary of the various media that either were sampled or were considered for sampling during the targeted inspection activities at the Site parcels:

- Documented SACM was sampled by a State of Michigan licensed asbestos inspector. Sampled media included tar paper, tank insulation, pipe insulation, asphaltic brick siding, asphaltic roofing, shingles, mastic, and fibers observed in a burn pile.

- Documented abandoned containers were not opened and sampled due to health and safety considerations; however, exposed contents or surface soils adjacent to the containers were considered for sampling.

- Documented abandoned container contents and RPM were considered for sampling.

- Soil and groundwater were sampled to characterize Site conditions based on historic use and observation of potentially contaminated areas.

3.2.2 Bulk Material Sampling

An MSG State of Michigan licensed asbestos inspector collected 18 bulk SACM samples during the Fall 2018 sampling event. The sample locations were based on documented SACM and included several roofing, siding, and insulating materials observed at Julio Company/Former Amoco Bulk Oil Terminal and Julio Marine. In accordance with the SAP, MSG utilized dedicated sampling equipment for each sample to prevent potential cross contamination of asbestos fibers and samples were placed in sealable plastic bags/containers. Each sample bag was labeled with the unique sample identifier, date, and time of sampling following sample collection. Sampling data—including sample analyses, sample collection times and dates—were recorded on laboratory chain-of-custody forms. The samples were submitted under chain-of-custody to Eurofins TestAmerica, Inc. North Canton, Ohio for analysis of asbestos content by PLM analyses.

The sampled locations were located with a GPS unit with sub-meter accuracy and photographed. A summary of the targeted inspection sampling, including descriptions, requested analyses, and other relevant information is included on *Table 3-1, Sampling and Analysis Summary.* Findings are provided in Section 5 and Section 6 of this SI Report.

3.2.3 Surface Soil Sampling

Proposed surface soil sampling locations were predetermined in the SAP based on the evaluations and assessments presented in Section 3.1.

Surface soil samples were collected from proposed surface soil (0-3 in. and 0-6 in.) sampling locations from throughout the Site parcels. A total of 45 surface soil samples (SS and SB designations), including quality assurance (QA)/quality control (QC) samples, were collected. Disposable (dedicated) scoops were used to collect soil from a depth of 0 to 3 inches below the ground surface while samples from 0 to 6 inches below the ground surface were collected from soil cores as described in Section 3.2.4. Samples were placed in laboratory-supplied, 8-ounce glass jars in accordance with the SAP. Sample labels containing the unique sample identifier, date and time of sampling were attached to each 8-oz jar prior to sample collection. Sampling data—including sample analyses, sample collection times and dates—were recorded on laboratory chain-of-custody forms. The samples were submitted under chain-of-custody to EGLE's Environmental Laboratory in Lansing, Michigan for analysis as outlined in the SAP. Each of the sample locations were located with a GPS unit with sub-meter accuracy and a description of the sampled material was documented on a field log. A photographic log documenting sample collection activities is included in *Appendix D, Photographic Log.* A summary of the samples collected, including their descriptions, requested analyses, and other relevant information is included in *Table 3-1, Sampling and Analysis Summary.* Sampling locations, analytical results, and findings are included in Section 5 and Section 6 of this SI Report.

3.2.4 Subsurface Soil Sampling

Proposed subsurface soil sampling locations were predetermined in the SAP based on the evaluations and assessments presented in Section 3.1.

Prior to subsurface investigative activities, proposed investigative locations were cleared of potential underground utility lines or other anomalies prior to mobilization. MSG staked the investigative locations, Michigan's one-call system was notified of the scheduled work in accordance with *Public Act 174, Miss Dig Underground Facility Damage Prevention and Safety Act*, a joint utility meeting was conducted, and utility lines within were marked by the respective utility companies. Additionally, GSS performed ground penetrating radar (GPR) activities at proposed boring locations to identify any additional underground anomalies prior to the commencement of fieldwork.

Subsurface soil samples were collected from throughout the Site parcels. A total of 14 subsurface soil samples (SB designation), including QA/QC samples, were collected from the Site parcels in accordance with the SAP. EGLE's GSS utilized a track-mounted direct-push drill rig to retrieve continuous soil cores from the subsurface by advancing a 5-foot long, 1.5-inch diameter Macro-Core sampler to the desired depth. Borings were advanced into the groundwater table and subsurface soil samples collected for laboratory analysis were selected based on field screening results and visual or olfactory indication that contamination may be present. The lithology for each boring was classified by the field geologist in accordance with the Unified Soil Classification System (USCS) and recorded on the field log and screened with a photoionization detector (PID). Subsurface soil samples were collected from the vadose zone and select borings were chosen for the collection of groundwater samples based on field observations.

The samples were submitted under chain-of-custody to EGLE's Environmental Laboratory in Lansing, Michigan for analysis as outlined in the SAP. Each of the sample locations were located with a GPS unit with sub-meter accuracy and a description of the sampled material was documented on a field log. A photographic log, documenting sample collection activities, is included in ***Appendix D, Photographic Log***. Completed boring logs are included in ***Appendix E, Boring Logs***. A summary of the samples collected during the investigation, including their descriptions, requested analyses, and other relevant information is included on ***Table 3-1, Sampling and Analysis Summary.*** Sampling locations, analytical results, and findings are included in Section 5 and Section 6 of this SI Report.

3.2.5 Groundwater Sampling

Certain soil boring locations were selected to include the installation of a temporary groundwater sampling point or permanent monitoring well. Groundwater samples were collected either from the newly installed monitoring wells or utilizing a Screen-Point-16 (SP-16) stainless steel screen reusable sampling rod and were collected from throughout the Site parcels. A total of 28 groundwater samples (GW or MW designation), including QA/QC samples, were collected from the Site parcels in accordance with the SAP.

During sample collection using the SP-16, the downhole sampling tools were advanced into the water-bearing zone in the boring and the outer rod was withdrawn to expose the internal stainless steel screen. A low-flow peristaltic pump with disposable Teflon tubing was used to collect a grab groundwater sample from the screened sample interval of the SP-16 or permanent monitoring well. Field parameters for dissolved oxygen (DO), pH, oxidation reduction potential (ORP), conductivity, temperature, and turbidity were measured with a water-quality monitoring instrument equipped with a flow-through cell at the time of groundwater sample collection. Groundwater samples were pumped directly into laboratory-provided sample jars. Sample jars were then labeled and placed in a cooler on ice for transportation under chain of custody to EGLE's Environmental Laboratory in Lansing, Michigan for analysis as outlined in the SAP.

Each of the sample locations were located with a GPS unit with sub-meter accuracy and a description of the sample interval documented on a field log. A photographic log documenting sample collection activities is included in ***Appendix D, Photographic Log***. GSS-completed boring logs documenting the temporary well screen interval are included in

Appendix E, Boring Logs. A summary of the samples collected during the investigation, including their descriptions, requested analyses, and other relevant information is included on *Table 3-1, Sampling and Analysis Summary.* Sampling locations, analytical results, and findings are included in Section 5 and Section 6 of this SI Report.

3.2.6 Sediment Sampling

Select sediment sampling locations were predetermined in the SAP based on the evaluations and assessments presented in Section 3.1. Other sediment sampling locations presented in the SAP were subject to change based on the findings of the underwater surveillance. These locations were moved with the intent of collecting material from the interior of submerged containers or from identified waste deposits based on GSS's underwater imagery targeting, a key element of the SI distinguishing it from previous investigations.

Sediment samples were collected from the north shoreline of the Portage Canal and Dollar Bay. A total of 12 sediment samples (SD designation), including QA/QC samples, were collected in accordance with the SAP. Sediment samples were collected utilizing the EGLE GSS's vibracore sampler. Polycarbonate tubing was advanced into the sediment using the vibrating drive head. The extracted sample core was opened, the sediment column logged, samples were collected using the prescribed intervals in the SAP or visual observations, including physical characteristics and staining, or olfactory evidence of contamination within the sediment sample core. The lithology for each sediment core was classified by the field geologist in accordance with the USCS and recorded on the field log. Sediment samples were transferred directly into laboratory-provided sample jars. Sample jars were then labeled and placed in a cooler on ice for transportation to the analytical laboratory under chain of custody. Offshore samples were maintained separately from terrestrial samples.

Each of the sample locations were located with a GPS unit with sub-meter accuracy and a description of the sample core was documented on a field log. A photographic log, documenting sample collection activities, is included in *Appendix D, Photographic Log*. Completed sediment logs are included in *Appendix F, Sediment Core Logs.* A summary of the samples collected during the SI, including their descriptions, requested analyses, and other relevant information is included on *Table 3-1, Sampling and Analysis Summary.* Sampling locations, analytical results, and findings are included in Section 7 of this SI Report.

3.2.7 Decontamination Procedures and Management of Investigative Derived Wastes

Investigative-derived wastes (IDW) include the byproducts of the field activities, including excess sample media, spent sampling supplies, and expendable personal protective equipment (PPE). The following paragraphs describe the procedures used during the SI to manage IDW and decontaminate equipment used during the investigation.

During implementation of the terrestrial investigation, soil cuttings, purge water, and decontamination water were generated. Soil cuttings, following logging, screening, and sampling, were returned to the boring by EGLE. For locations where groundwater samples were collected, the soil cuttings were temporarily staged until all samples were collected and the sampling equipment was extracted from the boring. Excess groundwater generated during sample collection was discharged to the ground surface by EGLE. Following groundwater sampling, the boring was backfilled with the staged soil cuttings. Expendable groundwater sampling materials were containerized in a trash bag for disposal as non-hazardous municipal solid waste by EGLE at the end of the project phase. Reusable equipment, including the stainless steel sampling screen, was decontaminated between boring locations. Decontamination water generated through washing and rinsing was discharged to the ground surface in the vicinity of the sampling locations. Spray bottles of wash and rinse water were used to minimize the volume of decontamination fluids generated by the soil boring and well installation activities.

Implementation of the offshore sampling activities resulted in the generation of similar waste streams. Spent polycarbonate tubing used in the collection of vibracore sediment samples, spent sampling supplies, and PPE were

temporarily staged on the sampling vessel until the vessel returned to the dock. Upon returning to shore, the staged waste was transferred to a dumpster by EGLE for disposal. Excess sediment, debris, and surface water generated as a result of the sampling activities were returned to the lake in the vicinity of the sample location by EGLE.

Reusable equipment was decontaminated on board the sampling vessel using an Alconox™ wash and rinse. Spray bottles of wash and rinse water were used to minimize the volume of decontamination fluids generated during the sediment sampling activities. Decontamination water generated through washing and rinsing was discharged to the lake in the vicinity of the sample location.

3.2.8 Sample Handling, Tracking, and Custody Procedures

All samples were identified, handled, shipped, tracked, and maintained under chain of custody as prescribed in the SAP. The following paragraphs summarize the sample management and tracking activities utilized during implementation of the SI.

Samples collected during the SI were given a unique sample identification (ID) number that was project- and location-specific. A record of sample ID numbers was kept with the field records and recorded on chain-of-custody forms. Sample labels using the nomenclature defined in the SAP were affixed to sample containers. After labeling, each sample was placed in a cooler with ice for transportation to the specified laboratory. Field documentation, including sampling forms, maps, and field logs were maintained in a field binder maintained by EGLE and MSG field personnel.

The field team used laboratory-provided sample custody forms to maintain and document sample integrity during sample collection, transportation, and storage. The chain of custody forms were used to document samples collected and the analyses requested. Chain of custody procedures documented the possession of individual samples from the time of collection in the field to the time of acceptance at the laboratory. Copies of the chain of custody records and the air bills (as needed) were retained and placed in the EGLE project file.

Laboratory chain-of-custody began with sample receipt and continues until samples are discarded. Sample coolers were generally hand delivered to the laboratory where a designated sample custodian received the incoming samples. The laboratory sample custodian recorded pertinent information associated with the samples, including the person(s) delivering the samples, the date and time received, and sample condition at the time of receipt (sealed, unsealed, or broken container; temperature; and other relevant remarks).

Investigative samples were delivered by a courier or shipped under chain of custody to the laboratories listed in the table below.

Matrix	Laboratory Name	Laboratory Address	Laboratory Contact Name	Laboratory Phone Number
Surface Soil Subsurface Soil Groundwater Surface Water Sediment	EGLE Environmental Laboratory	3350 N. Martin Luther King Blvd. Lansing, MI 48906-2933	EGLE Laboratory Services Section Kirby Shane	(517) 335-9800
Bulk Asbestos and Asbestos in Soil	Eurofins TestAmerica, Inc.	4101 Shuffel Street NW North Canton, OH 44720	Kris Brooks	(330) 966-9790

The EGLE Environmental Laboratory does not perform asbestos analyses. As a result, the samples were shipped under chain of custody and managed by the EGLE Environmental Laboratory to a contract laboratory under the Contract Laboratory program.

3.2.9 QA/QC

All samples were collected and analyzed using the field and laboratory quality control procedures prescribed in the SAP. The following paragraphs summarize the field and laboratory quality control procedures utilized during implementation of the SI.

QC samples were collected to evaluate the field sampling methods and the overall reproducibility of the laboratory analytical results. Field duplicate samples were collected, processed, stored, packaged, and analyzed by the same methods as the investigative samples. QC for analytical procedures were performed in accordance with the laboratories' standard operating procedures (SOP).

Matrix spike/matrix spike duplicate (MS/MSD) samples were not collected during the implementation of field activities. Alternatively, MS/MSD samples were selected by the laboratory and "batched". As such, MS/MSD samples were not necessarily derived from investigative samples from the Project, but may have come from another sample set at the laboratory. MS/MSD results were reported with investigative sample results.

The EGLE Environmental Laboratory and their contracted laboratories provided analytical results in electronic data deliverable (EDD) and report formats, with QA/QC data included (case narrative, investigated data results summary, and QC sample summary results). Laboratory-generated data was imported to the Project database for mapping, reporting, and archival activities. Laboratory analytical reports are included in ***Appendix G, Laboratory Analytical Reports.***

4. EXPOSURE ASSESSMENT

This Section presents the human health and ecological exposure criteria that are applicable to the QMCP. The discussions included in the following subsections will assist in framing the results presented in the detailed findings included in Section 5 and Section 6 with respect to the current land use and the anticipated future land use within the QMCP.

4.1 EGLE FACILITY DEFINITION

As defined in Section 20101(1)(s) of Part 201 of Michigan's Natural Resources and Environmental Protection Act (NREPA), being Public Act (PA) 451 of 1994, as amended, a "Facility" means any area, place, parcel or parcels of property, or portion of a parcel of property where a hazardous substance in excess of the concentrations that satisfy the cleanup criteria for unrestricted residential use has been released, deposited, disposed of, or otherwise comes to be located. Facility does not include any area, place, parcel or parcels of property, or portion of a parcel of property where any of the following conditions are satisfied:

(i) Response activities have been completed under this part or the Comprehensive Environmental Response, Compensation, and Liability Act, 42 United States Code (USC) 9601 to 9675, that satisfy the cleanup criteria for unrestricted residential use.

(ii) Corrective action has been completed under the resource conservation and recovery act, 42 USC 6901 to 6992k, part 111, or part 213 that satisfies the cleanup criteria for unrestricted residential use.

(iii) Site-specific criteria that have been approved by the department for application at the area, place, parcel of property, or portion of a parcel of property are met or satisfied and hazardous substances at the area, place, or property that are not addressed by site-specific criteria satisfy the cleanup criteria for unrestricted residential use.

(iv) Hazardous substances in concentrations above unrestricted residential cleanup criteria are present due only to the placement, storage, or use of beneficial use by-products or inert materials at the area, place, or property in compliance with part 115.

(v) The property has been lawfully split, subdivided, or divided from a facility and does not contain hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use.

(vi) Natural attenuation or other natural processes have reduced concentrations of hazardous substances to levels at or below the cleanup criteria for unrestricted residential use.

Note that in Section 20101(1)(x) of Part 201, hazardous substance does not include by definition stamp sands, which are defined as "finely grained crushed rock resulting from mining, milling, or smelting of copper ore and includes native substances contained within the crushed rock and any ancillary material associated with the crushed rock." Section 20101c goes on to further state that "Property onto which stamp sands have been deposited is not subject to regulation under this part unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use."

From a terrestrial standpoint, chemical concentrations detected in soil and groundwater in the QMCP exceed residential exposure criteria for one or more COCs. Analytical results and their implications on facility status are described further in the detailed findings in Section 5 and Section 6, which documents the Julio Properties – Dollar Bay Site parcels as being facilities.

4.2 APPLICABLE SCREENING CRITERIA

In support of developing a comprehensive approach for evaluating risks, the analytical results from previous investigations and this SI were compiled and compared to the following regulatory screening criteria that were in place at the time of Project completion:

- Part 201 of NREPA, being PA 451 of 1994, as amended Residential and Nonresidential Cleanup Criteria for Response Activity (updated, June 25, 2018).
  - Surface Soil;
  - Subsurface Soil;
  - Abandoned Container Contents;
  - RPM;
  - Groundwater; and,
  - Asbestos.
- EPA, National Emission Standards for Hazardous Air Pollutants (NESHAP) (40 CFR, Part 61, Subpart M) (EPA 1984).
  - Asbestos.
- EPA, Region 4, Ecological Screening Values (ESVs) (EPA 2018).
  - Sediment; and,
  - Surface Water.
- EGLE – Rule 57 Water Quality Values, Surface Water Assessment Section (February 2020).
  - Surface Water.
- Sediment Quality Guidelines, Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs) (MacDonald, et al, 2000).
  - Sediment.

It should be noted that while EGLE's Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (MSSLs) were used for screening purposes in evaluating the limits of contamination, they were not used for evaluation of exposure pathway exceedances in the Detailed Findings in Section 5 and Section 6, are not promulgated rules, and cannot be used for a "Facility" determination, compliance, or for obtaining closure of a release. The regulatory screening criteria summarized above may be applicable to all or select portions of the QMCP. Limiting factors in the assessment of the applicability of these criteria may include, but are not limited to, specific environmental media (as noted above), current and anticipated future land use categories, and relevant exposure pathways for human and ecological receptors. Assessment of these factors requires that the analytical results of the SI and the respective geological and hydrogeological characteristics of the Project area be evaluated to determine generally which exposure pathways, risks, and conditions are relevant and applicable. The following subsections present the criteria assessment rationale and applicability determinations for identified exposure pathways in the QMCP.

4.2.1 Non-Evaluated Exposure Pathways

The following exposure pathway was not evaluated at the Julio Properties – Dollar Bay:

- Risks to aesthetic characteristics of the affected media.

Although contaminated media has the potential to have impacts on aesthetics, this pathway was not assessed because assessment of potential risks to flora, fauna, the food chain, and aesthetics was beyond the scope of the evaluation. The comprehensive evaluation presented in this SI is aimed at determining if a release has occurred and whether or not human health and ecological risks are posed by any such release as they relate to current land use within the Site parcels.

4.2.2 Non-Applicable Exposure Pathways

The following exposure pathways are not applicable at the Julio Properties – Dollar Bay Site parcels:

- None.

No non-applicable exposure pathways have been identified at the Julio Properties – Dollar Bay Site parcels.

4.2.3 Relevant Exposure Pathways Where Applicable Criteria Are Not Exceeded

The following exposure pathways are relevant at the Julio Properties – Dollar Bay Site parcels, but the maximum detected contaminant concentrations do not exceed applicable exposure criteria:

- Risks posed by hazardous substances in groundwater that may result in flammable or explosive conditions to be present in both residential and nonresidential settings.

- Risks posed by hazardous substances in soil and the potential for the substances to be inhaled if they are emitted as particulates and dispersed in ambient air in both residential and nonresidential settings.

4.2.4 Relevant Exposure Pathways Where Criteria Are Exceeded, But Pathway Is Incomplete

The following exposure pathways are relevant at the Julio Properties – Dollar Bay Site parcels, but the exposure pathway is currently incomplete:

- Risks posed by hazardous substances that are covered or capped with soil and or a vegetative cover.

    - A portion of the Julio Marine property features capped and vegetated areas along the shoreline of the Portage Canal. These areas include vacant industrial or commercial property that may or may not have been included in previous remedial actions in the area. Risks may be present in these areas where cap material has covered potential hazardous materials.

4.2.5 Relevant Exposure Pathways Where Applicable Criteria Are Exceeded and Pathway is Complete

The following exposure pathways are relevant at the Julio Properties – Dollar Bay and the exposure pathways are potentially complete:

- Risks posed by hazardous substances in soil and the potential for the substances to leach to groundwater that could be used as a drinking water source in both residential and nonresidential settings.
- Risks posed by hazardous substances in soil and the potential for the substances to leach to groundwater that could vent to surface water.
- Risks posed by hazardous substances in soil and the potential for direct contact with these soils in both residential and nonresidential settings.
- Risks posed by hazardous substances in soil that may result in the volatilization of contaminants to indoor air in residential and nonresidential settings.
- Risks posed by hazardous substances in soil that may result in the volatilization of contaminants to ambient air in residential and nonresidential settings.
- Risks posed by hazardous substances in groundwater and the potential for that groundwater to be used as a drinking water source in both residential and nonresidential settings.
- Risks posed by hazardous substances in groundwater and the potential for that groundwater to vent to surface water.
- Risks posed by hazardous substances in groundwater that may result in the volatilization of contaminants to indoor air in both residential and nonresidential settings.
- Risks due to free-phase liquids.
- Risks posed by hazardous substances in pore water and sediments that have the potential to have toxic effects on aquatic biota and/or enter the food chain.

Although relevant, EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil and groundwater evaluation in the detailed findings included in Section 5 and Section 6. The rationale for this exclusion is twofold:

- The Project investigation and anticipated response actions are being undertaken pursuant to Part 201 of Michigan's NREPA, being PA 451 of 1994, as amended. The concentrations of metals in excess of EGLE drinking water and surface water pathway criteria are ubiquitous in the study area and are predominantly the result of the presence of stamp sands. Stamp sands are not defined as a hazardous substance nor are they subject to regulation under Part 201 unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use; and,
- The study area is part of OU 2 for which the EPA ROD remedy called for No Action. The EPA's ROD OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Canal, and other area water bodies. Note that EPA's No Action determination relies on the following to mitigate the effects of stamp sand to the extent practicable:

- The reduction of stamp sand loading to surface water bodies expected as a result of the remedial action taken at OU 1 and OU 3.
- Ongoing natural sedimentation and detoxification.
- Institutional programs and practices controlling potential future exposure to site-affected drinking water that were intended to be administered at the county and state level.
- The long-term monitoring and the five-year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.

Note that metals criteria for other relevant pathways, and organic and cyanide contaminants for all pathways were included in the evaluation.

EGLE's MSSLs may be applicable to all or a select portion of the Site parcels; however, due to limiting factors as discussed in Section 4.2, including unknown anticipated future land use and conditions, the screening levels were excluded from the exposure assessment for each subarea. As noted above, the screening levels are not promulgated rules and cannot be used for "Facility" determination or compliance.

4.2.6 Relevant Cleanup Criteria for Hazardous Substances in Contaminated Environmental Media Not Accounted for by Other Rules

To assure that hazardous substances in contaminated environmental media do not pose unacceptable risks not accounted for by other rules in Part 201, the concentration of a hazardous substance in a given environmental medium shall meet cleanup criteria based on sound scientific principles and determined by EGLE to be necessary to protect the public health, safety, and welfare and the environment.

The following, not accounted for by other rules in this part, are relevant at the Site parcels:

- Risks posed by physical hazards.

- Risks posed by hazardous substances in surface soil that may result from the direct transport or runoff of hazardous substances in soil into surface water.

- Risks posed by hazardous substances in waste and abandoned containers that may result from the direct transport or runoff of hazardous substances into soil, groundwater, and surface water.

4.3 CONCEPTUAL SITE MODEL

The applicable regulatory criteria and the relevant exposure pathways assessed in the preceding subsections indicate that COCs are present in various environmental media at the Site parcels. COCs have been identified in surface and vadose zone soils, groundwater, pore water, and sediment that have the potential to affect human and ecological receptors, as well as recreational users or consumers of the natural resources of Portage Canal. Further, ACM was identified in deteriorating building materials exposed to the elements and Light non-aqueous phase liquid (LNAPL) was measured in multiple monitoring wells, including near the shore of the Portage Canal.

The current and foreseeable land use at the Site parcels includes nonresidential uses; historical documentation indicates that this area was highly industrialized through the 1960s. The extent of these operations included both terrestrial and offshore operations that included the discharge of wastes and debris to the Portage Canal. The eventual end of mining era operations and the generally undocumented transition of these properties to alternative uses likely resulted in the redistribution of surface soils and potentially contaminants along the shoreline. Further, physical hazards are also posed by residual mining era related conditions.

A Conceptual Site Model (CSM) was developed for the general QMCP to graphically present the relevant exposure pathways summarized in Section 4.2 and their relationship to the distribution of contaminants in the nearshore (terrestrial and offshore) environment throughout the QMCP. While the CSM was developed for the QMCP, each individual parcel identified and addressed as part of the SI investigation is unique and may require a property-specific risk assessment based on current and anticipated future land-use. The QMCP CSM represented in ***Appendix H,*** *Conceptual Site Model – Exposure Pathway Evaluation* depicts these relationships under both residential and nonresidential land use scenarios.

5. DETAILED FINDINGS – JULIO COMPANY/FORMER AMOCO BULK FUEL TERMINAL

This Section summarizes the results and subsequent findings for the Julio Company/Former Amoco Bulk Fuel Terminal parcel within the Julio Properties – Dollar Bay portion of QMCP derived from implementation of the SAP. The narrative follows the systematic investigative approach outlined in Section 3, while providing specific details about the potential human health and ecological risks associated with the historical mining operations in this subarea of QMCP.

5.1 SITE INSPECTION AND INVESTIGATION RESULTS

The implementation of the site inspection and investigation activities provided critical lines of evidence that link the historical documentation and the current environmental conditions in and around Dollar Bay. The following subsections present the findings of the inspection and investigation activities and provide correlation of mining era operations and their potential impacts on the nearshore environment of the Portage Canal and Dollar Bay.

5.1.1 Site Inspection

The site inspection at each subarea included the inventory and locating of historical structures and similar surficial artifacts associated with the former industrial operations in the area. Each subarea was also inspected for potential physical and health hazards that were documented, photographed, and located with a GPS unit. The inventoried hazards were then qualitatively assessed for potential human health and environmental risks to determine if analytical sampling was warranted during the targeted inspection phase of the work.

On September 27, 2018, MSG field team personnel performed reconnaissance activities at the Julio Company/Former Amoco Bulk Fuel Terminal. The property parcel, totaling approximately 17.5 acres, was visually inspected and observations were recorded while traversing the property. The qualitative assessment of the reconnaissance findings at the Julio Company/Former Amoco Bulk Fuel Terminal warranted the performance of limited targeted inspection activities. The following provides a summary of the findings associated with the reconnaissance activities. A copy of the reconnaissance findings is provided in *Appendix C, Site Inspections – Reconnaissance Logs, Targeted Inspections & Physical Hazards Inventory* of this SI Report.

5.1.1.1 Reconnaissance

The reconnaissance activities identified multiple 55-gallon drums, 13 fuel tanks of various sizes, tar paper and insulation material that was SACM, evidence of a suspect UST, electrical components, batteries, pipes, and evidence of two potential releases.

5.1.1.2 Targeted Inspection

The qualitative assessment of the reconnaissance findings at the Julio Company/Former Amoco Bulk Fuel Terminal warranted the performance of limited targeted inspection activities. Bulk materials samples for asbestos analysis were collected on September 28, 2018 by a MSG field team. The following subsections summarize the findings of these sampling efforts.

5.1.1.2.1 Bulk Material Sampling

Based on the SACM hazards noted during the reconnaissance activities a limited asbestos survey was conducted as part of the SI to identify suspect potentially friable ACM. The asbestos survey was limited to SACMs in open areas of the property and within debris piles, and included black tar paper with fibers and tank insulation.

Four bulk samples were collected from the two SACMs as part of the SI. Laboratory analysis indicated that neither of the material samples contained greater than 1% asbestos.

The samples were analyzed in accordance with EPA Method 600/R-93/116, "Method for the Determination of Asbestos in Bulk Building Materials" using Polarized Light Microscopy (PLM). This laboratory analytical method identifies the presence and estimated concentration of asbestos fibers in sampled building materials. The location of the bulk asbestos sampling location collected during the targeted inspection activities are depicted on ***Figure 5-1, ACM Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)***. A detailed summary of bulk asbestos sample analytical results collected from the Julio Company/Former Amoco Bulk Fuel Terminal during the targeted inspection are provided in ***Table 5-1, Summary of ACM Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)***.

5.1.2 Site Investigation

The SI for the Julio Properties – Dollar Bay was developed based on a variety of data and information as outlined in Section 3. In addition to the historical accounts and documentation, current land use and potential exposure pathways were also taken into consideration when selecting the sampling locations specific to Julio Company/Former Amoco Bulk Fuel Terminal. The following subsections present the outcomes of investigative activities completed at the Julio Company/Former Amoco Bulk Fuel Terminal by summarizing the laboratory analytical results and characterizing their impacts on the environmental media in which they were detected.

5.1.2.1 Terrestrial Investigation

Intrusive investigation activities at the Julio Company/Former Amoco Bulk Fuel Terminal were generally guided by the findings of historical research and field observations. From a historical standpoint, the area was the location of a fuel storage facility operated by Amoco Oil Company and was later used for storage of various equipment and debris.

COCs in the study area were not generally understood nor previously investigated to fully characterize or address potential organic and inorganic contaminants in soil and groundwater. The following subsections present a summary of the field observations and analytical results derived from the terrestrial sampling activities at the Julio Company/Former Amoco Bulk Fuel Terminal.

5.1.2.1.1 Field Observations – Soil and Groundwater

Five borings were advanced by GSS on the property to 4 to 11 ft bgs. Boring locations are depicted on ***Figure 5-2, Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)***. Soil observations documented on field logs indicate that the subsurface at Julio Company/Former Amoco Bulk Fuel Terminal is generally comprised of fine to medium brown sand.

During groundwater sampling, temporary well points were established at 4-ft intervals starting from 5 ft bgs to the boring terminus. One groundwater sample was blind drilled and sampled from 22 to 24 ft bgs. Saturated soil conditions were encountered at a depths of 4.5 and 7 ft bgs. Groundwater quality parameters, including temperature, conductivity, DO, and pH, measured at the time of sample collection were generally considered normal.

5.1.2.1.2 Soil Sampling Results

Terrestrial soil investigation activities were completed at Julio Company/Former Amoco Bulk Fuel Terminal on September 9, 2018. An additional surface soil sample was collected on September 28, 2018 (QMCP-SS56). During the mobilizations a total of ten soil samples were collected from six (6) sampling locations. Soil boring locations are depicted on ***Figure 5-2, Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)***. Investigative methodologies and soil sampling techniques were conducted using the procedures outlined in Section 3.

Soil sampling included five shallow soil sampling intervals, generally from 0 to 3 inches or 0 to 6 inches in depth. The balance of the subsurface soil samples ranged from 0.5 ft to 6 ft in depth. The samples were analyzed for the parameters identified on ***Table 3-1, Sampling and Analysis Summary*** of this SI Report. The selection of analytical parameters was generally based upon potential environmental impacts associated with mining era operations in the vicinity of the sampling location or field observations.

The shallow and subsurface soil analytical results for the Julio Company/Former Amoco Bulk Fuel Terminal did not contain any COCs with concentrations at or above applicable regulatory criteria and MSSLs.

A detailed summary of soil analytical results for Julio Company/Former Amoco Bulk Fuel Terminal is provided in ***Table 5-2, Summary of Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal***). Soil boring logs are included in ***Appendix E, Boring Logs*** of this SI Report.

5.1.2.1.3 Groundwater Sampling Results

During the installation of soil borings at the Julio Company/Former Amoco Bulk Fuel Terminal, temporary groundwater sampling locations were established to characterize groundwater in the area. The temporary monitoring points were installed and sampled using the methodologies presented in Section 3. The screened intervals in the groundwater sampling locations were established at 5 to 9 ft, 7 to 11 ft, and 22 to 24 ft bgs respectively. Three groundwater samples were collected. Temporary groundwater sampling locations are depicted on ***Figure 5-3, Groundwater Analytical Results (***Julio Company/Former Amoco Bulk Fuel Terminal***)***.

The collected groundwater samples were analyzed for the parameters identified on ***Table 3-1, Sampling and Analysis Summary.*** The selection of analytical parameters was generally based on potential environmental impacts associated with mining era operations in the vicinity of the sampling location or field observations. Several VOCs and SVOCs in one sample (QMCP-GW60) were detected at concentrations exceeding Groundwater Surface Water Interface Criteria (GSIC) and MSSLs.

A detailed summary of groundwater analytical results collected from the Julio Company/Former Amoco Bulk Fuel Terminal is provided in ***Table 5-3, Summary of Groundwater Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal***). Groundwater analytical results are depicted on ***Figure 5-3, Groundwater Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)***. Soil boring logs are included in ***Appendix E, Boring Logs*** of this SI Report.

5.2 NATURE AND EXTENT OF CONTAMINATION

Utilizing the established regulatory criteria presented in Section 4 for various land use categories and exposure pathways, the laboratory analytical results for the Julio Company/Former Amoco Bulk Fuel Terminal were reviewed and compared to EGLE Cleanup Criteria Requirements for Response Activity as applicable for the sampled environmental media.

5.2.1 Comprehensive Exposure Assessment

The comparison was completed to determine which ecological and human exposure pathways, risks, and conditions are relevant at Julio Company/Former Amoco Bulk Fuel Terminal. Although not inclusive of relevant pathways where regulatory criteria were not exceeded, the following exposure pathways were determined to be relevant at Julio Company/Former Amoco Bulk Fuel Terminal:

- Risks posed by hazardous substances in groundwater and the potential for that groundwater to be used as a drinking water source in both residential and nonresidential settings.

- Risks posed by hazardous substances in groundwater that may result in the volatilization of contaminants to indoor air in both residential and nonresidential settings.

- Risks posed by hazardous substances in groundwater and the potential for that groundwater to vent to surface water.

As discussed in Section 4.2.5, EGLE drinking water and groundwater/surface water pathway criteria exceedances for metals were excluded from the soil and groundwater evaluation. The rationale for this exclusion is twofold:

- The Project investigation and anticipated response actions are being undertaken pursuant to Part 201 of NREPA, being PA 451 of 1994, as amended. The concentrations of metals in excess of the EGLE drinking water and groundwater/surface water interface pathway criteria are ubiquitous in the study area and are predominantly the result of the presence of stamp sands. Stamp sands are not defined as a hazardous substance nor are subject to regulation under Part 201 unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use; and,

- The study area is part of OU 2 for which the EPA ROD remedy called for No Action. The EPA's ROD OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Canal, and other area water bodies. Note that EPA's No Action determination relies on the following to mitigate the effects of stamp sand to the extent practicable:

  - The reduction of stamp sand loading to surface water bodies expected as a result of the remedial action taken at OU 1 and OU 3.

  - Ongoing natural sedimentation and detoxification.

  - Institutional programs and practices controlling potential future exposure to site-affected drinking water which were intended to be administered at the county and state level.

  - The long-term monitoring and the five-year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.

Note that metals criteria for other relevant pathways, and PCB and organic contaminants for all pathways were included in the evaluation.

Furthermore, as discussed in Section 4.2.5, EGLE's MSSLs were not included in the exposure pathway assessment due to unknown anticipated future land use and conditions and because the screening levels are not promulgated rules. The MSSLs were considered for screening and delineation purposes only.

5.2.1.1 Building Materials and Containers

During the targeted inspection activities completed at Julio Company/Former Amoco Bulk Fuel Terminal, two SACMs were identified and samples were collected from the building and insulation materials.

The following table provides an aggregate summary of the sample locations with respect to the total number of samples and how they compare to applicable regulatory criteria. The table is based solely on the total number of samples, inclusive of historical samples, collected from the Julio Company/Former Amoco Bulk Fuel Terminal. It lists only the number of samples for a specific analytical suite that contained one or more exceedance of a given criterion. Bulk asbestos samples were compared to applicable NESHAP standards and EGLE Particulate Soil Inhalation Criteria (PSIC).

Building Materials Analytical Result Summary Table	Analytical Summary			National Emissions Standard for Hazardous Air Pollutants	
	Total Number of Samples	Detected Analytes	Total Exceedances	Friable Asbestos Material	Non-Friable Asbestos Material
Asbestos (Bulk)	4	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more sample				Not applicable	

During the reconnaissance activities completed at Julio Company/Former Amoco Bulk Fuel Terminal, four intact drums, two empty drum carcasses, and a number of tanks were identified. None of the drums were sampled; however surface soil sample QMCP-SS56 was collected at an area where a petroleum and tar release was observed adjacent to one of the tanks.

5.2.1.2 Soil Exposure Pathway Assessment

Laboratory analysis of soil samples from the Julio Company/Former Amoco Bulk Fuel Terminal did not detect COC concentrations that were at or above concentrations that trigger a "Facility" designation as defined in Section 20101(1)(s) of the NREPA. The following tables provide a summary of the soil sample locations with respect to the total number of samples and how they compare to the applicable EGLE Cleanup Criteria for Response Activity under both Residential and Nonresidential exposure scenarios.

The tables are based solely on the total number of samples collected from Julio Company/Former Amoco Bulk Fuel Terminal. They list only the number of samples for a specific analytical suite that contained one or more exceedance of a given criterion.

Soil Analytical Result Summary Table	Analytical Summary			Cleanup Criteria Requirements for Response Activity – Residential**								
				Groundwater Protection		Indoor Air	Ambient Air				Contact	Csat
	Total Number of Samples	Detected Analytes*	Total Exceedances*	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Inorganics	9	7	0	NA*	NA*	0	0	0	0	0	0	0
Cyanide	0	0	0	0	0	0	0	0	0	0	0	0
VOCs	9	0	0	0	0	0	0	0	0	0	0	0
SVOCs	10	7	0	0	0	0	0	0	0	0	0	0
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	1	0	0	0	0	0	0	0	0	0	0	0
Pesticides	0	0	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more samples				NOT APPLICABLE								

NA = The EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil evaluation as explained in Section 4.2.5.*

**Denotes total number of specific instances of an analyte being detected or exceeding criteria, can be multiple within one sample location.*

***Denotes total number of samples exceeding criteria, cannot be multiple within one sample location.*

Total exceedance column does not include MSSLs or non-applicable criteria (Drinking Water Protection Criteria [DWPC] and Groundwater/Surface Water Interface Protection Criteria [GSIPC] for metals).

Soil Analytical Result Summary Table	Analytical Summary			Cleanup Criteria Requirements for Response Activity – Nonresidential**								
				Groundwater Protection		Indoor Air	Ambient Air				Contact	Csat
	Total Number of Samples	Detected Analytes*	Total Exceedances*	Nonresidential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Inorganics	9	7	0	NA*	NA*	0	0	0	0	0	0	0
Cyanide	0	0	0	0	0	0	0	0	0	0	0	0
VOCs	9	0	0	0	0	0	0	0	0	0	0	0
SVOCs	10	7	0	0	0	0	0	0	0	0	0	0
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	1	0	0	0	0	0	0	0	0	0	0	0
Pesticides	0	0	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more samples				NOT APPLICABLE								

NA = The EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil evaluation as explained in Section 4.2.5.*

**Denotes total number of specific instances of an analyte being detected or exceeding criteria, can be multiple within one sample location.*

***Denotes total number of samples exceeding criteria, cannot be multiple within one sample location.*

Total exceedance column does not include MSSLs or non-applicable criteria (DWPC and GSIPC for metals).

5.2.1.3 Groundwater Exposure Pathway Assessment

Groundwater analytical results from Julio Company/Former Amoco Bulk Fuel Terminal identified COC concentrations in groundwater that were at or above concentrations that trigger a "Facility" designation as defined in Section 20101(1)(s) of the NREPA. Similar to the preceding soil tables, the following table provides a summary of the aforementioned sample locations with respect to the total number of samples and how they compare to the applicable EGLE Cleanup Criteria for Response Activity under both Residential and Nonresidential exposure scenarios.

Groundwater Analytical Result Summary Table	Analytical Summary			Cleanup Criteria Requirements for Response Activity – Residential and Nonresidential**						
	Total Number of Samples	Total Number of Detected Analytes*	Total Exceedances*	Residential Drinking Water Criteria	Nonresidential Drinking Water Criteria	Groundwater Surface Water Interface Criteria	Residential Groundwater Volatilization to Indoor Air Inhalation Criteria	Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria	Water Solubility	Flammability and Explosivity Screening Levels
Inorganics	3	7	0	NA*	NA*	NA*	0	0	0	0
Cyanide	0	0	0	0	0	0	0	0	0	0
VOCs	3	15	4	0	0	1	0	0	0	0
SVOCs	3	4	1	0	0	1	0	0	0	0
Total PCBs	1	0	0	0	0	0	0	0	0	0
Pesticides	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more sample				1,2,4-TRIMETHYLBENZENE, 2-METHYLNAPHTHALENE (VOC), NAPHTHALENE (VOC), XYLENE (TOTAL), NAPHTHALENE (SVOC)						

NA = The EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil evaluation as explained in Section 4.2.5.*

**Denotes total number of specific instances of an analyte being detected or exceeding criteria, can be multiple within one sample location.*

***Denotes total number of samples exceeding criteria, cannot be multiple within one sample location.*

Total exceedance column does not include MSSLs or non-applicable criteria (Drinking Water Criteria [DWC] and Groundwater/Surface Water Interface Criteria [GSIC] for metals).

5.2.2 Extent of Contamination

The comparison of analytical results to applicable regulatory criteria indicates that potential human health and ecological risks are present in groundwater at the Julio Company/Former Amoco Bulk Fuel Terminal. Recalling the goals and objectives of the SI, the following subsections describe the extent of contamination in environmental media in the study area.

5.2.2.1 Building Materials and Containers Extent of Contamination

Reconnaissance activities and asbestos analytical results for the sampled building and insulation materials did not confirm that ACM is present at the Julio Company/Former Amoco Bulk Fuel Terminal. Analytical results for surface soil sample QMCP-SS56 collected at the spilled petroleum and tar material adjacent to a tank did not identify detections of COCs exceeding EGLE criteria.

5.2.2.2 Soil Extent of Contamination

Soil analytical results did not exceed applicable EGLE criteria for organic or inorganic contaminants in either residential or nonresidential scenarios.

Samples were collected from surface and subsurface soil intervals throughout the Julio Company/Former Amoco Bulk Fuel Terminal. The sampling locations were generally within approximately 700 to 1,200 ft of the shoreline of the Portage Canal.

5.2.2.3 Groundwater Extent of Contamination

Groundwater analytical results for VOCs and SVOCs exceeded GSIC and MSSLs at QMCP-GW60, collected from 7 to 11 ft bgs. No other analyzed constituents were detected above applicable criteria with the exception of metals, which were not evaluated further as discussed in Section 4.2.5. The groundwater sampling locations were established within the Julio Company/Former Amoco Bulk Fuel Terminal parcel approximately 640 to 1,200 ft from the shoreline of the Portage Canal at depths of 5 to 9 ft, 7 to 11 ft, and 22 to 24 ft bgs.

5.3 CONCLUSIONS AND RECOMMENDATIONS

The analytical results and interpretation summarized in the preceding subsections document potential human health and ecological risks that are present at the Julio Company/Former Amoco Bulk Fuel Terminal. The following subsections provide a synopsis of these findings and a recommended path forward for mitigating these risks.

5.3.1 Conclusions

Environmental impacts at the Julio Company/Former Amoco Bulk Fuel Terminal are generally characterized by detections of organic contaminants in groundwater. Although specific sources of these contaminants may not be fully understood, research related to the historical operations provided substantive evidence for assessing specific operational areas and selecting target analytes anticipated to be present within the study area.

The analytical results summarized above provide sufficient analytical data and lines of evidence to conclude that the Julio Company/Former Amoco Bulk Fuel Terminal parcel is a Facility as defined in Section 20101(1)(s) of the NREPA. The following table provides a summary of the affected environmental media, applicable regulatory criteria, and potential receptors.

Julio Company/Former Amoco Bulk Fuel Terminal – Media, Criteria, Potential Receptor Summary															
Media	Soil			Groundwater			Air		Sediment	Surface Water		Building Materials, Asbestos, and Abandoned Containers			
Criteria / Potential Receptor	Drinking Water Protection	Groundwater Surface Water Interface	Direct Contact	Drinking Water Protection	Groundwater Surface Water Interface	Flammability and Explosivity	Volatilization	Particulate Inhalation	Ecological	Ecological	Human Health	Particulate Inhalation	Flammability and Explosivity	Environmental	Human Health
Residential Human					✓										
Nonresidential Human					✓										
Water Column Organism															
Benthic Organism															
COCs exceeding applicable regulatory criteria in one or more sample	1,2,4-TRIMETHYLBENZENE, 2-METHYLNAPHTHALENE (VOC), NAPHTHALENE (VOC), XYLENE (TOTAL), NAPHTHALENE (SVOC)														

The following provides a summary of findings derived from the assessment of the Julio Company/Former Amoco Bulk Fuel Terminal with respect to the goals and objectives for the Project:

- Terrestrial sources of contamination are present in the form of VOCs and SVOCs in groundwater in the study area. The extent of contamination at the Julio Company/Former Amoco Bulk Fuel Terminal has not been fully defined or addressed.

- Groundwater impacts on the property exceeded GSIC and MSSLs for residential and nonresidential scenarios but did not exceed solubility or flammability/explosivity screening levels.

5.3.2 Recommendations

The conclusions outlined in the preceding subsection establish that the Julio Company/Former Amoco Bulk Fuel Terminal parcel is a Part 201 Facility. Section 20107a of Part 201 of NREPA describes the duties of owners or operators of a Facility, regardless of their liability, including: prevent unacceptable exposures, prevent exacerbation, and take reasonable precautions against the foreseeable actions of third parties. Some exceptions may apply; in any case, owners and operators of contaminated properties should become familiar with Section 20107a and the associated Rules.

FIGURES

DETAILED FINDINGS REPORT – JULIO COMPANY/FORMER AMOCO BULK FUEL TERMINAL

Image Source: Michigan Imagery Solution (Houghton - 2013)

QMCP-ASBBLK40A/B

QMCP-ASBBLK41A/B

DATA SOURCES

Sample IDs	Date Range
1) **QMCP-ASBBLK...**	**September 2018**

-EGLE RRD. *SI results not published.*

-Bulk Oil Storage
-Other historic land use and/or operations unknown.

EGLE Part 201 NREPA Particulate Soil Inhalation Criteria (PSIC) [1%]
EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) [1%]

Sample with Asbestos Not Detected

MDNR Property

Approximate Parcel Boundaries

N

0 125 Ft

Coordinate System: MIGeoRef(m)

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Figure 5-1
ACM Analytical Results
(Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

FILE: W:\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20210304_QMCP_SI_Report_4FigXX_JP_RipleyDollarBay_ASBBLK_v20210402.mxd 11:23:54 AM 4/2/2021 AMiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

QMCP-SB60
9/9/2018

QMCP-SB59
9/9/2018

QMCP-SS56
9/28/2018

QMCP-SB57
9/9/2018

QMCP-SB58
9/9/2018

QMCP-SB56
9/9/2018

DATA SOURCES

Sample IDs	Date Range
1) **QMCP-SB/SS...**	**September 2018**

-EGLE RRD. *SI results not published.*

-Bulk Oil Storage
-Other historic land use and/or operations unknown.

PCBs — Inorganics / Cyanide
VOCs — SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

MDNR Trail
Approximate Parcel Boundaries

Notes:
- *MDNR = Michigan Department of Natural Resources*
- *PCBs = Polychlorinated Biphenyls*
- *SVOCs = Semi-Volatile Organic Compounds*
- *VOCs = Volatile Organic Compounds*

N
0 125 Ft
Coordinate System: MIGeoRef(m)

EGLE Part 201 Cleanup Criteria for Response Action
[1]=Statewide Default Background Level
[2]*=Groundwater Surface Water Interface Protection Criteria
[3]=Soil Saturation Concentration Screening Levels
[4]*=Residential Drinking Water Protection Criteria
[5]=Residential Soil Volatilization to Indoor Air Inhalation Criteria (VSIC)
[6]=Residential Infinite Source Volatile Soil Inhalation Criteria
[7]=Residential Finite VSIC for 5 Meter Source Thickness
[8]=Residential Finite VSIC for 2 Meter Source Thickness
[9]=Residential Particulate Soil Inhalation Criteria
[10]=Residential Direct Contact Criteria
[11]*=Nonresidential Drinking Water Protection Criteria
[12]=Nonresidential Soil Volatilization to Indoor Air Inhalation
[13]=Nonresidential Infinite Source Volatile Soil Inhalation Criteria
[14]=Nonresidential Finite VSIC for 5 Meter Source Thickness
[15]=Nonresidential Finite VSIC for 2 Meter Source Thickness
[16]=Nonresidential Particulate Soil Inhalation Criteria
[17]=Nonresidential Direct Contact Criteria
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)
[18]=Soil Residential MSSL
[19]=Soil Nonresidential MSSL
* Exceedances of criteria 2, 4, and 11 shown for organics and cyanide only
Evaluation based on EGLE Criteria at time of Project completion.

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Figure 5-2
Soil Analytical Results
(Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

FILE: W:\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20210204_QMCP_SI_Report_4FigXX_JP_RipleyDollarBay_SOIL_all_v20210414.mxd 10:09:18 AM 4/14/2021 AMiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

QMCP-GW60 9/9/2018
(7-11 ft)

1,2,4-TRIMETHYLBENZENE	49 ug/l [3,8,9]
1,3,5-TRIMETHYLBENZENE	45 ug/l [8,9]
2-METHYLNAPHTHALENE (VOC)	46 ug/l [3]
ETHYLBENZENE	14 ug/l [8,9]
NAPHTHALENE (SVOC)	14 ug/l [3]
NAPHTHALENE (VOC)	40 ug/l [3]
XYLENE - TOTAL	93 ug/l [3,8]

QMCP-GW59
9/9/2018

QMCP-GW73
9/11/2018

-Bulk Oil Storage
-Other historic land use and/or operations unknown.

DATA SOURCES

Sample IDs	Date Range
1) **QMCP-GW...**	**September 2018**

-EGLE RRD. *SI results not published*

PCBs
VOCs
Inorganics / Cyanide
SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

MDNR Property
Approximate Parcel Boundaries

Notes:
- *ft = feet*
- *MDNR = Michigan Department of Natural Resources*
- *ug/l = micrograms per liter*
- *PCBs = Polychlorinated Biphenyls*
- *SVOCs = Semi-Volatile Organic Compounds*
- *VOCs = Volatile Organic Compounds*

N
0 130
Ft
Coordinate System: MIGeoRef(m)

EGLE Part 201 Cleanup Criteria for Response Action
[1]*=Residential Drinking Water Criteria
[2]*=Nonresidential Drinking Water Criteria
[3]*=Groundwater Surface Water Interface Criteria
[4]=Residential Groundwater Vol to Indoor Air Inhalation
[5]=Nonresidential Groundwater Vol to Indoor Air Inhalation
[6]=Water Solubility
[7]=Flammability and Explosivity Screening Level
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)
[8]=Shallow Groundwater Residential MSSL
[9]=Shallow Groundwater Nonresidential MSSL
[10]=Groundwater Residential MSSL
[11]=Groundwater Residential TS MSSL
[12]=Groundwater Nonresidential MSSL
[13]=Groundwater Nonresidential $MSSL_{12}$
[14]=Groundwater Nonresidential TS $MSSL_{12}$
* Exceedances of criteria 1, 2, and 3 are shown for organics only
Evaluation based on EGLE Criteria at time of Project completion.

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Figure 5-3
Groundwater Analytical Results
(Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

FILE: W:\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20210304_QMCP_SI_Report_AFinal\X_JP_RinleyDollarBay_GW_20210408.mxd 3:30:13 PM 4/8/2021 AMiller

TABLES

DETAILED FINDINGS REPORT – JULIO COMPANY/FORMER AMOCO BULK FUEL TERMINAL

TABLE 5-1
Summary of ACM Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

Sample Location	Field Sample ID	Sample Date	Asbestos		Friable/ Non-friable	Sample Description	Sample Notes
Julio Company/Former Amoco Bulk Fuel Terminal							
QMCP-ASBBLK40	QMCP-ASBBLK40A-092818	9/28/2018	ND	--	friable	Black tar paper with fibers	
QMCP-ASBBLK40	QMCP-ASBBLK40B-092818	9/28/2018	ND	--	friable	Black tar paper with fibers	
QMCP-ASBBLK41	QMCP-ASBBLK41A-092818	9/28/2018	ND	--	friable	Tank insulation	
QMCP-ASBBLK41	QMCP-ASBBLK41B-092818	9/28/2018	ND	--	friable	Tank insulation	

-- = Not Analyzed
ND = Not detected
EGLE = Michigan Department of Environment, Great Lakes, and Energy

Results greater than the National Emissions Standard for Hazardous Air Pollutants (NESHAP) and EGLE Particulate Soil Inhalation Criteria of 1% are highlighted yellow.
Evaluation based on EGLE Criteria at time of Project completion.

TABLE 5-2
Summary of Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EGLE Part 201 Generic Cleanup Criteria														Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Company/Former Amoco Bulk Fuel Terminal									
Station Name	CAS Number																	QMCP-SB56				QMCP-SB57		QMCP-SB58			
Field Sample ID																		QMCP-SB56 0-6in		QMCP-SB56 6in-4ft		QMCP-SB57 0-4ft		QMCP-SB58 0-6in		QMCP-SB58 6in-5ft	
Sample Date																		9/9/2018		9/9/2018		9/9/2018		9/9/2018		9/9/2018	
Sample Interval (bgs)																		0 - 0.5 ft		0.5 - 4 ft		0 - 4 ft		0 - 0.5 ft		0.5 - 5 ft	
Sample Description		[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[5] Residential Soil Volatilization to Indoor Air Inhalation Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[9] Residential Particulate Soil Inhalation Criteria	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[12] Nonresidential Soil Volatilization to Indoor Air Inhalation Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[16] Nonresidential Particulate Soil Inhalation Criteria	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	SAND, Fine to medium, brown, saturated at 4.5 feet		SAND, Fine to medium, brown, saturated at 4.5 feet		SAND, Fine to medium, brown, dry		SAND, Fine to medium, brown, dry		SAND, Fine to medium, brown, dry	
																		Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																											
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	NLV	100,000 (B)	400 (B)	700 (B)	NLV	NLV	NLV	NLV	44,000 (B)	900 (B,DD)	NA	NA	**4.7**	--	**1.3**	--	**1.3**	--	**7.6**	--	<1.0 U	--
Organics - PCBs (ug/kg)																											
TOTAL PCBS	1336-36-6	NLL	NLL	3.00E+6 (J,T)	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	5.20E+6 (J,T)	1,000 (J,T)	NLL	1.60E+7 (J,T)	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	6.50E+6 (J,T)	1,000 (J,T)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - SVOCs (ug/kg)																											
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	NLV	ID	20,000 (Q)	NLL	NLV	NLV	NLV	NLV	ID	80,000 (Q)	NA	NA	<220 U	--	<220 U	--	<210 U	--	<210 U	--	<210 U	--
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	ID	ID	80,000 (Q)	NA	NA	<450 U	--	<440 U	--	<430 U	--	<410 U	--	<420 U	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	ID	ID	8.00E+6 (Q)	NA	NA	<220 U	--	<220 U	--	<210 U	--	<210 U	--	<210 U	--
FLUORANTHENE	206-44-0	5,500	730,000	1.00E+9 (D)	7.40E+08	7.40E+08	7.40E+08	9.30E+09	4.60E+07	730,000	1.00E+9 (D)	8.90E+08	8.80E+08	8.80E+08	4.10E+09	1.30E+08	NA	NA	<220 U	--	<220 U	--	<210 U	--	<210 U	--	<210 U	--
PHENANTHRENE	85-01-8	2,100	56,000	2.80E+06	1.60E+05	1.60E+05	1.60E+05	6.70E+06	1.60E+06	1.60E+05	5.10E+06	1.90E+05	1.90E+05	1.90E+05	2.90E+06	5.20E+06	NA	NA	<220 U	--	<220 U	--	<210 U	--	<210 U	--	<210 U	--
PYRENE	129-00-0	ID	4.80E+05	1.00E+9 (D)	6.50E+08	6.50E+08	6.50E+08	6.70E+09	2.90E+07	4.80E+05	1.00E+9 (D)	7.80E+08	7.80E+08	7.80E+08	2.90E+09	8.40E+07	NA	NA	<220 U	--	<220 U	--	<210 U	--	<210 U	--	<210 U	--
Organics - VOCs (ug/kg)																											
TOTAL VOCS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	--	ND	--	ND	--	ND	--	ND	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 5-2
Summary of Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EGLE Part 201 Generic Cleanup Criteria														Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Company/Former Amoco Bulk Fuel Terminal									
Station Name	CAS Number																	QMCP-SB59				QMCP-SB60				QMCP-SS56	
Field Sample ID																		QMCP-SB59 0-6in		QMCP-SB59 6in-4ft		QMCP-SB60 0-6in		QMCP-SB60 6in-6ft		QMCP-SS56-0-3in	
Sample Date																		9/9/2018		9/9/2018		9/9/2018		9/9/2018		9/28/2018	
Sample Interval (bgs)																		0 - 0.5 ft		0.5 - 4 ft		0 - 0.5 ft		0.5 - 6 ft		0 - 0.25 ft	
Sample Description		[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[5] Residential Soil Volatilization to Indoor Air Inhalation Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[9] Residential Particulate Soil Inhalation Criteria	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[12] Nonresidential Soil Volatilization to Indoor Air Inhalation Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[16] Nonresidential Particulate Soil Inhalation Criteria	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	SAND, Fine to medium, brown, saturated at 4.5 feet		SAND, Fine to medium, brown, saturated at 4.5 feet		SAND and GRAVEL		SAND, Fine to medium, brown, saturated at 7 feet		Stained soil near fuel tank	
																		Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																											
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	NLV	100,000 (B)	400 (B)	700 (B)	NLV	NLV	NLV	NLV	44,000 (B)	900 (B,DD)	NA	NA	**1.4**	--	<1.0 U	--	**16**	--	**27**	--	NM	--
Organics - PCBs (ug/kg)																											
TOTAL PCBS	1336-36-6	NLL	NLL	3.00E+6 (J,T)	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	5.20E+6 (J,T)	1,000 (J,T)	NLL	1.60E+7 (J,T)	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	6.50E+6 (J,T)	1,000 (J,T)	NA	NA	NM	--	NM	--	NM	--	NM	--	ND	--
Organics - SVOCs (ug/kg)																											
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	NLV	ID	20,000 (Q)	NLL	NLV	NLV	NLV	NLV	ID	80,000 (Q)	NA	NA	<220 U	--	<220 U	--	<1100 U	--	**300**	--	<32000 U	--
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	ID	ID	80,000 (Q)	NA	NA	<430 U	--	<440 U	--	<22000 U	--	**440 J**	--	<63000 U	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	ID	ID	8.00E+6 (Q)	NA	NA	<220 U	--	<220 U	--	<1100 U	--	**300**	--	<32000 U	--
FLUORANTHENE	206-44-0	5,500	730,000	1.00E+9 (D)	7.40E+08	7.40E+08	7.40E+08	9.30E+09	4.60E+07	730,000	1.00E+9 (D)	8.90E+08	8.80E+08	8.80E+08	4.10E+09	1.30E+08	NA	NA	<220 U	--	<220 U	--	<1100 U	--	**750**	--	<32000 U	--
PHENANTHRENE	85-01-8	2,100	56,000	2.80E+06	1.60E+05	1.60E+05	1.60E+05	6.70E+06	1.60E+06	1.60E+05	5.10E+06	1.90E+05	1.90E+05	1.90E+05	2.90E+06	5.20E+06	NA	NA	<220 U	--	<220 U	--	<1100 U	--	**530**	--	<32000 U	--
PYRENE	129-00-0	ID	4.80E+05	1.00E+9 (D)	6.50E+08	6.50E+08	6.50E+08	6.70E+09	2.90E+07	4.80E+05	1.00E+9 (D)	7.80E+08	7.80E+08	7.80E+08	2.90E+09	8.40E+07	NA	NA	<220 U	--	<220 U	--	<1100 U	--	**550**	--	**64,000**	--
Organics - VOCs (ug/kg)																											
TOTAL VOCS	--	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	ND	--	ND	--	ND	--	ND	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 5-2
Summary of Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

Soil Table Footnotes:

- EGLE Part 201 residential and non-residential generic cleanup criteria and screening levels criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a. Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Release Date: December 30, 2013. Updated June 2018.
- Only detected analytes are listed - Gray rows indicate requested analyses. If no analytes are listed below a gray row then all analytes of that group were either not analyzed or not detected.
- **Bold** values are concentrations detected above the laboratory reporting limit.
- **Bold/Shaded** cells indicate analyte concentration exceeded applicable criteria. EGLE Part 201 criteria exceeded is indicated by the footnote in [brackets] following the result value and defined below:

[2] - Groundwater Surface Water Interface Protection Criteria
[3] - Soil Saturation Concentration Screening Levels
[4] - Residential Drinking Water Protection Criteria
[5] - Residential Soil Volatilization to Indoor Air Inhalation Criteria (VIAC)
[6] - Residential Infinite Source Volatile Soil Inhalation Criteria(VSIC)
[7] - Residential Finite VSIC for 5 Meter Source Thickness
[8] - Residential Finite VSIC for 2 Meter Source Thickness
[9] - Residential Particulate Soil Inhalation Criteria
[10] - Residential Direct Contact Criteria
[11] - Nonresidential Drinking Water Protection Criteria
[12] - Nonresidential Soil Volatilization to Indoor Air Inhalation Criteria (VIAC)
[13] - Nonresidential Infinite Source Volatile Soil Inhalation Criteria (VSIC)
[14] - Nonresidential Finite VSIC for 5 Meter Source Thickness
[15] - Nonresidential Finite VSIC for 2 Meter Source Thickness
[16] - Nonresidential Particulate Soil Inhalation Criteria
[17] - Nonresidential Direct Contact Criteria
[18] - Soil Residential MSSL
[19] - Soil Nonresidential MSSL

Evaluation based on EGLE Criteria at time of Project completion.
Samples described in this evaluation may actually refer to stamp sands or to other mining waste from the historic mining and reclamation processes conducted in the area.

-- = No Exceedances
NM = Not Measured
ND = Not Detected
bgs = Below ground surface
ft = Feet
in = Inches
mg/kg = Milligrams per kilogram.
PCBs = Polychlorinated biphenyls
VOC = Volatile organic compound
SVOC = Semi-volatile organic compound
ug/kg = Micrograms per kilogram
% = Percentage
MSSL = Media-Specific Volatilization to Indoor Air Interim Action Screening Level

Criteria Footnotes:

ID = Insufficient data to develop criterion.
NA = A criterion or value is not available
NLL = Hazardous substance is not likely to leach under most soil conditions.
NLV = Hazardous substance is not likely to volatilize under most conditions.
(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.
(D) = Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1.0E+9 parts per billion (ppb).
(DD) = Hazardous substance causes developmental effects. Residential direct contact criteria are protective of both prenatal and postnatal exposure. Nonresidential direct contact criteria are protective for a pregnant adult receptor.
(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. A hardness value of 47.5 $CaCO_3$/L and pH of 7, derived from the Michigan Department of Environmental Quality Draft Site Inspection Report for Lake Linden Operations dated 3/29/13, was used in the footnote G calculation spreadsheet.
(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.
(Q) = Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene.
(T) = Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards
(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)

Laboratory Footnotes:

J = The result is an estimated quantity.
U = Analyte analyzed for but not detected above the reported sample reporting limit.

TABLE 5-2
Summary of Soil Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

	Part 201 Generic Cleanup Criteria Evaluated	Exceedance
EGLE Part 201 Generic Cleanup Criteria (June 2018)	[2] - Groundwater Surface Water Interface Protection Criteria	NO
	[3] - Soil Saturation Concentration Screening Levels	NO
	[4] - Residential Drinking Water Protection Criteria	NO
	[5] - Residential Soil Volatilization to Indoor Air Inhalation Criteria (VIAC)	NO
	[6] - Residential Infinite Source Volatile Soil Inhalation Criteria (VSIC)	NO
	[7] - Residential Finite VSIC for 5 Meter Source Thickness	NO
	[8] - Residential Finite VSIC for 2 Meter Source Thickness	NO
	[9] - Residential Particulate Soil Inhalation Criteria	NO
	[10] - Residential Direct Contact Criteria	NO
	[11] - Nonresidential Drinking Water Protection Criteria	NO
	[12] - Nonresidential Soil Volatilization to Indoor Air Inhalation	NO
	[13] - Nonresidential Infinite Source Volatile Soil Inhalation Criteria	NO
	[14] - Nonresidential Finite VSIC for 5 Meter Source Thickness	NO
	[15] - Nonresidential Finite VSIC for 2 Meter Source Thickness	NO
	[16] - Nonresidential Particulate Soil Inhalation Criteria	NO
	[17] - Nonresidential Direct Contact Criteria	NO
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)	[18] - Soil Residential Media-Specific Screening Level (MSSL)	NO
	[19] - Soil Nonresidential MSSL	NO

TABLE 5-3
Summary of Groundwater Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EGLE Part 201 Generic Cleanup Criteria			Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Company/Former Amoco Bulk Fuel Terminal					
Station Name	CAS Number	[1] Residential Drinking Water Criteria	[2] Nonresidential Drinking Water Criteria	[3] Groundwater Surface Water Interface Criteria	[8] Shallow Groundwater Residential MSSL	[9] Shallow Groundwater Nonresidential MSSL	QMCP-GW59		QMCP-GW60		QMCP-GW73	
Field Sample ID							QMCP-GW59 5-9		QMCP-GW60 7-11		QMCP-GW73 22-24	
Sample Date							9/9/2018		9/9/2018		9/11/2018	
Sample Interval (bgs)							5 - 9 ft		7 - 11 ft		22 - 24 ft	
							Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (ug/l)												
ARSENIC	7440-38-2	10 (A)	10 (A)	10	NA	NA	NM	--	NM	--	**5.9**	--
CHROMIUM	7440-47-3	100 (A,B,H)	100 (A,B,H)	40 (B,G,H,X)	NA	NA	NM	--	NM	--	**27**	--
COPPER	7440-50-8	4.0 (B,E)	4.0 (B,E)	14 (B,G)	NA	NA	NM	--	NM	--	**240**	**[3]**
LEAD	7439-92-1	4.0 (B,L)	4.0 (B,L)	14 (B,G,X)	NA	NA	<1.0 U	--	**11**	**[1,2]**	**4.9**	**[1,2]**
SILVER	7440-22-4	34 (B)	98 (B)	0.2 (B,M)	NA	NA	NM	--	NM	--	**0.6**	**[3]**
ZINC	7440-66-6	2,400 (B)	5,000 (B,E)	63 (B,G)	NA	NA	NM	--	NM	--	**24**	--
Organics - PCBs as Aroclors (ug/l)												
TOTAL PCBS	1336-36-6	0.5 (A,J,T)	0.5 (A,J,T)	0.2 (J,M,T)	NA	NA	NM	--	NM	--	ND	--
Organics - SVOCs (ug/l)												
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	260	750	19	NA	NA	<5.0 U	--	**9.3**	--	<5.1 U	--
FLUORENE	86-73-7	880	2,000 (S)	12	NA	NA	<1.0 U	--	**1.4**	--	<1.0 U	--
NAPHTHALENE (SVOC)	91-20-3S	520	1,500	11	NA	NA	<1.0 U	--	**14**	**[3]**	<1.0 U	--
PHENANTHRENE	85-01-8	52	150	2.0 (M); 1.7	NA	NA	<1.0 U	--	**1.1**	--	<1.0 U	--
Organics - VOCs (ug/l)												
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	43 (JT)	67 (JT)	<1.0 U	--	**34**	--	<1 UJ	--
1,2,4-TRIMETHYLBENZENE	95-63-6	63 (E,I)	63 (E,I)	17 (I)	25 (JT)	44 (JT)	<1.0 U	--	**49**	**[3,8,9]**	<1 UJ	--
1,3,5-TRIMETHYLBENZENE	108-67-8	72 (E,I)	72 (E,I)	45 (I)	18 (JT)	30 (JT)	<1.0 U	--	**45**	**[8,9]**	<1 UJ	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	260	750	19	NA	NA	<5.0 U	--	**46**	**[3]**	<5 UJ	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	<5.0 U	--	**33**	--	<5 UJ	--
ETHYLBENZENE	100-41-4	74 (E,I)	74 (E,I)	18 (I)	2.8	7.6	<1.0 U	--	**14**	**[8,9]**	<1 UJ	--
HEXANE	110-54-3	3,000	8,600	NA	29	85	<1.0 U	--	**10**	--	<1 UJ	--
ISOPROPYLBENZENE	98-82-8	800	2,300	28	NA	NA	<1.0 U	--	**2.1**	--	<1 UJ	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	<2.0 U	--	**46**	--	<2 UJ	--
NAPHTHALENE (VOC)	91-20-3V	520	1,500	11	NA	NA	<5.0 U	--	**40**	**[3]**	<5 UJ	--
N-PROPYLBENZENE	103-65-1	80 (I)	230 (I)	ID	43	83	<1.0 U	--	**1.9**	--	<1 UJ	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	<1.0 U	--	**47**	--	<1 UJ	--
SEC-BUTYLBENZENE	135-98-8	80	230	ID	NA	NA	<1.0 U	--	**1.5**	--	<1 UJ	--
TOLUENE	108-88-3	790 (E,I)	790 (E,I)	270 (I)	300	570	<1.0 U	--	**3**	--	<1 UJ	--
XYLENE - TOTAL	--	280 (E,I)	280 (E,I)	49 (I)	75 (J)	120 (J)	ND	--	**93**	**[3,8]**	ND	--
Water Quality Parameters												
TEMPURATURE (°C)	--	NA	NA	NA	NA	NA	**15.5**	--	**16.3**	--	**15.0**	--
CONDUCTIVITY (mS/cm)	--	NA	NA	NA	NA	NA	**0.036**	--	**0.600**	--	**0.219**	--
DISSOLVED OXYGEN (%)	--	NA	NA	NA	NA	NA	**54.3**	--	**3.7**	--	**51.1**	--
pH	--	NA	NA	NA	NA	NA	**6.30**	--	**6.39**	--	**6.75**	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 5-3
Summary of Groundwater Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

Groundwater Table Footnotes:

- EGLE Part 201 residential and non-residential generic cleanup criteria and screening levels criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a. Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Release Date: December 30, 2013. Updated December 21, 2020.

- Only detected analytes are listed - Gray rows indicate requested analyses. If no analytes are listed below a gray row then all analytes of that group were either not analyzed or not detected.

- **Bold** values are concentrations detected above the laboratory reporting limit.

- **Bold/Shaded** cells indicate analyte concentration exceeded applicable criteria. EGLE Part 201 criteria exceeded is indicated by the footnote in [brackets] following the result value and defined below:

[1] - Residential Drinking Water Criteria
[2] - Nonresidential Drinking Water Criteria
[3] - Groundwater Surface Water Interface Criteria
[4] - Water Solubility
[5] - Residential Groundwater Volatilization to Indoor Air Inhalation Criteria
[6] - Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria
[7] - Flammability and Explosivity Screening Level
Evaluation based on EGLE Criteria at time of Project completion.

[8] Shallow Groundwater Residential MSSL
[9] Shallow Groundwater Nonresidential MSSL
[10] Groundwater Residential MSSL
[11] Groundwater Residential TS MSSL
[12] Groundwater Nonresidential MSSL
[13] Groundwater Nonresidential $MSSL_{12}$
[14] Groundwater Nonresidential TS MSSL

-- = No Exceedances
NM = Not Measured
ND = Not Detected
bgs = Below ground surface
ft = Feet
PCBs = Polychlorinated biphenyls
SVOC = Semi-volatile organic compound
VOC = Volatile organic compound

ug/l = Micrograms per liter
mg/l = Milligrams per liter
°C = Degrees Celsius
mS/cm = MilliSiemens per centimeter
% = Percentage
pH = pH acid-base scale
MSSL = Media-Specific Volatilization to Indoor Air Interim Action Screening Level
TS MSSL = Time Specific Media-Specific Volatilization to Indoor Air Interim Action Screening Level

Groundwater Table Footnotes:

ID = Insufficient data to develop criterion.

NA = A criterion or value is not available

(A) = Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.

(E) = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). A notice of aesthetic impact may be employed as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion, but do not exceed the applicable health-based drinking water value provided in a table available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information)

(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. A hardness value of 47.5 $CaCO_3$/L and pH of 7, derived from the Michigan Department of Environmental Quality Draft Site Inspection Report for Lake Linden Operations dated 3/29/13, was used in the footnote G calculation spreadsheet.

(H) = Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.

(I) = Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the EGLE, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.

(L) = Criteria for lead are derived using a biologically based model, as allowed for under Section 20120a(9) of the NREPA, and are not calculated using the algorithms and assumptions specified in pathway-specific rules. The generic residential drinking water criterion of 4 ug/L is linked to the generic residential soil direct contact criterion of 400 mg/kg. A higher concentration in the drinking water, up to the state action level of 15 ug/L, may be allowed as a site-specific remedy and still allow for drinking water use, under Section 20120a(2) and 20120b of the NREPA if soil concentrations are appropriately lower than 400 mg/kg. If a site-specific criterion is approved based on this subdivision, a notice shall be filed on the deed for all property where the groundwater concentrations will exceed 4 ug/L to provide notice of the potential for unacceptable risk if soil or groundwater concentrations increase. Acceptable combinations of site-specific soil and drinking water concentrations are presented in a table available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site (See R 299.49 Footnotes for generic cleanup criteria tables for additional information).

(M) = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

(S) = Criterion defaults to the hazardous substance-specific water solubility limit.

(T) = Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the published table if TSCA standards are not applicable.

(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)

MSSL Footnotes:

J = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations must be added together for comparison to screening level.

JT = Hazardous substance may be present in several isomer forms. Screening levels may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive screening level of the detected isomers.

Laboratory Footnotes:

U = Analyte analyzed for but not detected above the reported sample reporting limit.

UJ = Analyte analyzed for but not detected above the reported sample reporting limit and is an estimated quantity.

TABLE 5-3
Summary of Groundwater Analytical Results (Julio Company/Former Amoco Bulk Fuel Terminal)
Julio Properties - Dollar Bay
Houghton County, Michigan

	Part 201 Generic Cleanup Criteria Evaluated	Exceedance
EGLE Part 201 Generic Cleanup Criteria (December 2020)	[1] Residential Drinking Water Criteria	YES
	[2] Nonresidential Drinking Water Criteria	YES
	[3] Groundwater Surface Water Interface Criteria	YES
	[4] Residential Groundwater Volatilization to Indoor Air Inhalation Criteria	NO
	[5] Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria	NO
	[6] Water Solubility	NO
	[7] Flammability and Explosivity Screening	NO
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)	[8] Shallow Groundwater Residential Media-Specific Screening Level (MSSL)	YES
	[9] Shallow Groundwater Nonresidential MSSL	YES
	[10] Groundwater Residential MSSL	NO
	[11] Groundwater Residential Time Sensitive Media-Specific Screening Level (TS MSSL)	NO
	[12] Groundwater Nonresidential MSSL	NO
	[13] Groundwater Nonresidential $MSSL_{12}$	NO
	[14] Groundwater Nonresidential TS $MSSL_{12}$	NO

6. DETAILED FINDINGS – JULIO MARINE

This Section summarizes the results and subsequent findings for the Julio Marine parcel within the Julio Properties – Dollar Bay portion of QMCP derived from implementation of the SAP. The narrative follows the systematic investigative approach outlined in Section 3, while providing specific details about the potential human health and ecological risks associated with the historical mining operations in this subarea of QMCP.

6.1 SITE INSPECTION AND INVESTIGATION RESULTS

The implementation of the site inspection and investigation activities provided critical lines of evidence that link the historical documentation and the current environmental conditions in and around Dollar Bay. The following subsections present the findings of the inspection and investigation activities and provide correlation of mining era operations and their potential impacts on the nearshore environment of the Portage Canal and Dollar Bay.

6.1.1 Site Inspection

The site inspection at each subarea included the inventory and locating of historical structures and similar surficial artifacts associated with the former industrial operations in the area. Each subarea was also inspected for potential physical and health hazards that were documented, photographed, and located with a GPS unit. The inventoried hazards were then qualitatively assessed for potential human health and environmental risks to determine if analytical sampling was warranted during the targeted inspection phase of the work.

On September 26, 2018, December 3, 2019, and November 4, 2020, MSG field team personnel performed reconnaissance activities at Julio Marine. The property parcel, totaling approximately 11.9 acres, was visually inspected and observations were recorded while traversing the property. The qualitative assessment of the reconnaissance findings at Julio Marine warranted the performance of targeted inspection activities. The following provides a summary of the findings associated with the reconnaissance activities.

6.1.1.1 Reconnaissance

The reconnaissance activities identified over 200 drums and containers with varying contents, 49 ASTs and USTs, building debris piles that were SACM, compressed gas cylinders, pipe wrap, three large vats, electrical components, one transformer with suspect PCBs, and other scrap/debris items. A copy of the reconnaissance log is provided in *Appendix C, Site Inspections – Reconnaissance Logs, Targeted Inspections & Physical Hazards Inventory* of this SI Report.

6.1.1.2 Targeted Inspection

The qualitative assessment of the reconnaissance findings at Julio Marine warranted the performance of targeted inspection activities. Bulk materials samples for asbestos analysis were collected on October 1, 2018 by a MSG field team. The following subsections summarize the findings of these sampling efforts.

6.1.1.2.1 Bulk Material Sampling

Based on the SACM hazards noted during the reconnaissance activities a limited asbestos survey was conducted as part of the SI to identify suspect potentially friable ACM. The asbestos survey was limited to SACMs in open areas of the property and within debris piles.

Thirty-two bulk samples were collected from 16 SACMs as part of the SI. Laboratory analysis indicated that five of 16 SACMs contained greater than 1% asbestos. Four of the ACMs were friable. ACM identified within the Julio Marine

parcel included white thermal system insulation (TSI) on piping, silver painted mastic, silver painted roofing, silver coated roofing, and brown insulation observed inside a drum.

The samples were analyzed in accordance with EPA Method 600/R-93/116, "Method for the Determination of Asbestos in Bulk Building Materials" using Polarized Light Microscopy (PLM). This laboratory analytical method identifies the presence and estimated concentration of asbestos fibers in sampled building materials. The location of the bulk asbestos samples collected during the targeted inspection activities are depicted on ***Figure 6-1**, ACM Analytical Results (Julio Marine)*. A detailed summary of bulk asbestos sample analytical results collected from Julio Marine during the targeted inspection are provided in ***Table 6-1**, Summary of ACM Analytical Results (Julio Marine)*.

6.1.2 Site Investigation

The SI for the Julio Properties – Dollar Bay was developed based on a variety of data and information as outlined in Section 3. In addition to the historical accounts and documentation, current land use and potential exposure pathways were also taken into consideration when selecting the sampling locations specific to Julio Marine. The following subsections present the outcomes of investigative activities completed at Julio Marine by summarizing the laboratory analytical results and characterizing their impacts on the environmental media in which they were detected.

6.1.2.1 Terrestrial Investigation

Intrusive investigation activities at Julio Marine were generally guided by the findings of historical research and field observations. From a historical standpoint, the area was the location of operations subject to or associated with historic mining practices such as the Tamarack and Osceola Copper Manufacturing Company, John A. Roebling's Sons Copper Manufacturing, and Foley Copper Products Company Copper Wire Mill. It is currently the location of Julio Marine.

COCs in the study area were not generally understood nor previously investigated to fully characterize or address potential organic and inorganic contaminants in soil and groundwater. The following subsections present a summary of the field observations and analytical results derived from the terrestrial sampling activities at Julio Marine.

6.1.2.1.1 Field Observations – Soil and Groundwater

Nine borings on the property were advanced by GSS to between 4 and 14 ft bgs. Boring locations are depicted on ***Figure 6-2**, Soil Analytical Results (Julio Marine)*. Soil observations documented on field logs indicate that the subsurface at Julio Marine is generally comprised of fine to coarse brown sand.

During groundwater sampling, temporary well points were established at 4 ft intervals from between 2 and 13 ft bgs to the boring terminus, while permanent monitoring wells were screened from 3.5 to 8.5 ft bgs. Saturated soil conditions were encountered at depths of 2 to 9 ft bgs. Groundwater quality parameters, including temperature, conductivity, DO, and pH, measured at the time of sample collection were generally considered normal.

6.1.2.1.2 Soil Sampling Results

Terrestrial soil investigation activities were completed at Julio Marine on September 6, 10, and 26, 2018. Additional surface soil samples were collected on October 1, 2018, August 17, 2019, and September 24, 2020. During the mobilizations a total of 49 soil samples were collected from 40 sampling locations. Soil boring locations are depicted on ***Figure 6-2, Soil Analytical Results (Julio Marine)***. Investigative methodologies and soil sampling techniques were conducted using the procedures outlined in Section 3.

Soil sampling included 40 surface soil sampling intervals, from 0 to 3 inches or 0 to 6 inches in depth. The remaining nine (9) subsurface soil samples ranged up to 14 ft in depth. The samples were analyzed for the parameters identified on ***Table 3-1, Sampling and Analysis Summary*** of this SI Report. The selection of analytical parameters was generally based upon potential environmental impacts associated with mining era operations in the vicinity of the sampling location or field observations.

The surface and subsurface soil analytical results for Julio Marine contained inorganics, PCBs, VOCs, and SVOCs at or above applicable residential and nonresidential regulatory criteria and several COCs above MSSLs.

A detailed summary of soil analytical results for Julio Marine is provided in ***Table 6-2, Summary of Soil Analytical Results (Julio Marine***). Soil boring logs are included in ***Appendix E, Boring Logs*** of this SI Report.

6.1.2.1.3 Groundwater Sampling Results

During the advancement of soil borings at Julio Marine, nine (9) temporary groundwater sampling locations were established to characterize groundwater in the area. The temporary sampling points were installed and sampled using the methodologies presented in Section 3. The screened intervals in the groundwater sampling locations were established between 2 to 6 ft bgs and 13 to 17 ft bgs. In addition, on August 19 and 20, 2019, GSS installed nine (9) permanent monitoring wells with screened intervals from 3.5 ft to 8.5 ft bgs. GSS sampled these monitoring wells in October 2019 and again in September 2020. An additional water level and LNAPL gauging event occurred in November 2021. A summary of monitoring well construction and gauging results is provided in ***Table 6-3, Monitoring Well Construction and Elevation Data (Julio Marine)***. A total of 25 groundwater sample were collected. Temporary groundwater and permanent monitoring well sampling locations are depicted on ***Figure 6-3, Groundwater Analytical Results (Julio Marine)***.

Collected groundwater samples were analyzed for the parameters identified on ***Table 3-1, Sampling and Analysis Summary*** of this SI Report. The selection of analytical parameters was generally based upon potential environmental impacts associated with mining era operations in the vicinity of the sampling location or field observations. A few COCs, predominantly SVOCs, were detected at concentrations exceeding Groundwater/Surface Water Interface Criteria (GSIC) in groundwater collected from temporary well points QMCP-GW43, QMCP-GW45, and QMCP-GW46. PCBs were not detected in groundwater at Julio Marine, nor were any other COCs detected in groundwater above applicable criteria with the exception of metals, which were not evaluated further as discussed in Section 4.2.5.

A detailed summary of groundwater analytical results from Julio Marine is provided in ***Table 6-4, Summary of Groundwater Analytical Results (Julio Marine)***. Groundwater analytical results are depicted on ***Figure 6-3, Groundwater Analytical Results (Julio Marine)***. Soil boring logs are included in ***Appendix E, Boring Logs*** of this SI Report.

LNAPL was measured floating on top of the groundwater in QMCP-MW9 and QMCP-MW10 in October 2019. LNAPL was again observed in QMCP-MW10 in September 2020 and approximately 2-ft of LNAPL was identified in QMCP-MW10 in November 2021. During advancement of QMCP-SB48, LNAPL was observed in the groundwater sample

collected from 7 to 9 ft bgs. A fingerprint analysis on the collected LNAPL sample from QMCP-SB48 indicated motor oil and mineral oil.

6.2 NATURE AND EXTENT OF CONTAMINATION

Utilizing the established regulatory criteria presented in Section 4 for various land use categories and exposure pathways, the laboratory analytical results summarized in the preceding section for Julio Marine were reviewed and compared to EGLE Cleanup Criteria Requirements for Response Activity as applicable for the sampled environmental media.

6.2.1 Comprehensive Exposure Assessment

The comparison was completed to determine which ecological and human exposure pathways, risks, and conditions are relevant at Julio Marine. Although not inclusive of relevant pathways where regulatory criteria were not exceeded, the following exposure pathways were determined to be relevant at Julio Marine:

- Risks posed by hazardous substances in soil and the potential for the substances to leach to groundwater that could be used as a drinking water source in both residential and nonresidential settings.
- Risks posed by hazardous substances in soil and the potential for the substances to leach to groundwater that could vent to surface water.
- Risks posed by hazardous substances in soil that may result in the volatilization of contaminants to indoor air in residential and nonresidential settings.
- Risks posed by hazardous substances in soil that may result in the volatilization of contaminants to ambient air in residential and nonresidential settings.
- Risks posed by hazardous substances in soil and the potential for direct contact with these soils in both residential and nonresidential settings.
- Risks posed by hazardous substances in groundwater and the potential for that groundwater to be used as a drinking water source in both residential and nonresidential settings.
- Risks posed by hazardous substances in groundwater and the potential for that groundwater to vent to surface water.
- Risks posed by hazardous substances in groundwater that may result in the volatilization of contaminants to indoor air in both residential and nonresidential settings.
- Risks posed by free-phase liquids in groundwater.

As discussed in Section 4.2.5, the EGLE drinking water and groundwater/surface water pathway criteria exceedances for metals were excluded from the soil and groundwater evaluation. The rationale for this exclusion is twofold:

- The Project investigation and anticipated response actions are being undertaken pursuant to Part 201 of NREPA, being PA 451 of 1994, as amended. The concentrations of metals in excess of the EGLE drinking water and groundwater/surface water pathway criteria are ubiquitous in the study area and are predominantly the result of the presence of stamp sands. Stamp sands are not defined as a hazardous substance nor are

subject to regulation under Part 201 unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use; and,

- The study area is part of OU 2 for which the EPA ROD remedy called for No Action. The EPA's ROD OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Canal, and other area water bodies. Note that EPA's No Action determination relies on the following to mitigate the effects of stamp sand to the extent practicable:
  - The reduction of stamp sand loading to surface water bodies expected as a result of the remedial action taken at OU 1 and OU 3.
  - Ongoing natural sedimentation and detoxification.
  - Institutional programs and practices controlling potential future exposure to site-affected drinking water which were intended to be administered at the county and state level.
  - The long-term monitoring and the five-year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.

Note that metals criteria for other relevant pathways, and cyanide and organic contaminants for all pathways were included in the evaluation.

Furthermore, as discussed in Section 4.2.5, EGLE's MSSLs were not included in the exposure pathway assessment due to unknown anticipated future land use and conditions. The MSSLs were considered for screening and delineation purposes only.

6.2.1.1 Building Materials and Containers

During the targeted inspection activities completed at Julio Marine, 16 SACMs were identified and two samples of each SACM were collected for analysis from the building and insulating materials.

The following table provides an aggregate summary of the sample locations with respect to the total number of samples and how they compare to applicable regulatory criteria. The table is based solely on the total number of samples collected from Julio Marine. It lists only the number of samples for a specific analytical suite that contained one or more exceedance of a given criterion. Bulk asbestos samples were compared to applicable NESHAP standards and EGLE PSIC.

Building Materials Analytical Result Summary Table	Analytical Summary			National Emissions Standard for Hazardous Air Pollutants	
	Total Number of Samples	Detected Analytes	Total Exceedances	Friable Asbestos Material	Non-Friable Asbestos Material
Asbestos (Bulk)	32	5	5	4	1
COCs exceeding applicable regulatory criteria in one or more sample				Asbestos (chrysotile)	

During the targeted inspection activities completed at Julio Marine, numerous tanks and drums were identified. Water samples were collected and analyzed from an observed vat. No other containers were sampled. The analysis results detected inorganics, VOCs, and SVOCs but the concentrations did not exceed regulatory criteria. PCBs were not detected in the vat water. A detailed summary of vat water analytical results from Julio Marine is provided in ***Table 6-5, Summary of Vat Water Analytical Results (Julio Marine)***

6.2.1.2 Soil Exposure Pathway Assessment

Soil analytical results from Julio Marine identified COC concentrations in soil that were at or above concentrations that trigger a "Facility" designation as defined in Section 20101(1)(s) of the NREPA. The following tables provide an aggregate summary of the soil sample locations with respect to the total number of samples and how they compare to the applicable EGLE Cleanup Criteria for Response Activity under both Residential and Nonresidential exposure scenarios. The tables are based solely on the total number of samples collected from Julio Marine. They list only the number of samples for a specific analytical suite that contained one or more exceedances of a given criterion.

Soil Analytical Result Summary Table				Cleanup Criteria Requirements for Response Activity – Residential**								
	Analytical Summary			Groundwater Protection		Indoor Air	Ambient Air				Contact	Csat
	Total Number of Samples	Detected Analytes*	Total Exceedances*	Residential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Inorganics	38	210	30	NA*	NA*	0	0	0	0	0	24	0
Cyanide	10	1	0	0	0	0	0	0	0	0	0	0
VOCs	15	58	16	3	3	0	0	0	0	0	0	0
SVOCs	39	233	45	3	12	0	1	1	1	0	5	0
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	28	4	1	0	0	0	0	0	0	0	1	0
Pesticides	0	0	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more samples				ARSENIC, COPPER, LEAD, TOTAL PCBS, 1,2,4-TRIMETHYLBENZENE, 1,3,5,-TRIMETHYLBENZENE, 2-METHYLNAPHTHALENE (VOC), BENZENE, ETHYLBENZENE, NAPHTHALENE (VOC), N-BUTYLBENZENE, N-PROPYLBENZENE, SEC-BUTYLBENZENE, XYLENE-TOTAL, 2-METHYLNAPHTHALENE (SVOC), ACENAPHTHYLENE, BENZO(A)ANTHRACENE, BENZO(A)PYRENE, BENZO(B)FLUORANTHENE, DIBENZO(A,H)ANTHRACENE, FLUORATHENE, FLUORENE, INDENO(1,2,3-CD)PYRENE, NAPHTHALENE (SVOC), PHENANTHRENE							

NA = The EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil evaluation as explained in Section 4.2.5.*

**Denotes total number of specific instances of an analyte being detected or exceeding criteria, can be multiple within one sample location.*

***Denotes total number of samples exceeding criteria, cannot be multiple within one sample location.*

Total exceedance column does not include MSSLs or non-applicable criteria (DWPC and GSIPC for metals)

Soil Analytical Result Summary Table	Analytical Summary			Cleanup Criteria Requirements for Response Activity – Nonresidential**								
				Groundwater Protection		Indoor Air	Ambient Air				Contact	Csat
	Total Number of Samples	Detected Analytes*	Total Exceedances*	Nonresidential Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria	Soil Volatilization to Indoor Air Inhalation Criteria	Infinite Source Volatile Soil Inhalation Criteria (VSIC)	Finite VSIC for 5 Meter Source Thickness	Finite VSIC for 2 Meter Source Thickness	Particulate Soil Inhalation Criteria	Direct Contact Criteria	Soil Saturation Concentration Screening Levels
Inorganics	38	210	5	NA*	NA*	0	0	0	0	0	4	0
Cyanide	10	1	0	0	0	0	0	0	0	0	0	0
VOCs	15	58	15	3	3	0	0	0	0	0	0	0
SVOCs	39	233	37	1	12	0	1	1	1	0	4	0
Asbestos	0	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	28	4	1	0	0	0	0	0	0	0	1	0
Pesticides	0	0	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more samples	ARSENIC, COPPER, LEAD, TOTAL PCBS, 1,2,4-TRIMETHYLBENZENE, 1,3,5,-TRIMETHYLBENZENE, 2-METHYLNAPHTHALENE (VOC), BENZENE, ETHYLBENZENE, NAPHTHALENE (VOC), N-BUTYLBENZENE, N-PROPYLBENZENE, XYLENE-TOTAL, 2-METHYLNAPHTHALENE (SVOC), BENZO(A)ANTHRACENE, BENZO(A)PYRENE, BENZO(B)FLUORANTHENE, FLUORATHENE, FLUORENE, NAPHTHALENE (SVOC), PHENANTHRENE										

NA = The EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil evaluation as explained in Section 4.2.5.*

**Denotes total number of specific instances of an analyte being detected or exceeding criteria, can be multiple within one sample location.*

***Denotes total number of samples exceeding criteria, cannot be multiple within one sample location.*

Total exceedance column does not include MSSLs or non-applicable criteria (DWPC and GSIPC for metals)

6.2.1.3 Groundwater Exposure Pathway Assessment

Groundwater analytical results from Julio Marine identified COC concentrations in groundwater that were at or above concentrations that trigger a "Facility" designation as defined in Section 20101(1)(s) of the NREPA. Similar to the preceding soil tables, the following table provides a summary of the aforementioned sample locations with respect to the total number of samples and how they compare to the applicable EGLE Cleanup Criteria for Response Activity under both Residential and Nonresidential exposure scenarios.

Groundwater Analytical Result Summary Table	Analytical Summary			Cleanup Criteria Requirements for Response Activity – Residential and Nonresidential**						
	Total Number of Samples	Total Number of Detected Analytes*	Total Exceedances*	Residential Drinking Water Criteria	Nonresidential Drinking Water Criteria	Groundwater Surface Water Interface Criteria	Residential Groundwater Volatilization to Indoor Air Inhalation Criteria	Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria	Water Solubility	Flammability and Explosivity Screening Levels
Inorganics	7	56	0	NA*	NA*	NA*	0	0	0	0
Cyanide	0	0	0	0	0	0	0	0	0	0
VOCs	25	4	0	0	0	0	0	0	0	0
SVOCs	25	18	3	0	0	3	0	0	0	0
Total PCBs	11	0	0	0	0	0	0	0	0	0
Pesticides	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more sample				FLUORANTHENE, PHENANTHRENE						

NA = The EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil evaluation as explained in Section 4.2.5.*

**Denotes total number of specific instances of an analyte being detected or exceeding criteria, can be multiple within one sample location.*

***Denotes total number of samples exceeding criteria, cannot be multiple within one sample location.*

Total exceedance column does not include MSSLs or non-applicable criteria (DWC and GSIC for metals)

6.2.2 Extent of Contamination

The comparison of analytical results to applicable regulatory criteria indicates that potential human health and ecological risks are present in building materials, soil, and groundwater at Julio Marine. Recalling the goals and objectives of the SI, the following subsections describe the extent of contamination in environmental media in the study area.

6.2.2.1 Building Materials and Containers Extent of Contamination

Reconnaissance activities and asbestos analytical results confirmed that ACM is present at Julio Marine. Materials containing more than 1% friable chrysotile asbestos included white TSI on piping, silver painted roofing, silver coated roofing, and brown drum insulation. Material containing more than 1% non-friable chrysotile asbestos included silver painted mastic. These results exceed the NESHAP and EGLE PSIC.

6.2.2.2 Soil Extent of Contamination

Soil analytical results exceeded GSIPC, residential and nonresidential DWPC, residential and nonresidential VSIC, residential and nonresidential DCC, and/or soil MSSLs for VOCs, SVOCs, inorganic compounds, and/or PCBs at multiple sample locations.

Most samples were collected from surface and subsurface soil intervals from areas that are generally inaccessible to the public, but are accessible to workers inside the current perimeter fence at Julio Marine.

The extent of soil contamination has not been delineated at Julio Marine. Soils with elevated levels of inorganic COCs are ubiquitous in the area, which becomes a limiting factor when evaluating potential exposure pathways. In the case of Julio Marine, elevated concentrations of inorganic and organic contaminants potentially include exposure risks related to inhalation pathways and direct contact in residential and nonresidential scenarios, which must be a consideration when evaluating land use, property accessibility, and the extent of contamination in surface and near surface soils that could be encountered through normal use of the property.

The remaining exposure risks are generally related to the leaching of contaminants to groundwater and their potential impacts on drinking water (if used as a drinking water source) and surface water. These risks pose a long-term threat to the overall environmental health of the watershed. The widespread distribution of inorganic COCs throughout the region limit determinations related to the extent of contamination at Julio Marine. Nevertheless, risks posed to groundwater and surface water are relevant and are a factor when evaluating the extent of soil contamination.

6.2.2.3 Groundwater Extent of Contamination

Groundwater analytical results exceeded GSIC at three locations for SVOCs. In addition, QMCP-MW10 contained between 0.6 ft and 2 ft of LNAPL over the course of monitoring, QMCP-MW9 contained 0.21 ft of LNAPL in 2019, and LNAPL was also observed in the water sample collected at QMCP-SB48. Neither the extent of groundwater contamination nor the extent of LNAPL have been delineated at Julio Marine. The groundwater sampling locations were approximately 30 to 800 ft from the shoreline of the Portage Canal at depths of approximately 2 ft to 17 ft bgs. The LNAPL measured in QMCP-MW9 was within 50 ft of the Portage Canal.

The potential risks associated with groundwater as a drinking water source as well as it's connectivity to nearby surface water bodies should be a consideration in determinations related to the extent of contamination at Julio Marine. Of particular concern are the monitoring wells (QMCP-MW9 and QMCP-MW10) where LNAPL has been observed. These wells are approximately 50 feet and 130 feet respectively from the Portage Canal, so migration to surface water and/or pore water is a risk.

6.3 CONCLUSIONS AND RECOMMENDATIONS

The analytical results and interpretation summarized in the preceding subsections document potential human health and ecological risks that are present at Julio Marine. The following subsections provide a synopsis of these findings and a recommended path forward for mitigating these risks.

6.3.1 Conclusions

Environmental impacts at Julio Marine are generally characterized by detections of organic and inorganic contaminants in soil and groundwater. Although specific sources of these contaminants may not be fully understood, historical research related to the operations provided substantive evidence for assessing specific operational areas and selecting target analytes anticipated to be present within the study area.

The analytical results summarized above provide sufficient analytical data and lines of evidence to conclude that the study area is a "Facility" as defined in Section 20101(1)(s) of the NREPA. The following table provides a summary of the affected environmental media, applicable regulatory criteria, and potential receptors within Julio Marine.

Julio Marine – Media, Criteria, Potential Receptor Summary															
Media	Soil			Groundwater			Air		Sediment	Pore Water		Building Materials, Asbestos, and Abandoned Containers			
Criteria / Potential Receptor	Drinking Water Protection	Groundwater Surface Water Interface	Direct Contact	Drinking Water Protection	Groundwater Surface Water Interface	Flammability and Explosivity	Volatilization	Particulate Inhalation	Ecological	Ecological	Human Health	Particulate Inhalation	Flammability and Explosivity	Environmental	Human Health
Residential Human	✓	✓	✓	✓	✓		✓					✓			✓
Nonresidential Human	✓	✓	✓	✓	✓		✓					✓			✓
Water Column Organism															
Benthic Organism															
COCs exceeding applicable regulatory criteria in one or more sample	ASBESTOS, ARSENIC, COPPER, LEAD, TOTAL PCBS, 1,2,4-TRIMETHYLBENZENE, 1,3,5,-TRIMETHYLBENZENE, 2-METHYLNAPHTHALENE (VOC), BENZENE, ETHYLBENZENE, NAPHTHALENE (VOC), N-BUTYLBENZENE, N-PROPYLBENZENE, SEC-BUTYLBENZENE, XYLENE-TOTAL, 2-METHYLNAPHTHALENE (SVOC), ACENAPHTHYLENE, BENZO(A)ANTHRACENE, BENZO(A)PYRENE, BENZO(B)FLUORANTHENE, BENZO(K)FLUORANTHENE, CHRYSENE, DIBENZO(A,H)ANTHRACENE, FLUORATHENE, FLUORENE, INDENO(1,2,3-CD)PYRENE, NAPHTHALENE (SVOC), PHENANTHRENE, PYRENE, MANGANESE, SILVER, ZINC													

In addition to the evaluation of analytical results from Julio Marine, the following provides a summary of findings derived from the assessment of Julio Marine with respect to the goals and objectives for the Project:

- Terrestrial sources of contamination are present in the form of inorganic COCs, VOCs, SVOCs, PCBs, and asbestos in the study area. Due the limited availability of analytical data, the extent of contamination at Julio Marine has not been fully defined or addressed.

- The source and limits of LNAPL have not been identified. LNAPL was measured in a monitoring well within 50 ft of the Portage Canal.

6.3.2 Recommendations

The conclusions outlined in the preceding subsection establish that Julio Marine is a Part 201 Facility. Section 20107a of Part 201 of NREPA describes the duties of owners or operators of a Facility, regardless of their liability, including: prevent unacceptable exposures, prevent exacerbation, and take reasonable precautions against the foreseeable actions of third parties. Some exceptions may apply; in any case, owners and operators of contaminated properties should become familiar with Section 20107a and the associated Rules.

To date, limited actions to further monitor and/or delineate the extent of impact, and thus address the environmental issues, have occurred at Julio Marine. Additional new study data, collected from existing monitoring wells, and/or down

gradient from known impacts, could be evaluated to determine if environmental issues remain. LNAPL delineation and recoverability assessment is recommended based on the proximity of detected LNAPL to surface water.

FIGURES

DETAILED FINDINGS REPORT – JULIO MARINE

Image Source: Michigan Imagery Solution (Houghton - 2013)

QMCP-ASBBLK42 10/1/2018
WHITE TSI ON PIPE - *FRIABLE*
ASBESTOS-CHRYSOTILE 40% [1%]

QMCP-ASBBLK49 10/1/2018
SILVER PAINTED ROOFING, DAMAGED/DETERIORATED - *FRIABLE*
ASBESTOS-CHRYSOTILE 3% [1%]

QMCP-ASBBLK53 10/1/2018
SILVER COATED ROOFING, DAMAGED/DETERIORATED - *FRIABLE*
ASBESTOS-CHRYSOTILE 3% [1%]

QMCP-ASBBLK57 10/1/2018
BROWN INSULATION IN DRUM- *FRIABLE*
ASBESTOS-CHRYSOTILE 60% [1%]

QMCP-ASBBLK48A 10/1/2018
SILVER PAINTED MASTIC
ASBESTOS-CHRYSOTILE 15% [1%]

QMCP-ASBBLK45A/B
QMCP-ASBBLK43A/B
QMCP-ASBBLK44A/B
QMCP-ASBBLK46A/B
QMCP-ASBBLK47A/B
QMCP-ASBBLK52A/B
QMCP-ASBBLK50A/B
QMCP-ASBBLK51A/B
QMCP-ASBBLK56A/B
QMCP-ASBBLK54A/B
QMCP-ASBBLK55A/B

Waste Conveyor
Furnaces
Dust Bin
Oil House
Oil House

DATA SOURCES

Sample IDs	**Date Range**
1) **QMCP-ASBBLK... -EGLE RRD.** *SI results not published.*	**September 2018**

- 1907 Tamarack & Osceola Copper Manufacturing Co.
- 1928 John A Roebling's Sons Copper Manufacturing
- 1949 Foley Copper Products Co. Copper Wire Mill

EGLE Part 201 NREPA Particulate Soil Inhalation Criteria (PSIC) [1%]
EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) [1%]

Sample with Asbestos Greater than 1%
Sample with Asbestos Not Detected
Approximate 1865 Shoreline
Feature Identified on Sanborn Maps
Approximate Parcel Boundaries
EPA Cap Boundary

Notes:
- *ACM = Asbestos Containing Material*
- *TSI = Thermal Systems Insulation*

N
0 175 Ft
Coordinate System: MIGeoRef(m)

MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

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Figure 6-1
ACM Analytical Results
(Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

FILE: W:\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20210304_QMCP_SI_Report_4\FigXX_JP_RidgeyDollarBay_ASBBLK_v20210402.mxd 11:17:46 AM 4/2/2021 AMiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

Map Extent

Hancock
Houghton
Dollar Bay
Dodgeville

QMCP-SS230 9/24/2020
(0-0.25 ft)

ARSENIC	18 mg/kg [10]
BENZO(A)ANTHRACENE	32,000 ug/kg [10]
BENZO(A)PYRENE	27,000 ug/kg [10,17]
BENZO(B)FLUORANTHENE	47,000 ug/kg [10]
DIBENZO(A,H)ANTHRACENE	3,900 ug/kg [10]
FLUORANTHENE	89,000 ug/kg [2]
NAPHTHALENE (SVOC)	4,000 ug/kg [2]
PHENANTHRENE	67,000 ug/kg [2,4]

QMCP-SS229 9/24/2020
(0-0.25 ft)

ARSENIC	17 mg/kg [10]
2-METHYLNAPHTHALENE (SVOC)	4,900 ug/kg [2]
BENZO(A)ANTHRACENE	23,000 ug/kg [10]
BENZO(A)PYRENE	16,000 ug/kg [10,17]
BENZO(B)FLUORANTHENE	27,000 ug/kg [10]
FLUORANTHENE	92,000 ug/kg [2]
FLUORENE	10,000 ug/kg [2]
NAPHTHALENE (SVOC)	10,000 ug/kg [2]
PHENANTHRENE	65,000 ug/kg [2,4]

QMCP-SS223 9/24/2020
(0-0.25 ft)
ARSENIC 9.7 mg/kg [10]

QMCP-SS30 9/6/2018
(0-0.5 ft)

ARSENIC	9.8 mg/kg [10]
MERCURY	0.2 mg/kg [18,19]
BENZO(A)PYRENE	12,000 ug/kg [10,17]
FLUORANTHENE	41,000 ug/kg [2]
FLUORENE	5,600 ug/kg [2]
NAPHTHALENE (SVOC)	5,600 ug/kg [2]
PHENANTHRENE	43,000 ug/kg [2]

QMCP-SS222 8/17/2019
(0-0.25 ft)

ARSENIC	140 mg/kg [10,17]
NAPHTHALENE (SVOC)	1,100 ug/kg [2]

QMCP-SS29 9/6/2018
(0-0.5 ft)

ARSENIC	12 mg/kg [10]
COPPER	41,000 mg/kg [10]
MERCURY	0.07 mg/kg [18,19]
NAPHTHALENE (SVOC)	1,100 ug/kg [2]

QMCP-SS228 8/17/2019
(0-0.25 ft)

2-METHYLNAPHTHALENE (SVOC)	52,000 ug/kg [2]
NAPHTHALENE (SVOC)	12,000 ug/kg [2]
PHENANTHRENE	13,000 ug/kg [2]
1,2,3-TRIMETHYLBENZENE	15,000 ug/kg [18,19]
1,2,4-TRIMETHYLBENZENE	35,000 ug/kg [2,4,11,18,19]
1,3,5-TRIMETHYLBENZENE	11,000 ug/kg [2,4,11,18,19]
2-METHYLNAPHTHALENE (VOC)	64,000 ug/kg [2,4]
NAPHTHALENE (VOC)	12,000 ug/kg [2]
N-BUTYLBENZENE	24,000 ug/kg [4,11]
N-PROPYLBENZENE	5,200 ug/kg [4,11,18,19]
SEC-BUTYLBENZENE	4,400 ug/kg [4]
XYLENE - TOTAL	2,600 ug/kg [2,18,19]

QMCP-SB48 9/10/2018
(0-0.5 ft)

ARSENIC	7.8 mg/kg [10]
LEAD	670 mg/kg [10]
MERCURY	0.2 mg/kg [18,19]
XYLENE - TOTAL	400 ug/kg [18]

(0.5-5 ft)

BENZENE	120 ug/kg [4,11,18,19]
XYLENE - TOTAL	390 ug/kg [18]

LNAPL observed in groundwater. Fingerprint analysis indicated mineral oil and motor oil.

QMCP-SS57 10/1/2018
(0-0.25 ft)

ARSENIC	190 mg/kg [10,17]
LEAD	3,000 mg/kg [10,17]
MERCURY	0.4 mg/kg [18,19]
ACENAPHTHYLENE	7,500 J ug/kg [4]
BENZO(A)ANTHRACENE	100,000 J ug/kg [10,17]
BENZO(A)PYRENE	75,000 J ug/kg [10,17]
BENZO(B)FLUORANTHENE	180,000 J ug/kg [10,17]
FLUORANTHENE	300,000 J ug/kg [2]
FLUORENE	10,000 J ug/kg [2]
INDENO(1,2,3-CD)PYRENE	49,000 J ug/kg [10]
NAPHTHALENE (SVOC)	12,000 J ug/kg [2]
PHENANTHRENE	230,000 J ug/kg [2,4,6,7,8,11,13,14,15]

QMCP-SB46 9/10/2018
(0-4 ft)
XYLENE - TOTAL 390 ug/kg [18]

QMCP-SS28 9/6/2018
(0-0.5 ft)
MERCURY 0.2 mg/kg [18,19]

QMCP-SB44 9/10/2018
(0-0.5 ft)

ARSENIC	14 mg/kg [10]
MERCURY	0.06 mg/kg [18]

(0.5-4 ft)
ARSENIC 8.7 mg/kg [10]

QMCP-SS225 9/24/2020
(0-0.25 ft)

ARSENIC	22 mg/kg [10]
NAPHTHALENE (SVOC)	1,700 ug/kg [2]

QMCP-SS236 8/17/2019
(0-0.25 ft)
ARSENIC 27 mg/kg [10]

QMCP-SS58 10/1/2018
(0-0.25 ft)
ARSENIC 21 mg/kg [10]

QMCP-SS59 10/1/2018
(0-0.25 ft)

ARSENIC	22 mg/kg [10]
LEAD	470 mg/kg [10]
MERCURY	0.1 mg/kg [18,19]

QMCP-SS60 10/1/2018
(0-0.25 ft)

ARSENIC	19 mg/kg [10]
LEAD	2,300 mg/kg [10,17]
MERCURY	0.1 mg/kg [18,19]

QMCP-SS263 9/24/2020
(0-0.25 ft)
LEAD 1,000 mg/kg [10,17]

QMCP-SB45 9/10/2018
(0-0.5 ft)

ARSENIC	16	mg/kg [10]
MERCURY	0.1	mg/kg [18,19]
TOTAL PCBS	*1,600 J*	*ug/kg [10,17]*
2-METHYLNAPHTHALENE (SVOC)	10,000	ug/kg [2]
NAPHTHALENE (SVOC)	6,100	ug/kg [2]
PHENANTHRENE	3,900	ug/kg [2]
1,2,3-TRIMETHYLBENZENE	830	ug/kg [18,19]
1,2,4-TRIMETHYLBENZENE	2,300	ug/kg [2,4,11,18,19]
1,3,5-TRIMETHYLBENZENE	580	ug/kg [18,19]
2-METHYLNAPHTHALENE (VOC)	4,800	ug/kg [2]
BENZENE	520	ug/kg [2,4,11,18,19]
ETHYLBENZENE	470	ug/kg [2,18,19]
HEXANE	1,100	ug/kg [18,19]
NAPHTHALENE (VOC)	4,200	ug/kg [2]
XYLENE - TOTAL	7,600	ug/kg [2,4,11,18,19]

(0.5-5 ft)

ARSENIC	12	mg/kg [10]

QMCP-SS27 9/6/2018

QMCP-SS243 8/17/2019

QMCP-SB116 9/26/2020

QMCP-SS250 9/24/2020

QMCP-SS31 9/6/2018

QMCP-SS249 9/24/2020

QMCP-SS226 9/24/2020

QMCP-SS227 8/17/2019

QMCP-SB49 9/10/2018

QMCP-SS252 9/24/2020

QMCP-SB117 9/26/2020

QMCP-SS265 9/24/2020

QMCP-SB50 9/10/2018
(0-2 ft)
MERCURY 0.4 mg/kg [18,19]

QMCP-SS238 9/24/2020

QMCP-SS247 9/24/2020

QMCP-SS237 9/24/2020

QMCP-SS224 9/24/2020
(0-0.25 ft)
ARSENIC 8.3 mg/kg [10]

QMCP-SS235 8/17/2019
(0-0.25 ft)

ARSENIC	19 mg/kg [10]
2-METHYLNAPHTHALENE (SVOC)	5,000 ug/kg [2]
NAPHTHALENE (SVOC)	3,500 ug/kg [2]

QMCP-SS239 8/17/2019
(0-0.25 ft)

ARSENIC	11 mg/kg [10]
LEAD	660 mg/kg [10]

QMCP-SS240 8/17/2019
(0-0.25 ft)
ARSENIC 15 mg/kg [10]

QMCP-SB47 9/10/2018
(0-0.5 ft)

ARSENIC	16 mg/kg [10]
NAPHTHALENE (SVOC)	770 ug/kg [2]
XYLENE - TOTAL	270 ug/kg [18]

(0.5-5 ft)

ARSENIC	11 mg/kg [10]
BENZO(A)PYRENE	3,900 ug/kg [10]
FLUORANTHENE	16,000 ug/kg [2]
NAPHTHALENE (SVOC)	4,400 ug/kg [2]
PHENANTHRENE	25,000 ug/kg [2]
NAPHTHALENE (VOC)	4,200 ug/kg [2]
XYLENE - TOTAL	58 ug/kg [18]

Waste Conveyor
Furnaces
Dust Bin
Oil House
Oil House

- 1907 Tamarack & Osceola Copper Manufacturing Co.
- 1928 John A Roebling's Sons Copper Manufacturing
- 1949 Foley Copper Products Co. Copper Wire Mill

DATA SOURCES

Sample IDs	Date Range
1) **QMCP-SB/SS...**	**September 2018 - September 2020**

-EGLE RRD. *SI results not published.*

EGLE Part 201 Cleanup Criteria for Response Action
[1]=Statewide Default Background Level
[2]*=Groundwater Surface Water Interface Protection Criteria
[3]=Soil Saturation Concentration Screening Levels
[4]*=Residential Drinking Water Protection Criteria
[5]=Residential Soil Volatilization to Indoor Air Inhalation Criteria (VSIC)
[6]=Residential Infinite Source Volatile Soil Inhalation Criteria
[7]=Residential Finite VSIC for 5 Meter Source Thickness
[8]=Residential Finite VSIC for 2 Meter Source Thickness
[9]=Residential Particulate Soil Inhalation Criteria
[10]=Residential Direct Contact Criteria
[11]*=Nonresidential Drinking Water Protection Criteria
[12]=Nonresidential Soil Volatilization to Indoor Air Inhalation
[13]=Nonresidential Infinite Source Volatile Soil Inhalation Criteria
[14]=Nonresidential Finite VSIC for 5 Meter Source Thickness
[15]=Nonresidential Finite VSIC for 2 Meter Source Thickness
[16]=Nonresidential Particulate Soil Inhalation Criteria
[17]=Nonresidential Direct Contact Criteria
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)
[18]=Soil Residential MSSL
[19]=Soil Nonresidential MSSL
* Exceedances of criteria 2, 4, and 11 shown for organics and cyanide only
Evaluation based on EGLE Criteria at time of Project completion.

PCBs / VOCs
Inorganics / Cyanide
SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

1865 Shoreline
Approximate Parcel Boundaries
EPA Cap Boundary
Features Idenitfied on Sanborn Maps

Notes:
- *ft = feet*
- *J = estimated value*
- *LNAPL = Light Non-Aqueous Phase Liquid*
- *ug/kg = micrograms per kilogram*
- *mg/kg = milligrams per kilogram*
- *PCBS = Polychlorinated Biphenyls*
- *SVOCs = Semi-Volatile Organic Compounds*
- *VOCs = Volatile Organic Compounds*

N
0 175 Ft
Coordinate System: MIGeoRef(m)

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Figure 6-2
Soil Analytical Results
(Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

FILE: W:\Projects\Projects K,O\MDEQ0076ENGAPPS\GIS\mxds\Planning\20210304_QMCP_SI_Report_4FinXX_JP_RiplevDollarBay_SOIL_all_v20210414.mxd 4/14/2021 10:10:15 AM AMiller

Image Source: Michigan Imagery Solution (Houghton - 2013)

QMCP-Gw43 9/10/2018
(6-10 ft)
FLUORANTHENE 2.6 ug/l [3]

QMCP-MW12
10/17/2019
9/24/2020
602.25

602.1

602.0

601.9

601.8

601.7

QMCP-MW10 10/16/2019
- 0.6 ft of LNAPL observed
QMCP-MW10 9/24/2020
- LNAPL observed
QMCP-MW10 11/5/2021
- Approx. 2 feet of LNAPL observed

QMCP-MW14
10/16/2019
9/24/2020
601.81

QMCP-SB48
- LNAPL observed
- Sample submitted for fingerprint analysis indicated motor oil and mineral oil

QMCP-MW13
10/16/2019
9/24/2020
601.77

QMCP-MW15
10/17/2019
9/24/2020
601.80

QMCP-GW116
9/26/2020

Oil House

QMCP-MW7
10/16/2019
9/24/2020
601.73

QMCP-Gw49 9/10/2018
(5-9 ft)
MERCURY 0.2 ug/l [8,9]

QMCP-GW44
9/10/2018

QMCP-MW11 10/16/2019
- Slight petroleum staining observed on sample tubing

QMCP-MW11
9/24/2020
601.81

QMCP-GW117
9/26/2020

QMCP-MW8
10/16/2019
9/24/2020
601.63

QMCP-MW9 10/16/2019
- 0.21 ft of LNAPL observed
QMCP-MW9 9/24/2020
- No LNAPL observed
QMCP-MW9 11/5/2021
- No LNAPL observed

QMCP-MW9
9/24/2020
602.11

QMCP-GW50
9/10/2018

QMCP-Gw45 9/10/2018
(5-9 ft)
MERCURY 0.4 ug/l [8,9]
PHENANTHRENE 5.2 ug/l [3]

QMCP-Gw47 9/10/2018
(5-9 ft)
MERCURY 0.2 ug/l [8,9]

QMCP-Gw46 9/10/2018
(4-8 ft)
MERCURY 0.3 ug/l [8,9]
PHENANTHRENE 25 ug/l [3]

Waste Conveyor

Furnaces

Dust Bin

Oil House

- 1907 Tamarack & Osceola Copper Manufacturing Co.
- 1928 John A Roebling's Sons Copper Manufacturing
- 1949 Foley Copper Products Co. Copper Wire Mill

DATA SOURCES

Sample IDs	Date Range
1) QMCP-GW...	September 2018 - September 2020

-EGLE RRD. *SI results not published*

EGLE Part 201 Cleanup Criteria for Response Action
[1]*=Residential Drinking Water Criteria
[2]*=Nonresidential Drinking Water Criteria
[3]*=Groundwater Surface Water Interface Criteria
[4]=Residential Groundwater Vol to Indoor Air Inhalation
[5]=Nonresidential Groundwater Vol to Indoor Air Inhalation
[6]=Water Solubility
[7]=Flammability and Explosivity Screening Level

Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)
[8]=Shallow Groundwater Residential MSSL
[9]=Shallow Groundwater Nonresidential MSSL
[10]=Groundwater Residential MSSL
[11]=Groundwater Residential TS MSSL
[12]=Groundwater Nonresidential MSSL
[13]=Groundwater Nonresidential $MSSL_{12}$
[14]=Groundwater Nonresidential TS $MSSL_{12}$
* Exceedances of criteria 1, 2, and 3 are shown for organics only
Evaluation based on EGLE Criteria at time of Project completion.

PCBs / VOCs — Inorganics / Cyanide / SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

- LNAPL Observed
- Groundwater Contours (11-5-2021)
- 601.73 Groundwater Elevation Measurement - Feet
- Approximate 1865 Shoreline
- Features Identified on Sanborn Maps
- Approximate Parcel Boundaries
- EPA Cap Boundary

Notes:
- *ft = feet*
- *LNAPL = Light Non-Aqueous Phase Liquid*
- *PCBs = Polychlorinated Biphenyls*
- *SVOCs = Semi-Volatile Organic Compounds*
- *ug/l = miligrams per liter*
- *VOCs = Volatile Organic Compounds*

N

0 180 Ft

Coordinate System: MIGeoRef(m)

*QMCP-MW9 Groundwater elevation was not used during contouring. The result appears anomalous.

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Figure 6-3
Groundwater Analytical Results
(Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

FILE: W:\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20221018_DollarBay_GW_Nov21\Fig08_JP_DollarBay_GW_20221108.mxd 12:26:17 PM 11/8/2022 ABertapelle

TABLES

DETAILED FINDINGS REPORT – JULIO MARINE

TABLE 6-1
Summary of ACM Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Sample Location	Field Sample ID	Sample Date	Asbestos		Friable/ Non-friable	Sample Description	Sample Notes
Julio Marine							
QMCP-ASBBLK42	QMCP-ASBBLK42A-100118	10/1/2018	40%	Chrysotile	friable	White TSI on pipe	
QMCP-ASBBLK42	QMCP-ASBBLK42B-100118	10/1/2018	--	--	friable	White TSI on pipe	Not analyzed due to prior positive series
QMCP-ASBBLK43	QMCP-ASBBLK43A-100118	10/1/2018	ND	--	non-friable	Red roofing on ground	
QMCP-ASBBLK43	QMCP-ASBBLK43B-100118	10/1/2018	ND	--	non-friable	Red roofing on ground	
QMCP-ASBBLK44	QMCP-ASBBLK44A-100118	10/1/2018	ND	--	non-friable	Tan/red brick siding	
QMCP-ASBBLK44	QMCP-ASBBLK44B-100118	10/1/2018	ND	--	non-friable	Tan/red brick siding	
QMCP-ASBBLK45	QMCP-ASBBLK45A-100118	10/1/2018	ND	--	friable	Black tar paper with multi-colored specks	
QMCP-ASBBLK45	QMCP-ASBBLK45B-100118	10/1/2018	ND	--	friable	Black tar paper with multi-colored specks	
QMCP-ASBBLK46	QMCP-ASBBLK46A-100118	10/1/2018	ND	--	non-friable	Tan brick siding	
QMCP-ASBBLK46	QMCP-ASBBLK46B-100118	10/1/2018	ND	--	non-friable	Tan brick siding	
QMCP-ASBBLK47	QMCP-ASBBLK47A-100118	10/1/2018	ND	--	friable	Black tar paper	
QMCP-ASBBLK47	QMCP-ASBBLK47B-100118	10/1/2018	ND	--	friable	Black tar paper	
QMCP-ASBBLK48	QMCP-ASBBLK48A-100118	10/1/2018	15%	Chrysotile	non-friable	Silver painted mastic	
QMCP-ASBBLK48	QMCP-ASBBLK48B-100118	10/1/2018	--	--	non-friable	Silver painted mastic	Not analyzed due to prior positive series
QMCP-ASBBLK49	QMCP-ASBBLK49A-100118	10/1/2018	3%	Chrysotile	friable	Silver painted roofing	Damaged/deteriorated
QMCP-ASBBLK49	QMCP-ASBBLK49B-100118	10/1/2018	--	--	friable	Silver painted roofing	Not analyzed due to prior positive series
QMCP-ASBBLK50	QMCP-ASBBLK50A-100118	10/1/2018	ND	--	non-friable	Black shingle	Burn pile, 10SF
QMCP-ASBBLK50	QMCP-ASBBLK50B-100118	10/1/2018	ND	--	non-friable	Black shingle	Burn pile, 10SF
QMCP-ASBBLK51	QMCP-ASBBLK51A-100118	10/1/2018	ND	--	non-friable	Black tar paper	10SF
QMCP-ASBBLK51	QMCP-ASBBLK51B-100118	10/1/2018	ND	--	non-friable	Black tar paper	10SF
QMCP-ASBBLK52	QMCP-ASBBLK52A-100118	10/1/2018	ND	--	friable	White fibers in burn pile	
QMCP-ASBBLK52	QMCP-ASBBLK52B-100118	10/1/2018	ND	--	friable	White fibers in burn pile	
QMCP-ASBBLK53	QMCP-ASBBLK53A-100118	10/1/2018	3%	Chrysotile	friable	Silver coated roofing	Damaged/deteriorated
QMCP-ASBBLK53	QMCP-ASBBLK53B-100118	10/1/2018	--	--	friable	Silver coated roofing	Not analyzed due to prior positive series
QMCP-ASBBLK54	QMCP-ASBBLK54A-100118	10/1/2018	ND	--	non-friable	Red roofing	Damaged/deteriorated
QMCP-ASBBLK54	QMCP-ASBBLK54B-100118	10/1/2018	ND	--	non-friable	Red roofing	Damaged/deteriorated
QMCP-ASBBLK55	QMCP-ASBBLK55A-100118	10/1/2018	ND	--	non-friable	Green roofing	
QMCP-ASBBLK55	QMCP-ASBBLK55B-100118	10/1/2018	ND	--	non-friable	Green roofing	
QMCP-ASBBLK56	QMCP-ASBBLK56A-100118	10/1/2018	ND	--	non-friable	Building concrete	
QMCP-ASBBLK56	QMCP-ASBBLK56A-100118	10/1/2018	ND	--	non-friable	Building concrete	
QMCP-ASBBLK57	QMCP-ASBBLK57A-100118	10/1/2018	60%	Chrysotile	friable	Brown insulation in drum	
QMCP-ASBBLK57	QMCP-ASBBLK57B-100118	10/1/2018	--	--	friable	Brown insulation in drum	Not analyzed due to prior positive series

-- = Not analyzed
ND = Not detected
SF = Square feet
TSI = Thermal Systems Insulation
% = Percentage
EGLE = Michigan Department of Environment, Great Lakes, and Energy

Results greater than the National Emissions Standard for Hazardous Air Pollutants (NESHAP) and EGLE Particulate Soil Inhalation Criteria of 1% are highlighted yellow.
Evaluation based on EGLE Criteria at time of Project completion.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SB44				QMCP-SB45				QMCP-SB46		QMCP-SB47			
Field Sample ID															QMCP-SB44 0-6in		QMCP-SB44 6in-4ft		QMCP-SB45 0-6in		QMCP-SB45 6in-5ft		QMCP-SB46 0-4ft		QMCP-SB47 0-6in		QMCP-SB47 6in-5ft	
Sample Date															9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018	
Sample Interval (bgs)															0 - 0.5 ft		0.5 - 4 ft		0 - 0.5 ft		0.5 - 5 ft		0 - 4 ft		0 - 0.5 ft		0.5 - 5 ft	
Sample Description															SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 5 feet		SAND, Medium to coarse, brown, saturated at 5 feet	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																												
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	**14**	**[2,4,10,11]**	**8.7**	**[2,4,10,11]**	**16**	**[2,4,10,11]**	**12**	**[2,4,10,11]**	**5.4**	**[2,4,11]**	**16**	**[2,4,10,11]**	**11**	**[2,4,10,11]**
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	<0.2 U	--	<0.2 U	--	**0.8**	--	<0.2 U	--	**0.5**	--	**0.3**	--	<0.2 U	--
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	**66**	--	**69**	--	**58**	--	**19**	--	**29**	--	**59**	--	**84**	--
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	**6,500**	**[2,4,11]**	**6,300**	**[2,4,11]**	**2,300**	**[2]**	**180**	**[2]**	**710**	**[2]**	**7,300**	**[2,4,11]**	**9,700**	**[2,4,11]**
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	**27**	--	**19**	--	**90**	--	**3.4**	--	**20**	--	**43**	--	**34**	--
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	**470**	**[2,4,11]**	**420**	--	**430**	--	**270**	--	**260**	--	**410**	--	**590**	**[2,4,11]**
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	**0.06**	**[18]**	<0.06 U	--	**0.1**	**[18,19]**	<0.05 U	--	<0.05 U	--	<0.05 U	--	<0.05 U	--
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	**1.7**	**[2]**	**1.3**	**[2]**	**0.9**	--	<0.1 U	--	**0.4**	--	**1.4**	**[2]**	**0.9**	--
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	**73**	**[2]**	**59**	--	**120**	**[2]**	**36**	--	**130**	**[2]**	**79**	**[2]**	**78**	**[2]**
Inorganics - Cyanide (mg/kg)																												
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - PCBs (ug/kg)																												
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<120 U	--	<120 U	--	**1,600**	--	<110 U	--	<540 U	--	<110 U	--	<510 U	--
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	ND	--	ND	--	**1,600 J**	**[10,17]**	ND	--	ND	--	ND	--	ND	--
Organics - SVOCs (ug/kg)																												
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	<600 U	--	<580 U	--	**10,000**	**[2]**	<530 U	--	**800**	--	<540 U	--	**2,700**	--
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	<240 U	--	<230 U	--	<220 U	--	<210 U	--	<220 U	--	<220 U	--	**1,300**	--
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	<240 U	--	<230 U	--	<220 U	--	<210 U	--	<220 U	--	**210 J**	--	**980**	--
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	<240 U	--	<230 U	--	<220 U	--	<210 U	--	<220 U	--	<220 U	--	**2,300**	--
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	**460**	--	<230 U	--	**540**	--	<210 U	--	**330**	--	<220 U	--	**4,600**	--
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<480 U	--	<460 U	--	<440 U	--	<430 U	--	<430 U	--	<430 U	--	**3,900**	**[10]**
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	**830**	--	<460 U	--	**730**	--	<430 U	--	**970**	--	<430 U	--	**6,300**	--
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	<480 U	--	<460 U	--	<440 U	--	<430 U	--	<430 U	--	<430 U	--	**940**	--
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	<480 U	--	<460 U	--	<440 U	--	<430 U	--	<430 U	--	<430 U	--	**2,300**	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	**440**	--	<230 U	--	**830**	--	<210 U	--	**600**	--	<220 U	--	**4,600**	--
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<480 U	--	<460 U	--	<440 U	--	<430 U	--	<430 U	--	<430 U	--	<410 U	--
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	**890**	--	<230 U	--	**750**	--	<210 U	--	**660**	--	<220 U	--	**16,000**	**[2]**
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	<240 U	--	<230 U	--	<220 U	--	<210 U	--	<220 U	--	<220 U	--	**1,800**	--
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<480 U	--	<460 U	--	<440 U	--	<430 U	--	<430 U	--	<430 U	--	**1,100**	--
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	<240 U	--	<230 U	--	**6,100**	**[2]**	<210 U	--	**560**	--	**770**	**[2]**	**4,400**	**[2]**
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	**380**	--	<230 U	--	**3,900**	**[2]**	<210 U	--	**680**	--	**340**	--	**25,000**	**[2]**
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	**840**	--	<230 U	--	**740**	--	<210 U	--	**520**	--	**220**	--	**14,000**	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SB44				QMCP-SB45				QMCP-SB46		QMCP-SB47			
Field Sample ID															QMCP-SB44 0-6in		QMCP-SB44 6in-4ft		QMCP-SB45 0-6in		QMCP-SB45 6in-5ft		QMCP-SB46 0-4ft		QMCP-SB47 0-6in		QMCP-SB47 6in-5ft	
Sample Date															9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018	
Sample Interval (bgs)															0 - 0.5 ft		0.5 - 4 ft		0 - 0.5 ft		0.5 - 5 ft		0 - 4 ft		0 - 0.5 ft		0.5 - 5 ft	
Sample Description															SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 5 feet		SAND, Medium to coarse, brown, saturated at 5 feet	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																												
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	<70 U	--	<68 U	--	**830**	**[18,19]**	<60 U	--	<57 U	--	<58 U	--	<53 U	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	<70 U	--	<68 U	--	**2,300**	**[2,4,11,18,19]**	<60 U	--	**130**	--	**96**	--	**72**	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	<70 U	--	<68 U	--	**580**	**[18,19]**	<60 U	--	<57 U	--	<58 U	--	<53 U	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	<350 U	--	<340 U	--	**570**	--	<300 U	--	<290 U	--	<290 U	--	<260 U	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	<350 U	--	<340 U	--	**4,800**	**[2]**	<300 U	--	**310**	--	<290 U	--	**2,200**	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	<70 U	--	<68 U	--	**520**	**[2,4,11,18,19]**	<60 U	--	<57 U	--	<58 U	--	<53 U	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<350 U	--	<340 U	--	**3,600**	--	<300 U	--	<290 U	--	<290 U	--	<260 U	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	<70 U	--	<68 U	--	**470**	**[2,18,19]**	<60 U	--	<57 U	--	<58 U	--	<53 U	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	<70 UJ	--	<68 UJ	--	**1,100**	**[18,19]**	<60 UJ	--	<57 U	--	<58 U	--	<53 U	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	<70 U	--	<68 U	--	**250**	--	<60 U	--	<57 U	--	<58 U	--	<53 U	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<140 U	--	<140 U	--	**4,600**	--	<120 U	--	**230**	--	**150**	--	<110 U	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	<350 U	--	<340 U	--	**4,200**	**[2]**	<300 U	--	<290 U	--	<290 U	--	**4,200**	**[2]**
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	<70 U	--	<68 U	--	**190**	--	<60 U	--	<57 U	--	<58 U	--	<53 U	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	<70 U	--	<68 U	--	**310**	--	<60 U	--	<57 U	--	<58 U	--	<53 U	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<70 U	--	<68 U	--	**3,000**	--	<60 U	--	**160**	--	**120**	--	**58**	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	<70 U	--	<68 U	--	**100**	--	<60 U	--	<57 U	--	<58 U	--	<53 U	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	<70 U	--	<68 U	--	**3,300**	--	**59 J**	--	**180**	--	**82**	--	<53 U	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	ND	--	ND	--	**7,600**	**[2,4,11,18,19]**	ND	--	**390**	**[18]**	**270**	**[18]**	**58**	**[18]**

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine															
Station Name	CAS Number														QMCP-SB48				QMCP-SB49				QMCP-SB50		QMCP-SB116		QMCP-SB117		QMCP-SS27	
Field Sample ID															QMCP-SB48 0-6in		QMCP-SB48 6in-5ft		QMCP-SB49 0-6in		QMCP-SB49 6in-4ft		QMCP-SB50 0-2ft		QMCP-SB 116-5-6.5ft		QMCP-SB 117-13-14ft		QMCP-SS-27-0-6in	
Sample Date															9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/26/2020		9/26/2020		9/6/2018	
Sample Interval (bgs)															0 - 0.5 ft		0.5 - 5 ft		0 - 0.5 ft		0.5 - 4 ft		0 - 2 ft		5 - 6.5 ft		13 - 14 ft		0 - 0.5 ft	
Sample Description															SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND and GRAVEL with debris		SAND and GRAVEL with debris		SAND, Medium to coarse, brown, saturated at 2 feet		Fine to coarse gravel with large cobble at 6 feet, brown to reddish brown, wet at 6.5		Fine to medium sand, brown, wet		Brown to grey medium SAND with some gravel and slag	
		[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																														
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	**7.8**	**[2,4,10,11]**	**4**	**--**	**3.5**	**--**	**3.2**	**--**	**1.7**	**--**	NM	**--**	NM	**--**	**6.6**	**[2,4,11]**
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	**6.1**	**--**
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	**0.8**	**--**	<0.2 U	**--**	**0.3**	**--**	**0.2**	**--**	**0.3**	**--**	NM	**--**	NM	**--**	**0.4**	**--**
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	**33**	**--**	**24**	**--**	**78**	**--**	**30**	**--**	**8.5**	**--**	NM	**--**	NM	**--**	**94**	**--**
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	**4,300**	**[2]**	**3,200**	**[2]**	**890**	**[2]**	**2,200**	**[2]**	**1,000**	**[2]**	NM	**--**	NM	**--**	**1,100**	**[2]**
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	**670**	**[10]**	**76**	**--**	**15**	**--**	**48**	**--**	**170**	**--**	NM	**--**	NM	**--**	**4.3**	**--**
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	**320**	**--**	**330**	**--**	**510**	**[2,4,11]**	**360**	**--**	**140**	**--**	NM	**--**	NM	**--**	**900**	**[2,4,11]**
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	**0.2**	**[2,18,19]**	<0.05 U	**--**	<0.05 U	**--**	<0.05 U	**--**	**0.4**	**[2,18,19]**	NM	**--**	NM	**--**	<0.05 U	**--**
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	<0.2 U	**--**
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	**2.5**	**[2]**	**1.4**	**[2]**	**0.6**	**--**	**0.9**	**--**	**0.5**	**--**	NM	**--**	NM	**--**	**1.6**	**[2]**
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	**1,000**	**[2]**	**78**	**[2]**	**72**	**[2]**	**70**	**[2]**	**120**	**[2]**	NM	**--**	NM	**--**	**74**	**[2]**
Inorganics - Cyanide (mg/kg)																														
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	NM	**--**	<0.11 U	**--**
Organics - PCBs (ug/kg)																														
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<2700 U	**--**	<1100 U	**--**	<110 U	**--**	<110 U	**--**	<580 U	**--**	NM	**--**	NM	**--**	NM	**--**
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	ND	**--**	ND	**--**	ND	**--**	ND	**--**	ND	**--**	NM	**--**	NM	**--**	NM	**--**
Organics - SVOCs (ug/kg)																														
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	<530 U	**--**	**540 J**	**--**	<540 U	**--**	<540 U	**--**	<580 U	**--**	<280 U	**--**	<1100 U	**--**	<530 U	**--**
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	<210 U	**--**	<210 U	**--**	<220 U	**--**	<210 U	**--**	<230 U	**--**	<110 U	**--**	<430 U	**--**	<210 U	**--**
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	<210 U	**--**	<210 U	**--**	<220 U	**--**	<210 U	**--**	<230 U	**--**	<110 U	**--**	<430 U	**--**	<210 U	**--**
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	<210 U	**--**	<210 U	**--**	<220 U	**--**	<210 U	**--**	<230 U	**--**	<110 U	**--**	<430 U	**--**	<210 U	**--**
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	**320**	**--**	**910 J**	**--**	<220 U	**--**	**390**	**--**	**420**	**--**	**170**	**--**	<430 U	**--**	<210 U	**--**
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<430 U	**--**	<4300 U	**--**	<430 U	**--**	**430**	**--**	<470 U	**--**	<220 U	**--**	<860 U	**--**	<420 U	**--**
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	**660**	**--**	<4300 U	**--**	<430 U	**--**	**830**	**--**	**660**	**--**	**240**	**--**	<860 U	**--**	<420 U	**--**
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	<430 U	**--**	<4300 U	**--**	<430 U	**--**	<430 U	**--**	<470 U	**--**	<220 U	**--**	<860 U	**--**	<420 U	**--**
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	<430 U	**--**	<4300 U	**--**	<430 U	**--**	<430 U	**--**	<470 U	**--**	<220 U	**--**	<860 U	**--**	<420 U	**--**
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	**380**	**--**	**1,500 J**	**--**	<220 U	**--**	**460**	**--**	**470**	**--**	**180**	**--**	<430 U	**--**	<210 U	**--**
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<430 U	**--**	<4300 U	**--**	<430 U	**--**	<430 U	**--**	<470 U	**--**	<220 U	**--**	<860 U	**--**	<420 U	**--**
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	**640**	**--**	**1,100 J**	**--**	**270**	**--**	**810**	**--**	**1,100**	**--**	**380**	**--**	<430 U	**--**	<210 U	**--**
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	<210 U	**--**	<210 U	**--**	<220 U	**--**	<210 U	**--**	<230 U	**--**	<110 U	**--**	<430 U	**--**	<210 U	**--**
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<430 U	**--**	<4300 U	**--**	<430 U	**--**	<430 U	**--**	<470 U	**--**	<220 U	**--**	<860 U	**--**	<420 U	**--**
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	**220**	**--**	**310 J**	**--**	<220 U	**--**	<210 U	**--**	**260**	**--**	**110**	**--**	<430 U	**--**	<210 U	**--**
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	**440**	**--**	**940 J**	**--**	<220 U	**--**	**420**	**--**	**1,300**	**--**	**370**	**--**	<430 U	**--**	<210 U	**--**
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	**490**	**--**	**5,900 J**	**--**	**230**	**--**	**790**	**--**	**850**	**--**	**440**	**--**	<430 U	**--**	<210 U	**--**

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine															
Station Name	CAS Number														QMCP-SB48				QMCP-SB49				QMCP-SB50		QMCP-SB116		QMCP-SB117		QMCP-SS27	
Field Sample ID															QMCP-SB48 0-6in		QMCP-SB48 6in-5ft		QMCP-SB49 0-6in		QMCP-SB49 6in-4ft		QMCP-SB50 0-2ft		QMCP-SB 116-5-6.5ft		QMCP-SB 117-13-14ft		QMCP-SS-27-0-6in	
Sample Date															9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/26/2020		9/26/2020		9/6/2018	
Sample Interval (bgs)															0 - 0.5 ft		0.5 - 5 ft		0 - 0.5 ft		0.5 - 4 ft		0 - 2 ft		5 - 6.5 ft		13 - 14 ft		0 - 0.5 ft	
Sample Description															SAND, Medium to coarse, brown, saturated at 4 feet		SAND, Medium to coarse, brown, saturated at 4 feet		SAND and GRAVEL with debris		SAND and GRAVEL with debris		SAND, Medium to coarse, brown, saturated at 2 feet		Fine to coarse gravel with large cobble at 6 feet, brown to reddish brown, wet at 6.5		Fine to medium sand, brown, wet		Brown to grey medium SAND with some gravel and slag	
		[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																															
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	**130**	--	**110**	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	<280 U	--	<300 U	--	<290 U	--	<300 U	--	<330 U	--	<320 U	--	<2000 U	--	NM	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	**280**	--	**330**	--	<290 U	--	<300 U	--	<330 U	--	<320 U	--	<2000 U	--	NM	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	<56 U	--	**120**	**[4,11,18,19]**	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<280 U	--	<300 U	--	<290 U	--	<300 U	--	<330 U	--	<320 U	--	<2000 U	--	NM	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	<56 UJ	--	<60 UJ	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**230**	--	**250**	--	<110 U	--	<120 U	--	<130 U	--	<130 U	--	<790 U	--	NM	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	<280 U	--	<300 U	--	<290 U	--	<300 U	--	<330 U	--	<320 U	--	<2000 U	--	NM	--
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**170**	--	**140**	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	<56 U	--	<60 U	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	**160**	--	**300**	--	<57 U	--	<60 U	--	<66 U	--	<63 U	--	<390 U	--	NM	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	**400**	**[18]**	**390**	**[18]**	ND	--	ND	--	ND	--	ND	--	ND	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS28		QMCP-SS29				QMCP-SS30				QMCP-SS31			
Field Sample ID															QMCP-SS-28-0-6in		QMCP-SS-29-0-6in		QMCP-SS29-0-6in		QMCP-SS-30-0-6in		QMCP-SS30-0-6in		QMCP-SS-31-0-6in		QMCP-SS-31-0-6in DUP 4	
Sample Date															9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018	
Sample Interval (bgs)															0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft	
Sample Description															Brown medium SAND with some gravel		Black fine stamp SAND, oily residue 3in down, odor		Black fine stamp SAND, oily residue 3in down, odor		Black fine SAND with some gravel		Black fine SAND with some gravel		Brown fine to coarse SAND with gravel, 5-6in black		Brown fine to coarse SAND with gravel, 5-6in black	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																												
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	**2.5**	--	**12**	**[2,4,10,11]**	NM	--	**9.8**	**[2,4,10,11]**	NM	--	**4.2**	--	**4.2**	--
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	**41**	--	**64**	--	NM	--	**50**	--	NM	--	**91**	--	**64**	--
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	<0.2 U	--	<0.2 U	--	NM	--	**0.3**	--	NM	--	<0.2 U	--	<0.2 U	--
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	**14**	--	<200 U	--	NM	--	**27**	--	NM	--	**19**	--	**12**	--
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	**220**	**[2]**	**41,000**	**[2,4,10,11]**	NM	--	**1,600**	**[2]**	NM	--	**1,100**	**[2]**	**780**	**[2]**
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	**83**	--	**110**	--	NM	--	**68**	--	NM	--	**15**	--	**11**	--
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	**200**	--	**280**	--	NM	--	**290**	--	NM	--	**240**	--	**190**	--
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	**0.2**	**[2,18,19]**	**0.07**	**[18,19]**	NM	--	**0.2**	**[2,18,19]**	NM	--	<0.05 U	--	<0.06 U	--
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	<0.2 U	--	<0.2 U	--	NM	--	<0.2 U	--	NM	--	<0.2 U	--	<0.2 U	--
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	**0.3**	--	**4.6**	**[2,4]**	NM	--	**1.7**	**[2]**	NM	--	**0.6**	--	**0.4**	--
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	**70**	**[2]**	**160**	**[2]**	NM	--	**110**	**[2]**	NM	--	**33**	--	**25**	--
Inorganics - Cyanide (mg/kg)																												
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	<0.11 U	--	<0.11 U	--	NM	--	<1.1 U	--	NM	--	<0.11 U	--	<0.11 U	--
Organics - PCBs (ug/kg)																												
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - SVOCs (ug/kg)																												
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	<550 U	--	**1,500**	--	NM	--	**2,100**	--	NM	--	<550 U	--	<550 U	--
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	<220 U	--	<220 U	--	NM	--	**2,000**	--	NM	--	<220 U	--	<220 U	--
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	<220 U	--	<220 U	--	NM	--	**1,200**	--	NM	--	<220 U	--	<220 U	--
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	<220 U	--	<220 U	--	NM	--	**6,300**	--	NM	--	<220 U	--	<220 U	--
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<220 U	--	**540**	--	NM	--	**16,000**	--	NM	--	<220 U	--	<220 U	--
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<440 U	--	<440 U	--	NM	--	**12,000**	**[10,17]**	NM	--	<440 U	--	<440 U	--
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	<440 U	--	**1,200**	--	NM	--	**20,000**	--	NM	--	<440 U	--	<440 U	--
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	<440 U	--	<440 U	--	NM	--	**2,300**	--	NM	--	<440 U	--	<440 U	--
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	<440 U	--	<440 U	--	NM	--	**7,800**	--	NM	--	<440 U	--	<440 U	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	<220 U	--	**780**	--	NM	--	**16,000**	--	NM	--	<220 U	--	<220 U	--
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<440 U	--	<440 U	--	NM	--	**1,100**	--	NM	--	<440 U	--	<440 U	--
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	<220 U	--	**800**	--	NM	--	**41,000**	**[2]**	NM	--	<220 U	--	<220 U	--
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	<220 U	--	<220 U	--	NM	--	**5,600**	**[2]**	NM	--	<220 U	--	<220 U	--
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<440 U	--	<440 U	--	NM	--	**3,000**	--	NM	--	<440 U	--	<440 U	--
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	<220 U	--	**1,100**	**[2]**	NM	--	**5,600**	**[2]**	NM	--	**580**	--	**650**	--
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	<220 U	--	**1,000**	--	NM	--	**43,000**	**[2]**	NM	--	**270**	--	**240**	--
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	<220 U	--	**710**	--	NM	--	**27,000**	--	NM	--	<220 U	--	<220 U	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS28		QMCP-SS29				QMCP-SS30				QMCP-SS31			
Field Sample ID															QMCP-SS-28-0-6in		QMCP-SS-29-0-6in		QMCP-SS29-0-6in		QMCP-SS-30-0-6in		QMCP-SS30-0-6in		QMCP-SS-31-0-6in		QMCP-SS-31-0-6in DUP 4	
Sample Date															9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018	
Sample Interval (bgs)															0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft		0 - 0.5 ft	
Sample Description															Brown medium SAND with some gravel		Black fine stamp SAND, oily residue 3in down, odor		Black fine stamp SAND, oily residue 3in down, odor		Black fine SAND with some gravel		Black fine SAND with some gravel		Brown fine to coarse SAND with gravel, 5-6in black		Brown fine to coarse SAND with gravel, 5-6in black	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																												
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine									
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS57		QMCP-SS58		QMCP-SS59		QMCP-SS60		QMCP-SS222		QMCP-SS223	
Field Sample ID															QMCP-SS57-0-3in		QMCP-SS58-0-3in		QMCP-SS59-0-3in		QMCP-SS60-0-3in		QMCP-SS 222-0-3in		QMCP-SS 223-0-3in	
Sample Date															10/1/2018		10/1/2018		10/1/2018		10/1/2018		8/17/2019		9/24/2020	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															Black soot		Burn pile residue		Burn pile residue		Burn pile residue		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																										
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	**190**	**[2,4,10,11,17]**	**21**	**[2,4,10,11]**	**22**	**[2,4,10,11]**	**19**	**[2,4,10,11]**	**140**	**[2,4,10,11,17]**	**9.7**	**[2,4,10,11]**
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	**180**	**[2]**	**440**	**[2]**	**350**	**[2]**	**600**	**[2]**	NM	--	NM	**--**
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	**61**	**[2,4,11]**	**6.7**	**[2,4,11]**	**2.2**	**[2]**	**2.1**	**[2]**	NM	--	NM	**--**
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	<200 U	**--**	**38**	**--**	**43**	**--**	**44**	**--**	NM	--	NM	**--**
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	**520**	**[2]**	**650**	**[2]**	**1,200**	**[2]**	**810**	**[2]**	NM	--	NM	**--**
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	**3,000**	**[2,4,10,11,17]**	**270**	**--**	**470**	**[10]**	**2,300**	**[4,10,11,17]**	**140**	--	NM	**--**
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	**790**	**[2,4,11]**	**570**	**[2,4,11]**	**420**	**--**	**710**	**[2,4,11]**	NM	--	NM	**--**
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	**0.4**	**[2,18,19]**	<0.07 U	**--**	**0.1**	**[18,19]**	**0.1**	**[18,19]**	NM	--	NM	**--**
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	**2.8**	**[2]**	<0.2 U	**--**	<0.2 U	**--**	<0.2 U	**--**	NM	--	NM	**--**
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	**2.9**	**[2]**	**0.6**	**--**	**0.5**	**--**	**0.5**	**--**	NM	--	NM	**--**
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	**920**	**[2]**	**730**	**[2]**	**790**	**[2]**	**1,000**	**[2]**	NM	--	NM	**--**
Inorganics - Cyanide (mg/kg)																										
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	**2**	**--**	<0.75 U	**--**	<0.84 U	**--**	<0.79 U	**--**	NM	--	NM	**--**
Organics - PCBs (ug/kg)																										
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<20000 U	**--**	<150 U	**--**	<170 U	**--**	<160 U	**--**	**240**	--	NM	**--**
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	ND	**--**	ND	**--**	ND	**--**	ND	**--**	**240**	--	NM	**--**
Organics - SVOCs (ug/kg)																										
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	**3,400 J**	**--**	<750 U	**--**	<840 U	**--**	<790 U	**--**	**1,400**	--	**430**	--
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	**2,000 J**	**--**	<300 U	**--**	<340 U	**--**	<320 U	**--**	<110 U	--	<170 U	--
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	**7,500 J**	**[4]**	<300 U	**--**	<340 U	**--**	<320 U	**--**	<110 U	--	<170 U	--
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	**24,000 J**	**--**	<300 U	**--**	<340 U	**--**	<320 U	**--**	<110 U	--	<170 U	--
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	**100,000 J**	**[10,17]**	<300 U	**--**	**490**	**--**	**470**	**--**	**560**	--	**280**	--
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	**75,000 J**	**[10,17]**	<600 U	**--**	<6700 U	**--**	<6300 U	**--**	<2200 U	--	<3500 U	--
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	**180,000 J**	**[10,17]**	<600 U	**--**	<6700 U	**--**	<6300 U	**--**	<2200 U	--	<3500 U	--
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	**30,000 J**	**--**	<600 U	**--**	<6700 U	**--**	<6300 U	**--**	<2200 U	--	<3500 U	--
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	**39,000 J**	**--**	<600 U	**--**	<6700 U	**--**	<6300 U	**--**	<2200 U	--	<3500 U	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	**150,000 J**	**--**	<300 U	**--**	**670**	**--**	**610**	**--**	**920**	--	**410**	--
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<26000 U	**--**	<600 U	**--**	<6700 U	**--**	<6300 U	**--**	<2200 U	--	<3500 U	--
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	**300,000 J**	**[2]**	**550**	**--**	**880**	**--**	**970**	**--**	**1,300**	--	**700**	--
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	**10,000 J**	**[2]**	<300 U	**--**	<340 U	**--**	<320 U	**--**	<110 U	--	<170 U	--
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	**49,000 J**	**[10]**	<600 U	**--**	<6700 U	**--**	<6300 U	**--**	<2200 U	--	<3500 U	--
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	**12,000 J**	**[2]**	**570**	**--**	**490**	**--**	**300 J**	**--**	**1,100**	**[2]**	**320**	--
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	**230,000 J**	**[2,4,6,7,8,11,13,14,15]**	**690**	**--**	**550**	**--**	**610**	**--**	**1,200**	--	**530**	--
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	**230,000 J**	**--**	**520**	**--**	**930**	**--**	**990**	**--**	**1,100**	--	**1,000**	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine									
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS57		QMCP-SS58		QMCP-SS59		QMCP-SS60		QMCP-SS222		QMCP-SS223	
Field Sample ID															QMCP-SS57-0-3in		QMCP-SS58-0-3in		QMCP-SS59-0-3in		QMCP-SS60-0-3in		QMCP-SS 222-0-3in		QMCP-SS 223-0-3in	
Sample Date															10/1/2018		10/1/2018		10/1/2018		10/1/2018		8/17/2019		9/24/2020	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															Black soot		Burn pile residue		Burn pile residue		Burn pile residue		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																										
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS224		QMCP-SS225		QMCP-SS226		QMCP-SS227		QMCP-SS228		QMCP-SS229		QMCP-SS230	
Field Sample ID															QMCP-SS 224-0-3in		QMCP-SS 225-0-3in		QMCP-SS 226-0-3in		QMCP-SS 227-0-3in		QMCP-SS 228-0-3in		QMCP-SS 229-0-3in		QMCP-SS 230-0-3in	
Sample Date															9/24/2020		9/24/2020		9/24/2020		8/17/2019		8/17/2019		9/24/2020		9/24/2020	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															--		--		--		--		--		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																												
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	**8.3**	**[2,4,10,11]**	**22**	**[2,4,10,11]**	NM	--	**1.3**	--	NM	--	**17**	**[2,4,10,11]**	**18**	**[2,4,10,11]**
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	NM	--	NM	--	NM	--	**20**	--	NM	--	NM	--	NM	--
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Inorganics - Cyanide (mg/kg)																												
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - PCBs (ug/kg)																												
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	<150 U	--	<120 U	--	NM	--	NM	--	NM	--
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	NM	--	NM	--	ND	--	ND	--	NM	--	NM	--	NM	--
Organics - SVOCs (ug/kg)																												
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	<320 U	--	**2,600**	--	NM	--	<310 U	--	**52,000**	**[2]**	**4,900**	**[2]**	<2800 U	--
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	<130 U	--	<110 U	--	NM	--	<120 U	--	<11000 U	--	**4,500**	--	**1,900**	--
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	<130 U	--	**150**	--	NM	--	<120 U	--	<11000 U	--	**1,300**	--	**1,600**	--
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	<130 U	--	<110 U	--	NM	--	<120 U	--	<11000 U	--	**12,000**	--	**9,400**	--
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<130 U	--	**510**	--	NM	--	<12000 U	--	<1100 U	--	**23,000**	**[10]**	**32,000**	**[10]**
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<2500 U	--	**530**	--	NM	--	<25000 U	--	<2200 U	--	**16,000**	**[10,17]**	**27,000**	**[10,17]**
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	<2500 U	--	**2,200**	--	NM	--	<25000 U	--	<2200 U	--	**27,000**	**[10]**	**47,000**	**[10]**
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	<2500 U	--	**220 J**	--	NM	--	<25000 U	--	<2200 U	--	**980**	--	**9,900**	--
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	<2500 U	--	**570**	--	NM	--	<25000 U	--	<2200 U	--	**8,700**	--	**13,000**	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	**220**	--	**1,100**	--	NM	--	<12000 U	--	<1100 U	--	**22,000**	--	**33,000**	--
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<2500 U	--	<220 U	--	NM	--	<25000 U	--	<2200 U	--	**520**	--	**3,900**	**[10]**
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	**150**	--	**1,300**	--	NM	--	<120 U	--	<11000 U	--	**92,000**	**[2]**	**89,000**	**[2]**
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	<130 U	--	<110 U	--	NM	--	<120 U	--	<11000 U	--	**10,000**	**[2]**	**4,700**	--
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<2500 U	--	**260**	--	NM	--	<25000 U	--	<2200 U	--	**1,400**	--	**11,000**	--
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	**150**	--	**1,700**	**[2]**	NM	--	<120 U	--	**12,000**	**[2]**	**10,000**	**[2]**	**4,600**	**[2]**
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	**220**	--	**1,700**	--	NM	--	<120 U	--	**13,000**	**[2]**	**65,000**	**[2,4]**	**67,000**	**[2,4]**
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	**210**	--	**1,100**	--	NM	--	<12000 U	--	**5,200**	--	**45,000**	--	**57,000**	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS224		QMCP-SS225		QMCP-SS226		QMCP-SS227		QMCP-SS228		QMCP-SS229		QMCP-SS230	
Field Sample ID															QMCP-SS 224-0-3in		QMCP-SS 225-0-3in		QMCP-SS 226-0-3in		QMCP-SS 227-0-3in		QMCP-SS 228-0-3in		QMCP-SS 229-0-3in		QMCP-SS 230-0-3in	
Sample Date															9/24/2020		9/24/2020		9/24/2020		8/17/2019		8/17/2019		9/24/2020		9/24/2020	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															--		--		--		--		--		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																												
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	NM	--	NM	--	NM	--	NM	--	**15,000**	**[18,19]**	NM	--	NM	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	NM	--	NM	--	NM	--	NM	--	**35,000**	**[2,4,11,18,19]**	NM	--	NM	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	NM	--	NM	--	NM	--	NM	--	**11,000**	**[2,4,11,18,19]**	NM	--	NM	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	NM	--	NM	--	NM	--	NM	--	<6100 U	--	NM	--	NM	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	**64,000**	**[2,4]**	NM	--	NM	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	NM	--	NM	--	NM	--	NM	--	<1200 U	--	NM	--	NM	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	<6100 U	--	NM	--	NM	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	NM	--	NM	--	NM	--	NM	--	<1200 U	--	NM	--	NM	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	NM	--	NM	--	NM	--	NM	--	<1200 U	--	NM	--	NM	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	NM	--	NM	--	NM	--	NM	--	<1200 U	--	NM	--	NM	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	<2500 U	--	NM	--	NM	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	**12,000**	**[2]**	NM	--	NM	--
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	**24,000**	**[4,11]**	NM	--	NM	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	NM	--	NM	--	NM	--	NM	--	**5,200**	**[4,11,18,19]**	NM	--	NM	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	**2,600**	--	NM	--	NM	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	**4,400**	**[4]**	NM	--	NM	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	NM	--	NM	--	NM	--	NM	--	<1200 U	--	NM	--	NM	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	NM	--	NM	--	NM	--	NM	--	**2,600**	**[2,18,19]**	NM	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS235		QMCP-SS236		QMCP-SS237		QMCP-SS238		QMCP-SS239		QMCP-SS240		QMCP-SS243	
Field Sample ID															QMCP-SS 235-0-3in		QMCP-SS 236-0-3in		QMCP-SS 237-0-3in		QMCP-SS 238-0-3in		QMCP-SS 239-0-3in		QMCP-SS 240-0-3in		QMCP-SS 243-0-3in	
Sample Date															8/17/2019		8/17/2019		9/24/2020		9/24/2020		8/17/2019		8/17/2019		8/17/2019	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															--		--		--		--		--		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																												
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	**19**	**[2,4,10,11]**	**27**	**[2,4,10,11]**	NM	--	NM	--	**11**	**[2,4,10,11]**	**15**	**[2,4,10,11]**	**1.8**	--
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	**340**	--	**31**	--	NM	--	NM	--	**660**	**[10]**	**55**	--	**28**	--
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Inorganics - Cyanide (mg/kg)																												
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - PCBs (ug/kg)																												
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	<1200 U	--	<120 U	--	<110 U	--	<120 U	--	**120**	--	NM	--	<110 U	--
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	ND	--	ND	--	ND	--	ND	--	**120**	--	NM	--	ND	--
Organics - SVOCs (ug/kg)																												
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	**5,000**	**[2]**	**750**	--	NM	--	NM	--	<2500 U	--	<2600 U	--	<270 U	--
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	<1200 U	--	<120 U	--	NM	--	NM	--	<1000 U	--	<1000 U	--	<110 U	--
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	<1200 U	--	<120 U	--	NM	--	NM	--	<1000 U	--	<1000 U	--	<110 U	--
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	<1200 U	--	<120 U	--	NM	--	NM	--	<1000 U	--	<1000 U	--	<110 U	--
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<1200 U	--	<120 U	--	NM	--	NM	--	**980 J**	--	<1000 U	--	<110 U	--
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<2300 U	--	<230 U	--	NM	--	NM	--	<20000 U	--	<20000 U	--	<220 U	--
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	<2300 U	--	<230 U	--	NM	--	NM	--	<20000 U	--	<20000 U	--	<220 U	--
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	<2300 U	--	<230 U	--	NM	--	NM	--	<20000 U	--	<20000 U	--	<220 U	--
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	<2300 U	--	<230 U	--	NM	--	NM	--	<20000 U	--	<20000 U	--	<220 U	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	<1200 U	--	**140**	--	NM	--	NM	--	<1000 U	--	**1,200**	--	<110 U	--
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	<2300 U	--	<230 U	--	NM	--	NM	--	<20000 U	--	<20000 U	--	<220 U	--
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	<1200 U	--	**130**	--	NM	--	NM	--	**1,000 J**	--	**1,500**	--	<110 U	--
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	<1200 U	--	<120 U	--	NM	--	NM	--	<1000 U	--	<1000 U	--	<110 U	--
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	<2300 U	--	<230 U	--	NM	--	NM	--	<20000 U	--	<20000 U	--	<220 U	--
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	**3,500**	**[2]**	**550**	--	NM	--	NM	--	<1000 U	--	<1000 U	--	<110 U	--
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	**2,100**	--	**450**	--	NM	--	NM	--	<1000 U	--	<1000 U	--	<110 U	--
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	<1200 U	--	**130**	--	NM	--	NM	--	**2,300 J**	--	**1,400**	--	<110 U	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

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Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number														QMCP-SS235		QMCP-SS236		QMCP-SS237		QMCP-SS238		QMCP-SS239		QMCP-SS240		QMCP-SS243	
Field Sample ID															QMCP-SS 235-0-3in		QMCP-SS 236-0-3in		QMCP-SS 237-0-3in		QMCP-SS 238-0-3in		QMCP-SS 239-0-3in		QMCP-SS 240-0-3in		QMCP-SS 243-0-3in	
Sample Date															8/17/2019		8/17/2019		9/24/2020		9/24/2020		8/17/2019		8/17/2019		8/17/2019	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description		[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	--		--		--		--		--		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																												
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS247		QMCP-SS249		QMCP-SS249		QMCP-SS250		QMCP-SS252		QMCP-SS263		QMCP-SS265	
Field Sample ID															QMCP-SS 247-0-3in		QMCP-SS 249-0-3in		QMCP-SS 249-DUPE-0-3in		QMCP-SS 250-0-3in		QMCP-SS 252-0-3in		QMCP-SS 263-0-3in		QMCP-SS 265-0-3in	
Sample Date															9/24/2020		9/24/2020		9/24/2020		9/24/2020		9/24/2020		9/24/2020		9/24/2020	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															--		--		--		--		--		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (mg/kg)																												
ARSENIC	7440-38-2	4.6	4.6	NLV	NLV	NLV	7.6	4.6	NLV	NLV	NLV	37	NA	NA	NM	--	NM	--	NM	--	**3.6**	--	**6.4**	**[2,4,11]**	NM	--	NM	--
BARIUM	7440-39-3	130 (B,G)	1,300 (B)	NLV	NLV	NLV	37,000 (B)	1,300 (B)	NLV	NLV	NLV	1.3E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CADMIUM	7440-43-9	1.6 (B,G,X)	6.0 (B)	NLV	NLV	NLV	550 (B)	6.0 (B)	NLV	NLV	NLV	2,100 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CHROMIUM	7440-47-3	1.2E+6 (B,G,H,X)	1.0E+6 (B,D,H)	NLV	NLV	NLV	7.90E+5 (B,H)	1.00E+6 (B,D,H)	NLV	NLV	NLV	1.00E+6 (B,D,H)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
COPPER	7440-50-8	32 (B,G)	5,800 (B)	NLV	NLV	NLV	20,000 (B)	5,800 (B)	NLV	NLV	NLV	73,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
LEAD	7439-92-1	2,500 (B,G,X)	700 (B)	NLV	NLV	NLV	400 (B)	700 (B)	NLV	NLV	NLV	900 (B,DD)	NA	NA	NM	--	NM	--	NM	--	**36**	--	**26**	--	**1,000**	**[4,10,11,17]**	**77**	--
MANGANESE	7439-96-5	440 (B,G,X)	440 (B)	NLV	NLV	NLV	25,000 (B)	440 (B)	NLV	NLV	NLV	90,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MERCURY	7439-97-6	0.13 (B,Z)	1.7 (B,Z)	52 (B,Z)	52 (B,Z)	52 (B,Z)	160 (B,Z)	1.7 (B,Z)	62 (B,Z)	62 (B,Z)	62 (B,Z)	580 (B,Z)	0.022 (M)	0.066	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SELENIUM	7782-49-2	0.41 (B)	4.0 (B)	NLV	NLV	NLV	2,600 (B)	4.0 (B)	NLV	NLV	NLV	9,600 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SILVER	7440-22-4	1.0 (B,M)	4.5 (B)	NLV	NLV	NLV	2500 (B)	13 (B)	NLV	NLV	NLV	9,000 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ZINC	7440-66-6	62 (B,G)	2,400 (B)	NLV	NLV	NLV	1.70E+5 (B)	5,000 (B)	NLV	NLV	NLV	6.30E+5 (B)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Inorganics - Cyanide (mg/kg)																												
CYANIDE	57-12-5	0.1 (P,R)	4.0 (P,R)	NLV	NLV	NLV	12 (P,R)	4.0 (P,R)	NLV	NLV	NLV	250 (P,R)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - PCBs (ug/kg)																												
AROCLOR-1254	11097-69-1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**430**	--	<100 U	--	<100 U	--	NM	--	NM	--	NM	--	NM	--
TOTAL PCBS	1336-36-6	NLL	NLL	2.40E+5 (J,T)	7.90E+6 (J,T)	7.90E+6 (J,T)	1,000 (J,T)	NLL	8.10E+5 (J,T)	2.80E+7 (J,T)	2.80E+7 (J,T)	1,000 (J,T)	NA	NA	**430**	--	ND	--	ND	--	NM	--	NM	--	NM	--	NM	--
Organics - SVOCs (ug/kg)																												
2-METHYLNAPHTHALENE (SVOC)	91-57-6S	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	NM	--	NM	--	NM	--	<320 U	--	<270 U	--	NM	--	NM	--
ACENAPHTHENE	83-32-9	8,700	3.00E+05	8.10E+07	8.10E+07	8.10E+07	4.10E+07	8.80E+05	9.70E+07	9.70E+07	9.70E+07	1.30E+08	NA	NA	NM	--	NM	--	NM	--	<130 U	--	<110 U	--	NM	--	NM	--
ACENAPHTHYLENE	208-96-8	ID	5,900	2.20E+06	2.20E+06	2.20E+06	1.60E+06	17,000	2.70E+06	2.70E+06	2.70E+06	5.20E+06	NA	NA	NM	--	NM	--	NM	--	<130 U	--	<110 U	--	NM	--	NM	--
ANTHRACENE	120-12-7	ID	41,000	1.40E+09	1.40E+09	1.40E+09	2.30E+08	41,000	1.60E+09	1.60E+09	1.60E+09	7.30E+08	NA	NA	NM	--	NM	--	NM	--	<130 U	--	<110 U	--	NM	--	NM	--
BENZO(A)ANTHRACENE	56-55-3	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	NM	--	NM	--	NM	--	<130 U	--	**240**	--	NM	--	NM	--
BENZO(A)PYRENE	50-32-8	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	NM	--	NM	--	NM	--	<260 U	--	**280**	--	NM	--	NM	--
BENZO(B)FLUORANTHENE	205-99-2	NLL	NLL	ID	ID	ID	20,000 (Q)	NLL	ID	ID	ID	80,000 (Q)	NA	NA	NM	--	NM	--	NM	--	<260 U	--	**610**	--	NM	--	NM	--
BENZO(G,H,I)PERYLENE	191-24-2	NLL	NLL	NLV	NLV	NLV	2.50E+06	NLL	NLV	NLV	NLV	7.00E+06	NA	NA	NM	--	NM	--	NM	--	<260 U	--	<220 U	--	NM	--	NM	--
BENZO(K)FLUORANTHENE	207-08-9	NLL	NLL	NLV	NLV	NLV	2.00E+5 (Q)	NLL	NLV	NLV	NLV	8.00E+5 (Q)	NA	NA	NM	--	NM	--	NM	--	<260 U	--	<220 U	--	NM	--	NM	--
CHRYSENE	218-01-9	NLL	NLL	ID	ID	ID	2.00E+6 (Q)	NLL	ID	ID	ID	8.00E+6 (Q)	NA	NA	NM	--	NM	--	NM	--	<130 U	--	**310**	--	NM	--	NM	--
DIBENZO(A,H)ANTHRACENE	53-70-3	NLL	NLL	NLV	NLV	NLV	2,000 (Q)	NLL	NLV	NLV	NLV	8,000 (Q)	NA	NA	NM	--	NM	--	NM	--	<260 U	--	<220 U	--	NM	--	NM	--
FLUORANTHENE	206-44-0	5,500	730,000	7.40E+08	7.40E+08	7.40E+08	4.60E+07	730,000	8.90E+08	8.80E+08	8.80E+08	1.30E+08	NA	NA	NM	--	NM	--	NM	--	**180**	--	**600**	--	NM	--	NM	--
FLUORENE	86-73-7	5,300	390,000	1.30E+08	1.30E+08	1.30E+08	2.70E+07	890,000	1.50E+08	1.50E+08	1.50E+08	8.70E+07	NA	NA	NM	--	NM	--	NM	--	<130 U	--	<110 U	--	NM	--	NM	--
INDENO(1,2,3-CD)PYRENE	193-39-5	NLL	NLL	NLV	NLV	NLV	20,000 (Q)	NLL	NLV	NLV	NLV	80,000 (Q)	NA	NA	NM	--	NM	--	NM	--	<260 U	--	<220 U	--	NM	--	NM	--
NAPHTHALENE (SVOC)	91-20-3S	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	NM	--	NM	--	NM	--	<130 U	--	<110 U	--	NM	--	NM	--
PHENANTHRENE	85-01-8	2,100	56,000	1.60E+05	1.60E+05	1.60E+05	1.60E+06	1.60E+05	1.90E+05	1.90E+05	1.90E+05	5.20E+06	NA	NA	NM	--	NM	--	NM	--	<130 U	--	**250**	--	NM	--	NM	--
PYRENE	129-00-0	ID	4.80E+05	6.50E+08	6.50E+08	6.50E+08	2.90E+07	4.80E+05	7.80E+08	7.80E+08	7.80E+08	8.40E+07	NA	NA	NM	--	NM	--	NM	--	**150**	--	**460**	--	NM	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Location Code		EGLE Part 201 Generic Cleanup Criteria											Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine											
Station Name	CAS Number	[2] Groundwater Surface Water Interface Protection Criteria	[4] Residential Drinking Water Protection Criteria	[6] Residential Infinite Source Volatile Soil Inhalation Criteria	[7] Residential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[8] Residential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[10] Residential Direct Contact Criteria	[11] Nonresidential Drinking Water Protection Criteria	[13] Nonresidential Infinite Source Volatile Soil Inhalation Criteria	[14] Nonresidential Finite Volatile Soil Inhalation Criteria - 5 Meter Source Thickness	[15] Nonresidential Finite Volatile Soil Inhalation Criteria - 2 Meter Source Thickness	[17] Nonresidential Direct Contact Criteria	[18] Soil Residential MSSL	[19] Soil Nonresidential MSSL	QMCP-SS247		QMCP-SS249		QMCP-SS249		QMCP-SS250		QMCP-SS252		QMCP-SS263		QMCP-SS265	
Field Sample ID															QMCP-SS 247-0-3in		QMCP-SS 249-0-3in		QMCP-SS 249-DUPE-0-3in		QMCP-SS 250-0-3in		QMCP-SS 252-0-3in		QMCP-SS 263-0-3in		QMCP-SS 265-0-3in	
Sample Date															9/24/2020		9/24/2020		9/24/2020		9/24/2020		9/24/2020		9/24/2020		9/24/2020	
Sample Interval (bgs)															0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft		0 - 0.25 ft	
Sample Description															--		--		--		--		--		--		--	
															Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Organics - VOCs (ug/kg)																												
1,2,3-TRIMETHYLBENZENE	526-73-8	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	270 (JT)	800 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,2,4-TRIMETHYLBENZENE	95-63-6	570 (I)	2,100 (I)	2.10E+7 (I)	5.00E+8 (I)	5.00E+8 (I)	3.2E+07 (C,I)	2,100 (I)	2.50E+7 (I)	6.00E+8 (I)	6.00E+8 (I)	1.00E+8 (C,I)	150 (JT)	430 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
1,3,5-TRIMETHYLBENZENE	108-67-8	1,100 (I)	1,800 (I)	1.6 E+7 (I)	3.80E+8 (I)	3.80E+8 (I)	3.2E+07 (C)	2,100 (I)	1.90E+7 (I)	4.60E+8 (I)	4.60E+8 (I)	1.00E+8 (C,I)	100 (JT)	300 (JT)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-BUTANONE (MEK)	78-93-3	44,000 (I)	2.60E+5 (I)	2.90E+7 (I)	2.90E+7 (I)	3.50E+7 (I)	1.2E+8 (C,I,DD)	7.70E+5 (I)	3.50E+7 (I)	3.50E+7 (I)	3.60E+7 (I)	7.00E+8 (C,I,DD)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
2-METHYLNAPHTHALENE (VOC)	91-57-6V	4,200	57,000	1.50E+06	1.50E+06	1.50E+06	8.10E+06	1.70E+05	1.80E+06	1.80E+06	1.80E+06	2.60E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
BENZENE	71-43-2	240 (I,X)	100 (I)	13,000 (I)	34,000 (I)	79,000 (I)	1.8E+5 (I)	100 (I)	45,000 (I)	99,000 (I)	2.30E+5 (I)	8.40E+5 (C,I)	1.7 (M)	7.9 (M)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CYCLOHEXANE	110-82-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ETHYLBENZENE	100-41-4	360	1,500	720,000	1.00E+06	2.20E+06	2.20E+07	1,500	2.40E+06	3.10E+06	6.50E+06	7.10E+07	12 (M)	57	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
HEXANE	110-54-3	NA	1.8E+5 (C)	3.00E+06	3.20E+08	6.20E+06	9.2E+7 (C)	5.10E+5 (C)	3.50E+06	3.50E+06	6.40E+06	3.00E+8 (C)	25	74	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ISOPROPYLBENZENE	98-82-8	3,200	91,000	1.70E+06	1.70E+06	2.80E+06	2.50E+7 (C)	2.60E+05	2.00E+06	2.00E+06	3.00E+06	8.00E+7 (C)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
NAPHTHALENE (VOC)	91-20-3V	730	35,000	3.00E+05	3.00E+05	3.00E+05	1.60E+07	1.00E+05	3.50E+05	3.50E+05	3.50E+05	5.20E+07	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-BUTYLBENZENE	104-51-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
N-PROPYLBENZENE	103-65-1	ID	1,600 (I)	ID	ID	ID	2.50E+6 (I)	4,600	ID	ID	ID	8.00E+06	1,800	3,500	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
O-XYLENE	95-47-6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SEC-BUTYLBENZENE	135-98-8	ID	1,600	ID	ID	ID	2.50E+06	4,600	ID	ID	ID	8.00E+06	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
TOLUENE	108-88-3	5,400 (I)	16,000 (I)	2.80E+6 (I)	5.10E+6 (I)	1.20E+07 (I)	5E+07 (C,I)	16,000 (I)	3.30E+6 (I)	3.60E+7 (I)	3.60E+7 (I)	1.60E+8 (C,I)	3,700	11,000	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
XYLENE - TOTAL	1330-20-7	980 (I)	5,600 (I)	4.60E+7 (I)	6.10E+7 (I)	1.30E+8 (I)	4.1E+08 (C,I)	5,600 (I)	5.40E+7 (I)	6.50E+7 (I)	1.30E+8 (I)	1.00E+9 (C,D,I)	280 (J)	830 (J)	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

Soil Table Footnotes:

- EGLE Part 201 residential and non-residential generic cleanup criteria and screening levels criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a. Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Release Date: December 30, 2013. Updated June 2018.
- Only detected analytes are listed - Gray rows indicate requested analyses. If no analytes are listed below a gray row then all analytes of that group were either not analyzed or not detected.
- **Bold** values are concentrations detected above the laboratory reporting limit.
- **Bold/Shaded** cells indicate analyte concentration exceeded applicable criteria. EGLE Part 201 criteria exceeded is indicated by the footnote in [brackets] following the result value and defined below:

[2] - Groundwater Surface Water Interface Protection Criteria
[3] - Soil Saturation Concentration Screening Levels
[4] - Residential Drinking Water Protection Criteria
[5] - Residential Soil Volatilization to Indoor Air Inhalation Criteria (VIAC)
[6] - Residential Infinite Source Volatile Soil Inhalation Criteria (VSIC)
[7] - Residential Finite VSIC for 5 Meter Source Thickness
[8] - Residential Finite VSIC for 2 Meter Source Thickness
[9] - Residential Particulate Soil Inhalation Criteria
[10] - Residential Direct Contact Criteria
[11] - Nonresidential Drinking Water Protection Criteria
[12] - Nonresidential Soil Volatilization to Indoor Air Inhalation Criteria (VIAC)
[13] - Nonresidential Infinite Source Volatile Soil Inhalation Criteria (VSIC)
[14] - Nonresidential Finite VSIC for 5 Meter Source Thickness
[15] - Nonresidential Finite VSIC for 2 Meter Source Thickness
[16] - Nonresidential Particulate Soil Inhalation Criteria
[17] - Nonresidential Direct Contact Criteria
[18] - Soil Residential MSSL
[19] - Soil Nonresidential MSSL

Evaluation based on EGLE Criteria at time of Project completion.
Samples described in this evaluation may actually refer to stamp sands or to other mining waste from the historic mining and reclamation processes conducted in the area.

-- = No Exceedances
ND = Not Detected
NM = Not Measured
bgs = Below ground surface
ft = Feet
in = Inches
MSSL = Media-Specific Volatilization to Indoor Air Interim Action Screening Level
PCBs = Polychlorinated biphenyls
VOC = Volatile organic compound
SVOC = Semi-volatile organic compound
ug/kg = Micrograms per kilogram
mg/kg = Milligrams per kilogram.
% = Percentage

Criteria Footnotes:

ID = Insufficient data to develop criterion.
NA = A criterion or value is not available
NLL = Hazardous substance is not likely to leach under most soil conditions.
NLV = Hazardous substance is not likely to volatilize under most conditions.
(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.
(C) = The criterion developed under R 299.20 to R 299.26 exceeds the chemical- specific soil saturation screening level (Csat). The person proposing or implementing response activity shall document whether additional response activity is required to control free-phase liquids or NAPL to protect against risks associated with free-phase liquids by using methods appropriate for the free-phase liquids present. Development of a site-specific Csat or methods presented in R 299.22, R 299.24(5), and R 299.26(8) may be conducted for the relevant exposure pathways.
(D) = Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent or 1.0E+9 parts per billion (ppb).
(DD) = Hazardous substance causes developmental effects. Residential direct contact criteria are protective of both prenatal and postnatal exposure. Nonresidential direct contact criteria are protective for a pregnant adult receptor.
(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. A hardness value of 47.5 $CaCO_3$/L and pH of 7, derived from the Michigan Department of Environmental Quality Draft Site Inspection Report for Lake Linden Operations dated 3/29/13, was used in the footnote G calculation spreadsheet.
(H) = Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.
(I) = Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the EGLE, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.
(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.
(M) = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.
(P) = Amenable cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with all groundwater criteria. Total cyanide methods or method OIA-1677 shall be used to quantify cyanide concentrations for compliance with soil criteria. Nonresidential direct contact criteria may not be protective of the potential for release of hydrogen cyanide gas. Additional land or resource use restrictions may be necessary to protect for the acute inhalation concerns associated with hydrogen cyanide gas.
(Q) = Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene.
(R) = Hazardous substance may exhibit the characteristic of reactivity as defined in 40 C.F.R. §261.23 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost.
(T) = Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the published table if TSCA standards are not applicable.
(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)
(Z) = Mercury is typically measured as total mercury. The generic cleanup criteria, however, are based on data for different species of mercury. Specifically, data for elemental mercury, chemical abstract service (CAS) number 7439976, serve as the basis for the soil volatilization to indoor air criteria, groundwater volatilization to indoor air, and soil inhalation criteria. Data for methyl mercury, CAS number 22967926, serve as the basis for the GSI criterion; and data for mercuric chloride, CAS number 7487947, serve as the basis for the drinking water, groundwater contact, soil direct contact, and the groundwater protection criteria. Comparison to criteria shall be based on species-specific analytical data only if sufficient facility characterization has been conducted to rule out the presence of other species of

MSSL Footnotes:

J = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations must be added together for comparison to screening level.
JT = Hazardous substance may be present in several isomer forms. Screening levels may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive screening level of the detected isomers.
M = The screening level may be below target detection limits (TDL).

Laboratory Footnotes:

J = The result is an estimated quantity.
U = Analyte analyzed for but not detected above the reported sample reporting limit.

TABLE 6-2
Summary of Soil Analytical Results (Julio Marine)
Julio Propeties - Dollar Bay
Houghton County, MI

	Part 201 Generic Cleanup Criteria Evaluated	Exceedance
EGLE Part 201 Generic Cleanup Criteria (June 2018)	[2] - Groundwater Surface Water Interface Protection Criteria	YES
	[3] - Soil Saturation Concentration Screening Levels	NO
	[4] - Residential Drinking Water Protection Criteria	YES
	[5] - Residential Soil Volatilization to Indoor Air Inhalation Criteria (VIAC)	NO
	[6] - Residential Infinite Source Volatile Soil Inhalation Criteria (VSIC)	YES
	[7] - Residential Finite VSIC for 5 Meter Source Thickness	YES
	[8] - Residential Finite VSIC for 2 Meter Source Thickness	YES
	[9] - Residential Particulate Soil Inhalation Criteria	NO
	[10] - Residential Direct Contact Criteria	YES
	[11] - Nonresidential Drinking Water Protection Criteria	YES
	[12] - Nonresidential Soil Volatilization to Indoor Air Inhalation	NO
	[13] - Nonresidential Infinite Source Volatile Soil Inhalation Criteria	YES
	[14] - Nonresidential Finite VSIC for 5 Meter Source Thickness	YES
	[15] - Nonresidential Finite VSIC for 2 Meter Source Thickness	YES
	[16] - Nonresidential Particulate Soil Inhalation Criteria	NO
	[17] - Nonresidential Direct Contact Criteria	YES
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)	[18] - Soil Residential Media-Specific Screening Level (MSSL)	YES
	[19] - Soil Nonresidential MSSL	YES

TABLE 6-3
Monitoring Well Construction and Elevation Data (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Well ID	Latitude	Longitude	Top of Casing Elevation (feet amsl, GSS survey**)	Ground Surface Elevation (feet amsl)	Screen Length (feet)	Top of Screen Depth (feet below TOC)	Top of Screen Elevation (feet)	Top of Screen Elevation (feet amsl)	Total Depth of Well from TOC (feet)	Measurement Date	Depth to Water (feet below TOC)	Groundwater Elevation (feet amsl)	Depth to LNAPL (feet below TOC)	LNAPL Elevation (feet amsl)	LNAPL Thickness (feet)
MW-7	47.11428088	-88.49874875	606.14	606.44	5	3.5	96.5	602.6	8.5	10/16/2019	2.84	603.30	--	--	--
										9/23/2020	3.14	603.00	--	--	--
										11/5/2021	4.41	601.73	--	--	--
MW-8	47.11389012	-88.49970038	606.86	607.40	5	3.5	97.2	603.4	8.5	10/16/2019	3.68	603.18	--	--	--
										9/24/2020	3.96	602.90	--	--	--
										11/5/2021	5.23	601.63	--	--	--
MW-9	47.11379384	-88.50081834	606.68	606.89	5	3.5	97.0	603.2	8.5	10/16/2019	3.31	603.37	3.68	603.00	0.21
										9/24/2020	3.58	603.10	--	--	--
										11/5/2021	4.57	602.11	--	--	--
MW-10	47.11425795	-88.50071037	607.93	607.96	5	3.5	98.3	604.4	8.5	10/16/2019	--	--	4.60	603.33	0.6
										9/24/2020	--	--	NA	NA	NA
										11/5/2021	--	--	NA	NA	~2
MW-11	47.11413534	-88.50098528	607.16	607.42	5	3.5	97.5	603.7	8.5	10/16/2019	3.80	603.36	--	--	--
										9/24/2020	4.04	603.12	--	--	--
										11/5/2021	5.35	601.81	--	--	--
MW-12	47.11526003	-88.50057222	605.46	605.80	5	3.5	95.8	602.0	8.5	10/17/2019	1.98	603.48	--	--	--
										9/23/2020	2.31	603.15	--	--	--
										11/5/2021	3.21	602.25	--	--	--
MW-13	47.11451588	-88.49933747	608.37	608.80	5	3.5	98.7	604.9	8.5	10/16/2019	5.10	603.27	--	--	--
										9/24/2020	5.32	603.05	--	--	--
										11/5/2021	6.60	601.77			
MW-14	47.11466418	-88.50019712	608.00	608.48	5	3.5	98.4	604.5	8.5	10/16/2019	4.68	603.32	--	--	--
										9/24/2020	4.92	603.08	--	--	--
										11/5/2021	6.19	601.81	--	--	--
MW-15	47.11461151	-88.49995152	608.48	608.77	5	3.5	98.8	605.0	8.5	10/17/2019	5.11	603.37	--	--	--
										9/24/2020	5.40	603.08	--	--	--
										11/5/2021	6.68	601.80	--	--	--

Notes:
-- = Not Measured
amsl = Above Mean Sea Level
NA = LNAPL was observed but measurement data was not available
TOC = Top of Casing
LNAPL = Light Non-Aqueous Phase Liquid
Water level measurements and groundwater elevations are referenced to the TOC of MW-7 with an arbitrary elevation of 100.00 feet.
*Ground surface and TOC elevations were updated in September 2020. Ground surface elevations for MW-8 and MW-12 were updated from 101.22 and 99.82, respectively.
** TOC elevations were surveyed relative to USGS by Geological Services Section in 2021.
Groundwater Elevations measured on 11/5/2021 are depicted on ***Figure 6-3***, *Groundwater Analytical Results (Julio Marine)*.

TABLE 6-4
Summary of Groundwater Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EGLE Part 201 Generic Cleanup Criteria			Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine																							
Station Name	CAS Number	[1] Residential Drinking Water Criteria	[2] Nonresidential Drinking Water Criteria	[3] Groundwater Surface Water Interface Criteria	[8] Shallow Groundwater Residential MSSL	[9] Shallow Groundwater Nonresidential MSSL	QMCP-GW43		QMCP-GW44		QMCP-GW45		QMCP-GW46		QMCP-GW47		QMCP-GW49		QMCP-GW50		QMCP-GW116		QMCP-GW117		QMCP-MW7				QMCP-MW8			
Field Sample ID							QMCP-GW43 6-10		QMCP-GW44 4-8ft		QMCP-GW45 5-9		QMCP-GW46 4-8ft		QMCP-GW47 5-9		QMCP-GW49 5-9		QMCP-GW50 2-6		QMCP-GW 116-6-10ft		QMCP-GW 117-13-17ft		QMCP-MW7		QMCP-MW-7		QMCP-MW8		QMCP-MW 8	
Sample Date							9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/10/2018		9/26/2020		9/26/2020		10/16/2019		9/23/2020		10/16/2019		9/24/2020	
Sample Interval (bgs)							6 - 10 ft		4 - 8 ft		5 - 9 ft		4 - 8 ft		5 - 9 ft		5 - 9 ft		2 - 6 ft		6 - 10 ft		13 - 17 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft	
							Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (ug/l)																																
ARSENIC	7440-38-2	10 (A)	10 (A)	10	NA	NA	7.6	--	4.4	--	9.9	--	32	[1,2,3]	4.2	--	9.3	--	9.5	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CADMIUM	7440-43-9	5.0 (A,B)	5.0 (A,B)	1.3 (B,G,X)	NA	NA	<0.2 U	--	0.3	--	0.5	--	0.9	--	<0.2 U	--	0.3	--	<0.2 U	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CHROMIUM	7440-47-3	100 (A,B,H)	100 (A,B,H)	40 (B,G,H,X)	NA	NA	1.9	--	9.3	--	22	--	32	--	6.4	--	120	[1,2,3]	3.4	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
COPPER	7440-50-8	4.0 (B,E)	4.0 (B,E)	14 (B,G)	NA	NA	75	[3]	250	[3]	2,400	[1,2,3]	2,800	[1,2,3]	2,800	[1,2,3]	3,800	[1,2,3]	1,300	[1,2,3]	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
LEAD	7439-92-1	4.0 (B,L)	4.0 (B,L)	14 (B,G,X)	NA	NA	1.8	--	3.0	--	7.0	[1,2]	16	[1,2,3]	15	[1,2,3]	73	[1,2,3]	67	[1,2,3]	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MANGANESE	7439-96-5	50 (B,E)	50 (B,E)	1,000 (B,G,X)	NA	NA	560	[1,2]	650	[1,2]	490	[1,2]	420	[1,2]	540	[1,2]	2,000	[1,2,3]	1,500	[1,2,3]	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MERCURY	7439-97-6	2.0 (A,B,Z)	2.0 (A,B,Z)	0.0013 (B,Z)	0.088	0.14	<0.2 U	--	<0.2 U	--	0.4	[3,8,9]	0.3	[3,8,9]	0.2	[3,8,9]	0.2	[3,8,9]	<0.2 U	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SILVER	7440-22-4	34 (B)	98 (B)	0.2 (B,M)	NA	NA	<0.2 U	--	0.3	[3]	1.7	[3]	2.4	[3]	2.9	[3]	3.1	[3]	0.7	[3]	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ZINC	7440-66-6	2,400 (B)	5,000 (B,E)	63 (B,G)	NA	NA	11	--	7.6	--	18	--	27	--	16	--	160	[3]	43	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - PCBs as Aroclors (ug/l)																																
TOTAL PCBS	1336-36-6	0.5 (A,J,T)	0.5 (A,J,T)	0.2 (J,M,T)	NA	NA	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	NM	--	NM	--	ND	--	ND	--	ND	--	NM	--
Organics - SVOCs (ug/l)																																
ACENAPHTHENE	83-32-9	1,300	3,800	38	NA	NA	<1.0 U	--	<1.0 U	--	1.4	--	<10 U	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
ANTHRACENE	120-12-7	43 (S)	43 (S)	ID	NA	NA	<1.0 U	--	<1.0 U	--	1.4	--	<10 U	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
BENZO(A)ANTHRACENE	56-55-3	2.1 (Q)	8.5 (Q)	ID	NA	NA	1.4	--	<1.0 U	--	<1.0 U	--	<10 U	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
BENZO(A)PYRENE	50-32-8	5.0 (A,Q)	5.0 (A,Q)	ID	NA	NA	1.2	--	<1.0 U	--	<1.0 U	--	<10 U	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
BENZO(B)FLUORANTHENE	205-99-2	1.5 (Q,S,AA)	1.5 (Q,S,AA)	ID	NA	NA	1.4	--	<1.0 U	--	<1.0 U	--	<10 U	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
CHRYSENE	218-01-9	1.6 (Q,S)	1.6 (Q,S)	ID	NA	NA	1.1	--	<1.0 U	--	<1.0 U	--	<10 U	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
FLUORANTHENE	206-44-0	210 (S)	210 (S)	1.6	NA	NA	2.6	[3]	<1.0 U	--	<1.0 U	--	<10 U	--	<1.0 U	--	1	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
FLUORENE	86-73-7	880	2,000 (S)	12	NA	NA	<1.0 U	--	<1.0 U	--	2	--	11	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
NAPHTHALENE (SVOC)	91-20-3S	520	1,500	11	NA	NA	<1.0 U	--	<1.0 U	--	<1.0 U	--	<10 U	--	1.1	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
PHENANTHRENE	85-01-8	52	150	2.0 (M)	NA	NA	<1.0 U	--	<1.0 U	--	5.2	[3]	25	[3]	0.96 J	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
PYRENE	129-00-0	140 (S)	140 (S)	ID	NA	NA	2.1	--	1.2	--	4.4	--	17	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
Organics - VOCs (ug/l)																																
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	<2.0 U	--	<2.0 U	--	<2.0 U	--	<2.0 U	--	<2.0 U	--	<2.0 U	--	<2.0 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--
N-BUTYLBENZENE	104-51-8	80	230	ID	NA	NA	<1.0 U	--	<1.0 U	--	<1.0 U	--	1	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
TOLUENE	108-88-3	790 (E,I)	790 (E,I)	270 (I)	300	570	9.4	--	<1.0 U	--	<1.0 U	--	1.7	--	<1.0 U	--	<1.0 U	--	<1.0 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
XYLENE - TOTAL	--	280 (E,I)	280 (E,I)	49 (I)	75 (J)	120 (J)	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	<0 U	--	ND	--	ND	--
Water Quality Parameters																																
TEMPURATURE (°C)	NA	NA	NA	NA	NA	NA	14.1	--	14.4	--	18.6	--	15.3	--	14.8	--	15.6	--	17.6	--	NM	--	NM	--	13.0	--	16.1	--	11.9	--	13.4	--
CONDUCTIVITY(mS/cm)	NA	NA	NA	NA	NA	NA	0.308	--	0.225	--	0.076	--	0.101	--	0.295	--	0.257	--	0.233	--	NM	--	NM	--	0.293	--	0.316	--	0.147	--	0.225	--
DISSOLVED OXYGEN (%)	NA	NA	NA	NA	NA	NA	25.6	--	1.8	--	1.4	--	3.0	--	2.6	--	10.5	--	2.5	--	NM	--	NM	--	2.5	--	2.9	--	10.4	--	3.2	--
pH	NA	NA	NA	NA	NA	NA	6.09	--	6.22	--	5.63	--	6.20	--	6.37	--	6.60	--	6.13	--	NM	--	NM	--	6.62	--	4.11	--	6.54	--	4.09	--
TURBIDITY (nTu)	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	28.0	--	11.7	--	4.16	--	4.14	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-4
Summary of Groundwater Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EGLE Part 201 Generic Cleanup Criteria			Media-Specific Volatilization to Indoor Air Interim Action Screening Levels		Julio Marine																					
Station Name	CAS Number	[1] Residential Drinking Water Criteria	[2] Nonresidential Drinking Water Criteria	[3] Groundwater Surface Water Interface Criteria	[8] Shallow Groundwater Residential MSSL	[9] Shallow Groundwater Nonresidential MSSL	QMCP-MW9				QMCP-MW11				QMCP-MW12				QMCP-MW13				QMCP-MW14				QMCP-MW15			
Field Sample ID							QMCP-MW9		QMCP-MW 9		QMCP-MW11		QMCP-MW 11		QMCP-MW12		QMCP-MW 12		QMCP-MW13		QMCP-MW 13		QMCP-MW14		QMCP-MW 14		QMCP-MW15		QMCP-MW 15	
Sample Date							10/16/2019		9/24/2020		10/16/2019		9/24/2020		10/17/2019		9/24/2020		10/16/2019		9/24/2020		10/16/2019		9/24/2020		10/17/2019		9/24/2020	
Sample Interval (bgs)							3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft		3.5 - 8.5 ft	
							Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (ug/l)																														
ARSENIC	7440-38-2	10 (A)	10 (A)	10	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CADMIUM	7440-43-9	5.0 (A,B)	5.0 (A,B)	1.3 (B,G,X)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
CHROMIUM	7440-47-3	100 (A,B,H)	100 (A,B,H)	40 (B,G,H,X)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
COPPER	7440-50-8	4.0 (B,E)	4.0 (B,E)	14 (B,G)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
LEAD	7439-92-1	4.0 (B,L)	4.0 (B,L)	14 (B,G,X)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MANGANESE	7439-96-5	50 (B,E)	50 (B,E)	1,000 (B,G,X)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
MERCURY	7439-97-6	2.0 (A,B,Z)	2.0 (A,B,Z)	0.0013 (B,Z)	0.088	0.14	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
SILVER	7440-22-4	34 (B)	98 (B)	0.2 (B,M)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
ZINC	7440-66-6	2,400 (B)	5,000 (B,E)	63 (B,G)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - PCBs as Aroclors (ug/l)																														
TOTAL PCBS	1336-36-6	0.5 (A,J,T)	0.5 (A,J,T)	0.2 (J,M,T)	NA	NA	ND	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--
Organics - SVOCs (ug/l)																														
ACENAPHTHENE	83-32-9	1,300	3,800	38	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
ANTHRACENE	120-12-7	43 (S)	43 (S)	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
BENZO(A)ANTHRACENE	56-55-3	2.1 (Q)	8.5 (Q)	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
BENZO(A)PYRENE	50-32-8	5.0 (A,Q)	5.0 (A,Q)	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
BENZO(B)FLUORANTHENE	205-99-2	1.5 (Q,S,AA)	1.5 (Q,S,AA)	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
CHRYSENE	218-01-9	1.6 (Q,S)	1.6 (Q,S)	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
FLUORANTHENE	206-44-0	210 (S)	210 (S)	1.6	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
FLUORENE	86-73-7	880	2,000 (S)	12	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
NAPHTHALENE (SVOC)	91-20-3S	520	1,500	11	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
PHENANTHRENE	85-01-8	52	150	2.0 (M)	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
PYRENE	129-00-0	140 (S)	140 (S)	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
Organics - VOCs (ug/l)																														
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--	<2 U	--
N-BUTYLBENZENE	104-51-8	80	230	ID	NA	NA	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
TOLUENE	108-88-3	790 (E,I)	790 (E,I)	270 (I)	300	570	<1 U	--	<1 U	--	**1.8**	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--	<1 U	--
XYLENE - TOTAL	--	280 (E,I)	280 (E,I)	49 (I)	75 (J)	120 (J)	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--
Water Quality Parameters																														
TEMPURATURE (°C)	NA	NA	NA	NA	NA	NA	**12.3**	--	**14**	--	**11.7**	--	**13.3**	--	**11.7**	--	**14.6**	--	**11.2**	--	**13.7**	--	**12.2**	--	**14.3**	--	**10.8**	--	**13.6**	--
CONDUCTIVITY(mS/cm)	NA	NA	NA	NA	NA	NA	**0.121**	--	**0.143**	--	**0.277**	--	**0.425**	--	**0.179**	--	**0.317**	--	**0.138**	--	**0.159**	--	**0.317**	--	**0.277**	--	**0.129**	--	**0.094**	--
DISSOLVED OXYGEN (%)	NA	NA	NA	NA	NA	NA	**0.9**	--	**3.7**	--	**1.0**	--	**3.3**	--	**8.4**	--	**5**	--	**16.8**	--	**25.6**	--	**27.5**	--	**4**	--	**29.9**	--	**23.8**	--
pH	NA	NA	NA	NA	NA	NA	**6.33**	--	**3.59**	--	**6.28**	--	**3.72**	--	**6.98**	--	**4.05**	--	**6.72**	--	**6.74**	--	**6.07**	--	**6.43**	--	**5.49**	--	**5.29**	--
TURBIDITY (nTu)	NA	NA	NA	NA	NA	NA	**49.4**	--	**39.4**	--	**5.92**	--	**7.88**	--	**5.06**	--	**3.85**	--	**5.56**	--	**1.79**	--	**3.05**	--	**3.38**	--	**4.16**	--	**2.04**	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-4
Summary of Groundwater Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Groundwater Table Footnotes:

- EGLE Part 201 residential and non-residential generic cleanup criteria and screening levels criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a. Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Release Date: December 30, 2013. Updated December 21, 2020.

- Only detected analytes are listed - Gray rows indicate requested analyses. If no analytes are listed below a gray row then all analytes of that group were either not analyzed or not detected.

- **Bold** values are concentrations detected above the laboratory reporting limit.

- **Bold/Shaded** cells indicate analyte concentration exceeded applicable criteria. EGLE Part 201 criteria exceeded is indicated by the footnote in [brackets] following the result value and defined below:

[1] - Residential Drinking Water Criteria
[2] - Nonresidential Drinking Water Criteria
[3] - Groundwater Surface Water Interface Criteria
[4] - Water Solubility
[5] - Residential Groundwater Volatilization to Indoor Air Inhalation Criteria
[6] - Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria
[7] - Flammability and Explosivity Screening Level
[8] Shallow Groundwater Residential MSSL
[9] Shallow Groundwater Nonresidential MSSL
[10] Groundwater Residential MSSL
[11] Groundwater Residential TS MSSL
[12] Groundwater Nonresidential MSSL
[13] Groundwater Nonresidential $MSSL_{12}$
[14] Groundwater Nonresidential TS MSSL

Evaluation based on EGLE Criteria at time of Project completion.

-- = No Exceedances
ND = Not Detected
NM = Not Measured
bgs = Below ground surface
ft = Feet
PCBs = Polychlorinated biphenyls
SVOC = Semi-volatile organic compound
VOC = Volatile organic compound
ug/l = Micrograms per liter
°C = Degrees Celsius
mS/cm = MilliSiemens per centimeter
% = Percentage
nTu = Nephelometric Turbidity Unit
pH = pH acid-base scale
MSSL = Media-Specific Volatilization to Indoor Air Interim Action Screening Level
TS MSSL = Time Sensitive Media-Specific Volatilization to Indoor Air Interim Action Screening Level

Groundwater Table Footnotes:

ID = Insufficient data to develop criterion.

NA = A criterion or value is not available

(A) = Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

(AA) = Use 10,000 ug/l where groundwater enters a structure through the use of a water well, sump or other device. Use 28,000 ug/l for all other uses.

(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.

(E) = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). A notice of aesthetic impact may be employed as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion, but do not exceed the applicable health-based drinking water value provided in a table available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information)

(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. A hardness value of 47.5 $CaCO_3$/L and pH of 7, derived from the Michigan Department of Environmental Quality Draft Site Inspection Report for Lake Linden Operations dated 3/29/13, was used in the footnote G calculation spreadsheet.

(H) = Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.

(I) = Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the EGLE, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.

(L) = Criteria for lead are derived using a biologically based model, as allowed for under Section 20120a(9) of the NREPA, and are not calculated using the algorithms and assumptions specified in pathway-specific rules. The generic residential drinking water criterion of 4 ug/L is linked to the generic residential soil direct contact criterion of 400 mg/kg. A higher concentration in the drinking water, up to the state action level of 15 ug/L, may be allowed as a site-specific remedy and still allow for drinking water use, under Section 20120a(2) and 20120b of the NREPA if soil concentrations are appropriately lower than 400 mg/kg. If a site-specific criterion is approved based on this subdivision, a notice shall be filed on the deed for all property where the groundwater concentrations will exceed 4 ug/L to provide notice of the potential for unacceptable risk if soil or groundwater concentrations increase. Acceptable combinations of site-specific soil and drinking water concentrations are presented in a table available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site (See R 299.49 Footnotes for generic cleanup criteria tables for additional information).

(M) = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

(Q) = Criteria for carcinogenic polycyclic aromatic hydrocarbons were developed using relative potential potencies to benzo(a)pyrene.

(S) = Criterion defaults to the hazardous substance-specific water solubility limit.

(T) = Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the published table if TSCA standards are not applicable.

(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)

(Z) = Mercury is typically measured as total mercury. The generic cleanup criteria, however, are based on data for different species of mercury. Specifically, data for elemental mercury, chemical abstract service (CAS) number 7439976, serve as the basis for the soil volatilization to indoor air criteria, groundwater volatilization to indoor air, and soil inhalation criteria. Data for methyl mercury, CAS number 22967926, serve as the basis for the GSI criterion; and data for mercuric chloride, CAS number 7487947, serve as the basis for the drinking water, groundwater contact, soil direct contact, and the groundwater protection criteria. Comparison to criteria shall be based on species-specific analytical data only if sufficient facility characterization has been conducted to rule out the presence of other species of mercury.

MSSL Footnotes:

J = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations must be added together for comparison to screening level.

Laboratory Footnotes:

J = The result is an estimated quantity.

U = Analyte analyzed for but not detected above the reported sample reporting limit.

TABLE 6-4
Summary of Groundwater Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

	Part 201 Generic Cleanup Criteria Evaluated	Exceedance
EGLE Part 201 Generic Cleanup Criteria (December 2020)	[1] Residential Drinking Water Criteria	YES
	[2] Nonresidential Drinking Water Criteria	YES
	[3] Groundwater Surface Water Interface Criteria	YES
	[4] Residential Groundwater Volatilization to Indoor Air Inhalation Criteria	NO
	[5] Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria	NO
	[6] Water Solubility	NO
	[7] Flammability and Explosivity Screening	NO
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)	[8] Shallow Groundwater Residential Media-Specific Screening Level (MSSL)	YES
	[9] Shallow Groundwater Nonresidential MSSL	YES
	[10] Groundwater Residential MSSL	NO
	[11] Groundwater Residential Time Sensitive Media-Specific Screening Level (TS MSSL)	NO
	[12] Groundwater Nonresidential MSSL	NO
	[13] Groundwater Nonresidential $MSSL_{12}$	NO
	[14] Groundwater Nonresidential TS $MSSL_{12}$	NO

TABLE 6-5
Summary of Vat Water Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EGLE Part 201 Generic Cleanup Criteria						Media-Specific Volatilization to Indoor Air Interim Action Screening Levels						Julio Marine					
Station Name	CAS Number	[1] Residential Drinking Water Criteria	[2] Nonresidential Drinking Water Criteria	[3] Groundwater Surface Water Interface Criteria	[4] Residential Groundwater Volatilization to Indoor Air Inhalation Criteria	[5] Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria	[6] Water Solubility	[8] Shallow Groundwater Residential MSSL	[9] Shallow Groundwater Nonresidential MSSL	[10] Groundwater Residential MSSL	[11] Groundwater Residential TS MSSL	[12] Groundwater Nonresidential MSSL	[13] Groundwater Nonresidential $MSSL_{12}$	QMCP-east vat water		QMCP-middle vat water		QMCP-west vat water	
Field Sample ID														QMCP-east vat water		QMCP-middle vat water		QMCP-west vat water	
Sample Date														8/20/2019		8/20/2019		8/20/2019	
														Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics - Metals (ug/l)																			
ARSENIC	7440-38-2	10 (A)	10 (A)	10	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	**21**	--	**15**	--	**4.3**	--
BARIUM	7440-39-3	2,000 (A,B)	2,000 (A,B)	200 (B,G)	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	**13**	--	**16**	--	**12**	--
CADMIUM	7440-43-9	5.0 (A,B)	5.0 (A,B)	1.3 (B,G,X)	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	**0.6**	--	<0.2 U	--	<0.2 U	--
COPPER	7440-50-8	4.0 (B,E)	4.0 (B,E)	14 (B,G)	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	**19**	--	**2.1**	--	<1 U	--
LEAD	7439-92-1	4.0 (B,L)	4.0 (B,L)	14 (B,G,X)	NVL	NLV	NA	NA	NA	NA	NA	NA	NA	**3.4**	--	**9.6**	--	<1 U	--
ZINC	7440-66-6	2,400 (B)	5,000 (B,E)	63 (B,G)	NLV	NLV	NA	NA	NA	NA	NA	NA	NA	**150**	--	**170**	--	**45**	--
Organics - PCBs as Aroclors (ug/l)																			
TOTAL PCBS	1336-36-6	0.5 (A,J,T)	0.5 (A,J,T)	0.2 (J,M,T)	45 (J,S,T)	45 (J,S,T)	44.7 (J,T)	NA	NA	NA	NA	NA	NA	ND	--	ND	--	ND	--
Organics - SVOCs (ug/l)																			
NAPHTHALENE (SVOC)	91-20-3S	520	1,500	11	31,000 (S)	31,000 (S)	31,000	NA	NA	NA	NA	NA	NA	<10 U	--	**1.1**	--	<1 U	--
Organics - VOCs (ug/l)																			
1,2,4-TRIMETHYLBENZENE	95-63-6	63 (E,I)	63 (E,I)	17 (I)	56,000 (I,S)	56,000 (I,S)	55,890 (I)	25 (JT)	44 (JT)	440 (JT)	1,300 (JT)	1,300 (JT)	2,600 (JT)	**2.3**	--	<1 U	--	<1 U	--
2-BUTANONE (MEK)	78-93-3	13,000 (I)	38,000 (I)	2,200 (I)	240,000,000	240,000,000	240,000,000	NA	NA	NA	NA	NA	NA	**5.7**	--	<5 U	--	<5 U	--
2-PROPANONE (ACETONE)	67-64-1	730 (I)	2,100 (I)	1,700 (I)	1,000,000,000	1,000,000,000	1,000,000,000	50,000	62,000	1.20E+07	1.20E+07	2.50E+07	2.50E+07	**26**	--	<20 U	--	<20 U	--
M,P-XYLENE	1330-20-7	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	**2.1**	--	<2 U	--	<2 U	
XYLENE - TOTAL	--	280 (E,I)	280 (E,I)	49 (I)	190,000 (I,S)	190,000 (I,S)	186,000 (I)	75 (J)	120 (J)	1,200 (J)	3,600 (J)	3,500 (J)	7,100 (J)	**2.1**	--	ND	--	ND	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 6-5
Summary of Vat Water Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

Groundwater Table Footnotes:

- EGLE Part 201 residential and non-residential generic cleanup criteria and screening levels criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a. Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Release Date: December 30, 2013. Updated December 21, 2020.

- Only detected analytes are listed - Gray rows indicate requested analyses. If no analytes are listed below a gray row then all analytes of that group were either not analyzed or not detected.

- **Bold** values are concentrations detected above the laboratory reporting limit.

- **Bold/Shaded** cells indicate analyte concentration exceeded applicable criteria. EGLE Part 201 criteria exceeded is indicated by the footnote in [brackets] following the result value and defined below:

[1] - Residential Drinking Water Criteria
[2] - Nonresidential Drinking Water Criteria
[3] - Groundwater Surface Water Interface Criteria
[4] - Water Solubility
[5] - Residential Groundwater Volatilization to Indoor Air Inhalation Criteria
[6] - Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria
[7] - Flammability and Explosivity Screening Level
[8] Shallow Groundwater Residential MSSL
[9] Shallow Groundwater Nonresidential MSSL
[10] Groundwater Residential MSSL
[11] Groundwater Residential TS MSSL
[12] Groundwater Nonresidential MSSL
[13] Groundwater Nonresidential $MSSL_{12}$
[14] Groundwater Nonresidential TS MSSL

Evaluation based on EGLE Criteria at time of Project completion.

-- = No Exceedances
ND = Not Detected
ug/l = Micrograms per liter
PCBs = Polychlorinated biphenyls
SVOC = Semi-volatile organic compound
VOC = Volatile organic compound
MSSL = Media-Specific Volatilization to Indoor Air Interim Action Screening Level
TS MSSL = Time Sensitive Media-Specific Volatilization to Indoor Air Interim Action Screening Level

Groundwater Table Footnotes:

NA = A criterion or value is not available

NLV = Hazardous substance is not likely to volatilize under most conditions.

(A) = Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.

(E) = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). A notice of aesthetic impact may be employed as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion, but do not exceed the applicable health-based drinking water value provided in a table available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information)

(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site. A hardness value of 47.5 $CaCO_3$/L and pH of 7, derived from the Michigan Department of Environmental Quality Draft Site Inspection Report for Lake Linden Operations dated 3/29/13, was used in the footnote G calculation spreadsheet.

(I) = Hazardous substance may exhibit the characteristic of ignitability as defined in 40 C.F.R. §261.21 (revised as of July 1, 2001), which is adopted by reference in these rules and is available for inspection at EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulation may be purchased, at a cost as of the time of adoption of these rules of $45, from the Superintendent of documents, Government Printing Office, Washington, DC 20401 (stock number 869-044-00155-1), or from the EGLE, Remediation and Redevelopment Division (RRD), 525 West Allegan Street, Lansing, Michigan 48933, at cost.

(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.

(L) = Criteria for lead are derived using a biologically based model, as allowed for under Section 20120a(9) of the NREPA, and are not calculated using the algorithms and assumptions specified in pathway-specific rules. The generic residential drinking water criterion of 4 ug/L is linked to the generic residential soil direct contact criterion of 400 mg/kg. A higher concentration in the drinking water, up to the state action level of 15 ug/L, may be allowed as a site-specific remedy and still allow for drinking water use, under Section 20120a(2) and 20120b of the NREPA if soil concentrations are appropriately lower than 400 mg/kg. If a site-specific criterion is approved based on this subdivision, a notice shall be filed on the deed for all property where the groundwater concentrations will exceed 4 ug/L to provide notice of the potential for unacceptable risk if soil or groundwater concentrations increase. Acceptable combinations of site-specific soil and drinking water concentrations are presented in a table available on the Department of Environment, Great Lakes, and Energy (EGLE) internet web site (See R 299.49 Footnotes for generic cleanup criteria tables for additional information).

(M) = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

(S) = Criterion defaults to the hazardous substance-specific water solubility limit.

(T) = Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the published table if TSCA standards are not applicable.

(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)

MSSL Footnotes:

J = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations must be added together for comparison to screening level.

JT = Hazardous substance may be present in several isomer forms. Screening levels may be used for the individual isomer provided that it is the sole isomer detected; however, when multiple isomers are detected in a medium, the isomer-specific concentrations must be added together and compared to the most restrictive screening level of the detected isomers.

Laboratory Footnotes:

U = Analyte analyzed for but not detected above the reported sample reporting limit.

TABLE 6-5
Summary of Vat Water Analytical Results (Julio Marine)
Julio Properties - Dollar Bay
Houghton County, Michigan

	Part 201 Generic Cleanup Criteria Evaluated	Exceedance
EGLE Part 201 Generic Cleanup Criteria (December 2020)	[1] Residential Drinking Water Criteria	NO
	[2] Nonresidential Drinking Water Criteria	NO
	[3] Groundwater Surface Water Interface Criteria	NO
	[4] Residential Groundwater Volatilization to Indoor Air Inhalation Criteria	NO
	[5] Nonresidential Groundwater Volatilization to Indoor Air Inhalation Criteria	NO
	[6] Water Solubility	NO
	[7] Flammability and Explosivity Screening	NO
Media-Specific Volatilization to Indoor Air Interim Action Screening Levels (March 2021)	[8] Shallow Groundwater Residential Media-Specific Screening Level (MSSL)	NO
	[9] Shallow Groundwater Nonresidential MSSL	NO
	[10] Groundwater Residential MSSL	NO
	[11] Groundwater Residential Time Sensitive Media-Specific Screening Level (TS MSSL)	NO
	[12] Groundwater Nonresidential MSSL	NO
	[13] Groundwater Nonresidential $MSSL_{12}$	NO
	[14] Groundwater Nonresidential TS $MSSL_{12}$	NO

7. DETAILED FINDINGS – PORTAGE CANAL AND DOLLAR BAY

This Section summarizes the results and subsequent findings of the offshore sampling components of the SAP at the Julio Properties – Dollar Bay portion of QMCP. Although critical to the understanding of contaminant migration into the Portage Canal and Dollar Bay, the terrestrial portion of the investigation is emphasized in the preceding detailed findings reports for each subarea. This Section provides a comprehensive assessment of the Portage Canal and Dollar Bay using analytical results derived from the SI. The narrative follows the offshore investigative approach outlined in Section 3, while providing specific details about the potential human health and ecological risks associated with mining era operations as they relate to the Portage Canal and Dollar Bay.

The offshore investigation included sediment and pore water sampling from the Portage Canal and the connecting waters of Dollar Bay. The following subsections present a summary of the analytical results derived from offshore sampling activities.

7.1 OFFSHORE INVESTIGATION RESULTS

Similar to the terrestrial investigation, the offshore investigation activities for the Julio Properties – Dollar Bay were also guided by several factors. Since in-lake historical analytical data was not available, terrestrial historical and analytical data was evaluated to determine if adequate characterization data was available in each study area to assess the overall sediment and surface water quality in the Portage Canal and Dollar Bay. In addition, underwater surveillance of the area, as described in Section 3, was used to locate and assess potential offshore waste deposits. Lastly, field observations, both terrestrial and offshore, were used to position sampling locations. Sediment and pore water sampling completed as part of the SI were conducted in accordance with the sampling methods described in Section 3. The following subsections present the outcomes of offshore investigative activities completed in the Portage Canal and Dollar Bay connecting waters by summarizing the laboratory analytical results and characterizing their impacts on the environmental media in which they were detected.

7.1.1 Portage Canal and Dollar Bay

Offshore sediment and pore water samples were collected, but surface water samples were not collected from the Portage Canal or Dollar Bay during the SI. The following subsections present a summary of the analytical results derived from offshore sampling activities.

7.1.1.1 Sediment Sampling Results

Sediment sampling activities were completed on September 6 and 7, 2018. During this time, a total of four sediment samples were collected from two sampling locations (QMCP-SD10 and QMCP-SD14) offshore from the Julio Properties – Dollar Bay parcels.

Sediment sampling included two surficial sediment samples, ranging from 0 to 1 ft or less in depth. The investigation also included two deeper sediment samples collected from depths up to 3 ft. All samples were analyzed for inorganic compounds, PCBs, and SVOCs as identified in *Table 3-1, Sampling and Analysis Summary* of this SI Report.

The analytical results for sediment samples collected during the SI identified concentrations of copper that exceeded applicable screening levels in two of the four samples. SVOCs were detected at concentrations that exceeded applicable screening levels at one location (QMCP-SD10). Total PCBs were not detected in any of the sediment samples collected.

A detailed summary of sediment analytical results collected from the Portage Canal and Dollar Bay connecting waters is provided in ***Table 7-1, Sediment and Pore Water Analytical Results*** and depicted in ***Figure 7-1, Sediment and Pore Water Analytical Results***.

7.1.1.2 Pore Water Sampling Results

No surface water samples were collected from the Portage Canal or Dollar Bay during implementation of the SI; however, two pore water samples (QMCP-PS10 and QMCP-PS45) were collected on September 10, 2018 from near sediment sample locations that indicated signs of contamination (sheen and/or odor) and offshore from QMCP-MW9 that contained LNAPL. Both samples were analyzed for VOCs, and QMCP-PS10 was also analyzed for PCBs and inorganic constituents.

The pore water analytical results for the samples identified multiple inorganic COCs at concentrations above regulatory criteria and/or screening values in QMCP-PS10. Total PCBs and VOCs were not detected in any of the pore water samples collected from the Portage Canal.

A detailed summary of pore water analytical results collected from the Portage Canal and Dollar Bay connecting waters is provided in ***Table 7-1, Sediment and Pore Water Analytical Results*** and depicted in ***Figure 7-1, Sediment and Pore Water Analytical Results***.

7.2 NATURE AND EXTENT OF CONTAMINATION

Utilizing the established regulatory criteria presented in Section 4, the laboratory analytical results summarized in the preceding section were reviewed and compared to the following criteria as applicable for the sampled environmental media:

- EGLE – Rule 57 Water Quality Values;
- EGLE Part 201 Cleanup Criteria for Response Action – Residential and Nonresidential DWC and GSIC;
- EPA Ecological Screening Values (ESVs); and,
- Sediment Quality Guidelines, Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs), MacDonald, et al, 2000.

7.2.1 Comprehensive Exposure Assessment

The comparison was completed to determine which ecological and human exposure pathways, risks, and conditions are relevant in the Portage Canal and Dollar Bay connecting waters. Although not inclusive of relevant pathways where criteria were not exceeded, the following exposure pathways were determined to be relevant in the Portage Canal and Dollar Bay connecting waters as it pertains to the offshore investigative activities completed during the SI:

- Risks due to hazardous substances in sediments and pore water.

7.2.1.1 Portage Canal and Dollar Bay – Exposure Pathway Assessment

Sediment analytical results from the Portage Canal and Dollar Bay connecting waters identified COC concentrations that were at or above concentrations that pose potential risks to sediment dwelling species, and consequently the food chain. The following table provides a summary of the sample locations. The table lists only the number of samples for a specific analytical suite that contained one or more exceedance of a given criterion.

Sediment Analytical Result Summary Table	Analytical Summary			EPA, Region IV, Freshwater Sediment Ecological Screening Values (March 2018)	Consensus Based Sediment Quality Guidelines	
	Total Number of Samples	Detected Analytes	Total Exceedances	Ecological Screening Values	Threshold Effect Concentration (TEC)	Probable Effect Concentration (PEC)
Inorganics	4	25	2	2	2	2
Cyanide	0	0	0	0	0	0
VOCs	0	0	0	0	0	0
SVOCs	4	2	2	1	1	0
Total PCBs	4	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more sample				COPPER, FLUORANTHENE, PYRENE		

The pore water analytical results from the Portage Canal and Dollar Bay connecting waters identified COC concentrations that were at or above concentrations that pose potential risks to ecological receptors, and consequently the food chain. The following table provides a summary of the sample locations. The table lists only the number of samples for a specific analytical suite that contained one or more exceedance of a given criterion.

Pore Water Analytical Result Summary Table	Analytical Summary			Cleanup Criteria Requirements for Response Activity			EPA Region IV Surface Water Ecological Screening Values (March 2018)		EGLE Rule 57 Water Quality Values		
	Total Number of Samples	Detected Analytes	Total Exceedances	Residential Drinking Water Criteria	Nonresidential Drinking Water Criteria	Groundwater Surface Water Interface Criteria	Region IV Freshwater Ecological Screening Value - Acute	Region IV Freshwater Ecological Screening Value - Chronic	Human Non-Cancer Value - Drinking Water Source	Human Cancer Value - Drinking Water Source	Wildlife Value
Inorganics	1	6	4	1	1	1	1	1	0	0	0
Cyanide	0	0	0	0	0	0	0	0	0	0	0
VOCs	2	0	0	0	0	0	0	0	0	0	0
SVOCs	0	0	0	0	0	0	0	0	0	0	0
Total PCBs	1	0	0	0	0	0	0	0	0	0	0
COCs exceeding applicable regulatory criteria in one or more sample				COPPER, LEAD, MANGANESE, SILVER							

7.2.2 Portage Canal and Dollar Bay Extent of Contamination

The comparison of analytical results to applicable regulatory criteria indicates that potential human health and ecological risks are present in the form of contaminated sediment and pore water in the Portage Canal and Dollar Bay connecting waters. The following subsections describe the extent of contamination.

7.2.2.1 Sediment – Extent of Contamination

Sediment sampling analytical results exceeded applicable screening levels for copper from both samples at the QMCP-SD10 location. Results also exceeded applicable screening levels for SVOCs in the surficial sediment sample at this location. The limits of sediment contamination have not been defined.

As previously stated, metals are prevalent in the region and the related inorganic constituent exceedances, although potentially detrimental to aquatic biota, remain a consistent finding in sediment samples collected from across the Project area. Nevertheless, exceedances of inorganic COC screening values in sediment should be considered when evaluating the extent of contamination at Julio Marine – Dollar Bay.

The detection of SVOCs in sediment samples is likely indicative of a nearby contaminant source, versus the ubiquitous nature of the inorganic COCs described above. SVOC contamination in sediment present risks both to benthic organisms and human health due to their close proximity to the shoreline. The potential risks associated with SVOCs in nearshore sediment may be an indication of a terrestrial source of contamination that should be considered when evaluating the extent of sediment contamination at Julio Marine.

7.2.2.2 Pore Water – Extent of Contamination

Analytical results from pore water samples collected offshore from Julio Properties – Dollar Bay identified inorganic impacts exceeding applicable screening values and comparable criteria for one sample (QMCP-PS10). Constituents exceeding criteria or screening levels included copper, lead, manganese, and silver.

Similar to the previously discussed sediment sample results, metals are ubiquitous in the study area and are predominantly the result of the presence of stamp sands. Stamp sands are not defined as a hazardous substance nor are they subject to regulation under Part 201 unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use. The related exceedances, although potentially detrimental to aquatic biota, remain a consistent finding in samples collected from the Project area. Nevertheless, exceedances of inorganic COCs in pore water should be considered when evaluating the extent of contamination at Julio Marine.

7.3 CONCLUSIONS AND RECOMMENDATIONS

The analytical results and interpretation summarized in the preceding subsections document ecological and potential human health risks that are present in the Portage Canal and Dollar Bay connecting waters and the implications of those findings on environmental conditions throughout connected waterbodies such as Portage Lake. The following subsections provide a synopsis of these findings and a recommended path forward for mitigating these risks.

7.3.1 Conclusions

Environmental impacts offshore from the Julio Properties – Dollar Bay are generally characterized by detections of organic and inorganic contaminants in sediment and pore water, repercussions of mining era operations in the region. Although specific sources of these contaminants may not be fully understood, historical research related to the operations, closing, and eventual abandonment/scrapping of mining company operations provided substantive

evidence for assessing specific operational areas and selecting target analytes anticipated to be present in environmental media within the study area. The findings of these investigative activities, specifically as it relates to concentrations of contaminants in sediment and pore water are summarized as follows:

- Sediment – Copper and SVOCs were detected at or in excess of applicable screening values offshore from Julio Marine. Copper concentrations exceeded the ESV, TEC, and PEC, while SVOCs exceeded the ESVs and TECs. Sediment results may be indicative of historic offshore waste deposits and/or venting groundwater impacts.
- Pore Water – Inorganic COCs were detected at or in excess of applicable screening values offshore from Julio Marine. Concentrations of copper, lead, manganese, and silver exceeded Residential and Nonresidential DWC, GSIC, chronic ESVs, and/.or acute ESVs.

7.3.2 Recommendations

SI results have confirmed that potential ongoing sources of contamination are present in the Portage Canal. For Julio Marine where potential upland sources of these COCs have not previously been addressed, evaluation of remedial alternatives to mitigate concerns related to human health and/or the environment could be conducted.

ELGE should continue to provide new study data to the Remediation and Redevelopment Division Superfund Section (RRD SFS), which is responsible for monitoring EPA's remedy for the terrestrial and lake portions of the Torch Lake Superfund Site. RRD SFS should evaluate whether any remedy modifications are necessary. The EPA and RRD SFS should verify that administrative controls for areas that have been previously remediated by the EPA have been employed to ensure that the selected remedy is performing as designed and those institutional controls, where required, have been recorded and are being enforced.

FIGURES

DETAILED FINDINGS REPORT – PORTAGE CANAL AND DOLLAR BAY

Image Source: Michigan Imagery Solution (Houghton - 2013)

Julio Company/
Former Amoco Bulk Fuel Terminal

Julio Marine Dollar Bay

Lake Portage
(Dollar Bay 1995)
*Surface Water analyzed
for pentachlorophenol only

QMCP-SD13 9/7/2018
(0-0.58 ft)

ARSENIC	16	mg/kg [1,2]
CHROMIUM	110	mg/kg [1,2]
COPPER	1,400	mg/kg [1,2,3]
ZINC	180	mg/kg [1,2]

(0.58-3.2 ft)

COPPER	67	mg/kg [1,2]

QMCP-SD12 9/6/2018

(0-1 ft)		
COPPER	100	mg/kg [1,2]
(1-1.9 ft)		
COPPER	74	mg/kg [1,2]

QMCP-SD09 9/6/2018

(0-0.5 ft)		
ARSENIC	22	mg/kg [1,2]
COPPER	5,300	mg/kg [1,2,3]
SILVER	3.0	mg/kg [1]
BENZO(A)ANTHRACENE	970	ug/kg [1,2]
BENZO(A)PYRENE	1,000	ug/kg [1,2]
BENZO(B)FLUORANTHENE	1,900	ug/kg [1]
BENZO(K)FLUORANTHENE	600 J	ug/kg [1]
CHRYSENE	1,300	ug/kg [1,2,3]
FLUORANTHENE	3,000	ug/kg [1,2,3]
NAPHTHALENE (SVOC)	330	ug/kg [1,2]
PHENANTHRENE	2,300	ug/kg [1,2,3]
PYRENE	2,400	ug/kg [1,2,3]

QMCP-SD11

QMCP-PS45

QMCP-SD14

QMCP-SD10 9/6/2018

(0-0.33 ft)		
COPPER	4,100	mg/kg [1,2,3]
FLUORANTHENE	460	ug/kg [1,2]
PYRENE	440	ug/kg [1,2]
(0.33-0.92 ft)		
COPPER	1,500	mg/kg [1,2,3]

QMCP-PS10 9/10/2018

COPPER	250	ug/l [GW3,SW1,SW2]
LEAD	2.0	ug/l [SW1]
MANGANESE	390	ug/l [GW1,GW2,SW1]
SILVER	0.3	ug/l [GW3,SW1]

DATA SOURCES

Sample IDs	Date Range
1) **QMCP-SD/PS...**	**September 2018**

-EGLE RRD. *SI results not published.*

PCBs
VOCs
Inorganics / Cyanide
SVOCs

- At Least One Exceedance for Indicated Parameter Group
- No Exceedances for Indicated Parameter Group
- At Least One Detection of PCBs
- PCBs Not Detected
- Indicated Parameter Group Not Analyzed

- Approximate 1865 Shoreline
- MDNR Property
- Feature Identified on Sanborn Maps
- Approximate Parcel Boundaries
- EPA Cap Boundary

Notes:
- *J = estimated value*
- *ug/kg = micrograms per kilogram*
- *ug/l = micrograms per liter*
- *mg/kg = milligrams per kilogram*
- *MDNR = Michigan Department of Natural Resources*
- *PCBs = Polychlorinated Biphenyls*
- *SVOCs = Semi-Volatile Organic Compounds*
- *VOCs = Volatile Organic Compounds*

Porewater sample locations shown have been adjusted due to symbol size

N

0 550 Ft

Coordinate System: MIGeoRef(m)

EGLE Part 201 Cleanup Criteria for Response Action
[1]=Sediment Ecological Screening Level (EPA Region IV)
[2]=Threshold Effect Concentration (TEC)
[3]=Probable Effect Concentration (PEC)
[GW1]=Residential Drinking Water Criteria
[GW2]=Nonresidential Drinking Water Criteria
[GW3]=Groundwater Surface Water Interface Criteria
[SW1]=Surface Water Ecological Screening Level - Chronic (EPA Region IV)
[SW2]=Surface Water Ecological Screening Level - Acute (EPA Region IV)
[SW3]=Surface Water Rule 57 HNV Drink
[SW4]=Surface Water Rule 57 HCV Drink
[SW5]=Surface Water Rule 57 WV
Evaluation based on EGLE Criteria at time of Project completion.

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

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Figure 7-1
Sediment and Pore Water
Analytical Results
(Julio Properties - Dollar Bay)
Houghton County, Michigan

FILE: W:\Projects\Projects K-O\MDEQ0076\ENGAPPS\GIS\mxds\Planning\20210304_QMCP_SI_Report_4\FinXX_JPR\plev\DollarBay_SED_SDMs_SW_PW_v20210402.mxd 9:39:27 AM 4/2/2021 AMiller

TABLES

DETAILED FINDINGS REPORT – PORTAGE CANAL AND DOLLAR BAY

TABLE 7-1
Sediment and Pore Water Analytical Results
Julio Properties - Dollar Bay
Houghton County, Michigan

Location Code		EPA Region IV Sediment ESVs	Sediment Quality Guidelines		EGLE Part 201 Groundwater Generic Cleanup Criteria			EPA Region IV Surface Water ESVs		Sediment - Dollar Bay																						Pore Water - Dollar Bay			
Station Name	CAS Number	[1] Region IV ESV - Freshwater Sediment	[2] Threshold Effect Concentration	[3] Probable Effect Concentration	[GW1] Residential Drinking Water Criteria	[GW2] Nonresidential Drinking Water Criteria	[GW3] Groundwater Surface Water Interface Criteria	[SW1] Region IV Freshwater ESV - Chronic	[SW2] Region IV Freshwater ESV - Acute	QMCP-SD09		QMCP-SD10				QMCP-SD11						QMCP-SD12				QMCP-SD13				QMCP-SD14				QMCP-PS10		QMCP-PS45	
Sample ID										QMCP-SD09-0-6"		QMCP-SD10-0-4"		QMCP-SD10-4-11"		QMCP-SD 11-6-12"		QMCP-SD 11-6-12" FD		QMCP-SD11-0-6"		QMCP-SD 12-0-12"		QMCP-SD 12-12-23"		QMCP-SD 13-0-7"		QMCP-SD 13-7-38"		QMCP-SD 14-0-12"		QMCP-SD 14-12-36"		QMCP-PS10		QMCP-PS45	
Sample Date										9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/6/2018		9/7/2018		9/7/2018		9/7/2018		9/7/2018		9/10/2018		9/10/2018	
Sample Interval (bgs)										0 - 0.5 ft		0 - 0.333 ft		0.333 - 0.92 ft		0.5 - 1 ft		0.5 - 1 ft		0 - 0.5 ft		0 - 1 ft		1 - 1.92 ft		0 - 0.58 ft		0.58 - 3.2 ft		0 - 1 ft		1 - 3 ft		--		--	
Sample Description										--		--		--		--		--		--		--		--		--		--		--		--		Collected near QMCP-SD10 where sediments indicated signs of contamination (oily sheen)		Collected offshore of terrestrial location QMCP-SB45/GW45	
										Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds	Result	Exceeds
Inorganics- Metals (mg/kg)																																			
ARSENIC	7440-38-2	9.8	9.79	33	NA	NA	NA	NA	NA	22	[1,2]	4.1	--	2.5	--	1.5	--	1.1	--	1.6	--	3.9	--	4.3	--	16	[1,2]	2.9	--	1.4	--	0.6	--	NM	--	NM	--
CADMIUM	7440-43-9	1	0.99	4.98	NA	NA	NA	NA	NA	<0.2 U	--	<0.2 U	--	<0.2 U	--	<0.2 U	--	<0.2 U	--	<0.2 U	--	0.2	--	0.3	--	<0.2 U	--	0.4	--	<0.2 U	--	<0.2 U	--	NM	--	NM	--
CHROMIUM	7440-47-3	43.4	43.4	111	NA	NA	NA	NA	NA	27	--	11	--	13	--	5.0 J	--	4.6 J	--	5.6	--	14	--	17	--	110	[1,2]	10	--	5.0 J	--	4.8 J	--	NM	--	NM	--
COPPER	7440-50-8	31.6	31.6	149	NA	NA	NA	NA	NA	5,300	[1,2,3]	4,100	[1,2,3]	1,500	[1,2,3]	5.2	--	5.1	--	20	--	100	[1,2]	74	[1,2]	1,400	[1,2,3]	67	[1,2]	14	--	6.9	--	NM	--	NM	--
LEAD	7439-92-1	35.8	35.8	128	NA	NA	NA	NA	NA	33	--	7.6	--	3.6	--	1.1	--	1.2	--	3.3	--	2.2	--	1.9	--	17	--	1.2	--	1.4	--	<1.0 U	--	NM	--	NM	--
MANGANESE	7439-96-5	460	NA	NA	NA	NA	NA	NA	NA	200	--	100	--	78	--	29 J	--	32	--	97	--	120	--	120	--	230	--	130	--	32	--	31	--	NM	--	NM	--
MERCURY	7439-97-6	0.18	0.18	1.06	NA	NA	NA	NA	NA	0.1	--	<0.09 U	--	<0.07 U	--	<0.06 U	--	<0.06 U	--	<0.06 U	--	<0.3 U	--	<0.3 U	--	<0.1 U	--	<0.3 U	--	<0.06 U	--	<0.06 U	--	NM	--	NM	--
SILVER	7440-22-4	1	NA	NA	NA	NA	NA	NA	NA	3	[1]	0.4	--	0.2	--	<0.1 U	--	<0.1 U	--	<0.1 U	--	0.1	--	0.2	--	0.4	--	0.1	--	<0.1 U	--	<0.1 U	--	NM	--	NM	--
ZINC	7440-66-6	121	121	459	NA	NA	NA	NA	NA	72	--	20	--	12	--	7.2	--	7.7	--	11	--	24	--	34	--	180	[1,2]	21	--	6.3	--	5	--	NM	--	NM	--
Inorganics - Metals (ug/l)																																			
ARSENIC	7440-38-2	NA	NA	NA	10 (A)	10 (A)	10	150 ^	340 ^	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	1.8	--	--	--
CHROMIUM	7440-47-3	NA	NA	NA	100 (A,B,H)	100 (A,B,H)	40 (B,G,H,X)	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	5.3	--	--	--
COPPER	7440-50-8	NA	NA	NA	1,000 (B,E)	1,000 (B,E)	4.7 (B,G)	4.94 ^ *	6.94 ^ *	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	250	[GW3,SW1,SW2]	--	--
LEAD	7439-92-1	NA	NA	NA	4.0 (B,L)	4.0 (B,L)	14 (B,G,X)	1.23 ^ *	31.6 ^ *	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	2.0	[SW1]	--	--
MANGANESE	7439-96-5	NA	NA	NA	50 (B,E)	50 (B,E)	1,000 (B,G,X)	93	1,680	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	390	[GW1,GW2,SW1]	--	--
SILVER	7440-22-4	NA	NA	NA	34 (B)	98 (B)	0.2 (B,M)	0.06 ^ *	1.05 ^ *	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	0.3	[GW3,SW1]	--	--
Organics- PCBs (ug/kg)																																			
TOTAL PCBS	1336-36-3	59.8	59.8	676	NA	NA	NA	NA	NA	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	ND	--	NM	--	NM	--
Organics - PCBs (ug/l)																																			
TOTAL PCBS	1336-36-6	NA	NA	NA	0.5 (A,J,T)	0.5 (A,J,T)	0.2 (J,M,T)	0.014	0.014	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	ND	--	NM	--
Organics- SVOCs (ug/kg)																																			
BENZO(A)ANTHRACENE	56-55-3	108	108	1,050	NA	NA	NA	NA	NA	970	[1,2]	<360 U	--	<280 U	--	<240 U	--	<240 U	--	<260 U	--	<2800 U	--	<3200 U	--	<420 U	--	<1300 U	--	<240 U	--	<240 U	--	NM	--	NM	--
BENZO(A)PYRENE	50-32-8	150	150	1,450	NA	NA	NA	NA	NA	1,000	[1,2]	<710 U	--	<560 U	--	<480 U	--	<480 U	--	<510 U	--	<5600 U	--	<6500 U	--	<840 U	--	<2500 U	--	<470 U	--	<480 U	--	NM	--	NM	--
BENZO(B)FLUORANTHENE	205-99-2	190	NA	NA	NA	NA	NA	NA	NA	1,900	[1]	<710 U	--	<560 U	--	<480 U	--	<480 U	--	<510 U	--	<5600 U	--	<6500 U	--	<840 U	--	<2500 U	--	<470 U	--	<480 U	--	NM	--	NM	--
BENZO(K)FLUORANTHENE	207-08-9	240	NA	NA	NA	NA	NA	NA	NA	600 J	[1]	<710 U	--	<560 U	--	<480 U	--	<480 U	--	<510 U	--	<5600 U	--	<6500 U	--	<840 U	--	<2500 U	--	<470 U	--	<480 U	--	NM	--	NM	--
CHRYSENE	218-01-9	166	166	1,290	NA	NA	NA	NA	NA	1,300	[1,2,3]	<360 U	--	<280 U	--	<240 U	--	<240 U	--	<260 U	--	<2800 U	--	<3200 U	--	<420 U	--	<1300 U	--	<240 U	--	<240 U	--	NM	--	NM	--
FLUORANTHENE	206-44-0	423	423	2,230	NA	NA	NA	NA	NA	3,000	[1,2,3]	460	[1,2]	<280 U	--	<240 U	--	<240 U	--	<260 U	--	<2800 U	--	<3200 U	--	<420 U	--	<1300 U	--	<240 U	--	<240 U	--	NM	--	NM	--
NAPHTHALENE (SVOC)	91-20-3S	176	176	561	NA	NA	NA	NA	NA	330	[1,2]	<360 U	--	<280 U	--	<240 U	--	<240 U	--	<260 U	--	<2800 U	--	<3200 U	--	<420 U	--	<1300 U	--	<240 U	--	<240 U	--	NM	--	NM	--
PHENANTHRENE	85-01-8	204	204	1,170	NA	NA	NA	NA	NA	2,300	[1,2,3]	<360 U	--	<280 U	--	<240 U	--	<240 U	--	<260 U	--	<2800 U	--	<3200 U	--	<420 U	--	<1300 U	--	<240 U	--	<240 U	--	NM	--	NM	--
PYRENE	129-00-0	195	195	1,520	NA	NA	NA	NA	NA	2,400	[1,2,3]	440	[1,2]	<280 U	--	<240 U	--	<240 U	--	<260 U	--	<2800 U	--	<3200 U	--	<420 U	--	<1300 U	--	<240 U	--	<240 U	--	NM	--	NM	--
Organics - VOCs (ug/l)																																			
TOTAL VOCS	--	NA	NA	NA	NA	NA	NA	NA	NA	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	NM	--	ND	--	ND	--

Note: Analytical and Criteria Footnotes are included on the last page of the table.

TABLE 7-1
Sediment and Pore Water Analytical Results
Julio Properties - Dollar Bay
Houghton County, Michigan

Table Footnotes:

- EGLE Part 201 residential and non-residential generic cleanup criteria and screening levels criteria were originally promulgated December 21, 2002 within the Administrative Rules for Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. This table reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a. Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. Release Date: December 30, 2013. Updated December 21, 2020.
- EGLE Rule 57 values derived from the Michigan Department of Environment Great Lakes and Energy, Water Bureau, Water Resources Protection, filed with the Secretary of State on January 13, 2006. Part 4 Water Quality Standards, Rule 323.1057 Toxic Substances, as amended. Updated on August 1, 2019.
- ESVs are adapted from the Environmental Protection Agency Region IV Ecological Risk Assessment Supplemental Guidance, published November 1995, updated March 2018.
- TECs, and PECs are adapted from Appendix A and Appendix B of Michigan Department of Environment, Great Lakes, and Energy (EGLE) - Remediation and Redevelopment Division Operational Memorandum No. 4 Attachment 3, Interim Final August 2, 2006.
- Only detected analytes are listed - Gray rows indicate requested analyses.
- **Bold** values are concentrations detected above the laboratory reporting limit.
- **Bold/Shaded** cells indicate analyte concentration exceeded applicable criteria. Criteria exceeded is indicated by the footnote in [brackets] following the result value and defined below:

[1] - EPA Region IV Freshwater Sediment ESV
[2] - TECs (MacDonald et al. 2000)
[3] - PECs (MacDonald et al.2000)
[GW1] - EGLE Part 201 Residential Drinking Water Criteria
[GW2] - EGLE Part 201 Nonresidential Drinking Water Criteria
[GW3] - EGLE Part 201 Groundwater Surface Water Interface Criteria
[SW1] - EPA Region IV Surface Water Freshwater ESV - Chronic
[SW2] - EPA Region IV Surface Water Freshwater ESV - Acute
[SW3] - EGLE Rule 57 Water Quality Value - Human Noncancer Value - Drinking Water Source
[SW4] - EGLE Rule 57 Water Quality Value - Human Cancer Value - Drinking Water Source
[SW5] - EGLE Rule 57 Water Quality Value - Wildlife Value

Evaluation based on EGLE Criteria at time of Project completion.

-- = No Exceedances
NM = Not Measured
ND = Not Detected
ft = Feet
bgs = Below ground surface
ug/l = Micrograms per liter
mg/kg = Milligrams per kilogram.
ug/kg = Micrograms per kilogram
PCBs = Polychlorinated biphenyls
SVOC = Semi-volatile organic compound
VOC = Volatile organic compound
RBSL = Risk Based Screening Level
EPA = United States Environmental Protection Agency
ESV = Ecological Screening Value
PEC = Probable Effect Concentration
TEC = Threshold Effect Concentration

Critertia Footnotes:

ID = Insufficient data to develop criterion.

NA = A criterion or value is not available

NLV = Hazardous substance is not likely to volatilize under most conditions.

(A) = Criterion is the state of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.

(B) = Background, as defined in R 299.1(b), may be substituted if higher than the calculated cleanup criterion. Background levels may be less than criteria for some inorganic compounds.

(E) = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA). A notice of aesthetic impact may be employed as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion, but do not exceed the applicable health-based drinking water value provided in a table available on EGLE internet web site. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information)

(G) = Groundwater surface water interface (GSI) criterion depends on the pH or water hardness, or both, of the receiving surface water. The final chronic value (FCV) for the protection of aquatic life shall be calculated based on the pH or hardness of the receiving surface water. Where water hardness exceeds 400 mg $CaCO_3$/L, use 400 mg $CaCO_3$/L for the FCV calculation. The FCV formula provides values in units of ug/L or ppb. The generic GSI criterion is the lesser of the calculated FCV, the wildlife value (WV), and the surface water human non-drinking water value (HNDV). The soil GSI protection criteria for these hazardous substances are the greater of the 20 times the GSI criterion or the GSI soil-water partition values using the GSI criteria developed with the procedure described in this footnote. A spreadsheet that may be used to calculate GSI and GSI protection criteria for (G)-footnoted hazardous substances is available on the EGLE internet web site. A hardness value of 47.5 $CaCO_3$/L and pH of 7, derived from the Michigan Department of Environmental Quality Draft Site Inspection Report for Lake Linden Operations dated 3/29/13, was used in the footnote G calculation spreadsheet.

(H) = Valence-specific chromium data (Cr III and Cr VI) shall be compared to the corresponding valence-specific cleanup criteria. If both Cr III and Cr VI are present in groundwater, the total concentration of both cannot exceed the drinking water criterion of 100 ug/L. If analytical data are provided for total chromium only, they shall be compared to the cleanup criteria for Cr VI. Cr III soil cleanup criterion for protection of drinking water can only be used at sites where groundwater is prevented from being used as a public water supply, currently and in the future, through an approved land or resource use restriction.

(J) = Hazardous substance may be present in several isomer forms. Isomer-specific concentrations shall be added together for comparison to criteria.

(L) = Criteria for lead are derived using a biologically based model, as allowed for under Section 20120a(9) of the NREPA, and are not calculated using the algorithms and assumptions specified in pathway-specific rules. The generic residential drinking water criterion of 4 ug/L is linked to the generic residential soil direct contact criterion of 400 mg/kg. A higher concentration in the drinking water, up to the state action level of 15 ug/L, may be allowed as a site-specific remedy and still allow for drinking water use, under Section 20120a(2) and 20120b of the NREPA if soil concentrations are appropriately lower than 400 mg/kg. If a site-specific criterion is approved based on this subdivision, a notice shall be filed on the deed for all property where the groundwater concentrations will exceed 4 ug/L to provide notice of the potential for unacceptable risk if soil or groundwater concentrations increase. Acceptable combinations of site-specific soil and drinking water concentrations are presented in a table available on the EGLE internet web site (See R 299.49 Footnotes for generic cleanup criteria tables for additional

(M) = Calculated criterion is below the analytical target detection limit, therefore, the criterion defaults to the target detection limit.

(S) = Criterion defaults to the hazardous substance-specific water solubility limit.

(T) = Refer to the federal Toxic Substances Control Act (TSCA), 40 C.F.R. §761, Subpart D and 40 C.F.R. §761, Subpart G, to determine the applicability of TSCA cleanup standards. Subpart D and Subpart G of 40 C.F.R. §761 (July 1, 2001) are adopted by reference in these rules and are available for inspection at the EGLE, 525 West Allegan Street, Lansing, Michigan. Copies of the regulations may be purchased, at a cost as of the time of adoption of these rules of $55, from the Superintendent of Documents, Government Printing Office, Washington, DC 20401, or from the EGLE, RRD, 525 West Allegan Street, Lansing, Michigan 48933, at cost. Alternatives to compliance with the TSCA standards listed below are possible under 40 C.F.R. §761 Subpart D. New releases may be subject to the standards identified in 40 C.F.R. §761, Subpart G. Use Part 201 soil direct contact cleanup criteria in the published table if TSCA standards are not applicable.

(X) = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source. (See R 299.49 Footnotes for generic cleanup criteria tables for additional information.)

Rule 57 Footnotes: ID = insufficient data to derive value; NLS = no literature search has been conducted; @ = Bioaccumulative Chemical of Concern; * = the lowest Human Noncancer Value (HNV), Wildlife Value (WV), Human Cancer Value (HCV), or Final Chronic Value (FCV) given for this chemical will adequately protect the uses identified with an ID* or *

EPA Region IV ESV Footnotes: Red font indicates a bioaccumulative chemical; ^ - Screening value is for filtered (dissolved) metals. A conversion factor (CF) was used to convert the screening value for total metals in surface water to a screening value for dissolved metals in surface water. CMC (dissolved) = CMC (total) × CF. See Table 1c for screening values for total (unfiltered) metals; * - The freshwater screening value is hardness dependent. The screening value shown in Table 1a is for dissolved metals assuming a hardness of 50 mg/L as CaCO3. A correction for site-specific hardness was based on equations listed in Tables 1b and 1c. If hardness data are unavailable hardness may be estimated as: H = 2.497 × Ca (mg/L) + 4.118 × Mg (mg/L). A site-specific hardness value of 47.5 mg/kg CaCo3 was used to determine values based on equations is Table 1b and 1c for total (unfiltered) metals.

Laboratory Footnotes:

J = The result is an estimated quantity.

U = Analyte analyzed for but not detected above the reported sample reporting limit.

TABLE 7-1
Sediment and Pore Water Analytical Results
Julio Properties - Dollar Bay
Houghton County, Michigan

	Applicable Criteria Evaluated	Exceedance
EPA Region IV Sediment Ecological Screening Values (March 2018)	[1] Region IV Ecological Screening Value - Freshwater Sediment	YES
Sediment Quality Guidelines (August 2006)	[2] Threshold Effect Concentration	YES
	[3] Probable Effect Concentration	YES
EGLE Part 201 Generic Cleanup Criteria (December 2020)	[GW1] Residential Drinking Water Criteria	YES
	[GW2] Nonresidential Drinking Water Criteria	YES
	[GW3] Groundwater Surface Water Interface Criteria	YES
EPA Region IV Surface Water Ecological Screening Values (March 2018)	[SW1] Region IV Freshwater Ecological Screening Value - Chronic	YES
	[SW2] Region IV Freshwater Ecological Screening Value - Acute	YES
EGLE Rule 57 Water Quality Values (August 2019)	[SW3] Human Non-Cancer Value - Drinking Water Source	NO
	[SW4] Human Cancer Value - Drinking Water Source	NO
	[SW5] Wildlife Value	NO

8. CONCLUSIONS AND RECOMMENDATIONS

The analytical results and interpretation summarized in the detailed findings presented in Section 5 through Section 7 document potential human health and ecological risks that are present at Julio Properties – Dollar Bay. The following subsections provide a synopsis of these findings and a recommended path forward for mitigating the identified risks.

8.1 CONCLUSIONS

Environmental impacts at the Julio Properties – Dollar Bay are generally characterized by detections of organic and inorganic contaminants in soil, sediment, groundwater, and pore water; repercussions of mining era operations in the region. Although specific sources of these contaminants may not be fully understood, historical research related to the operations, closing, and eventual abandonment/scrapping of mining company operations provided substantive evidence for assessing specific operational areas and selecting target analytes anticipated to be present in environmental media throughout the area.

The findings of these investigative activities are summarized as follows with respect to the goals and objectives for the Project relative to the EGLE criteria at the time of Project completion:

- ACM is present in several areas of the Julio Marine parcel and include white TSI on piping, silver painted mastic, silver painted roofing, silver coated roofing, and brown insulation observed inside a drum. Four of the ACMs were friable. These materials are present in several areas of Julio Marine and are subject to migration via wind and water erosion. Asbestos concentrations in five bulk material samples contained asbestos fibers at concentrations greater than 1 %. The damaged and friable nature of these materials poses a potential risk to human health as it relates to the inhalation pathway. Although soil samples were not collected for analysis of asbestos fibers, the exposed nature of these materials makes them subject to further degradation that could potentially impact surface soils at Julio Marine. ACM was not identified at the Julio Company/Former Amoco Bulk Fuel Terminal parcel.

- PCBs were detected at four locations at Julio Marine and exceeded Residential and Nonresidential DCC in a surface soil sample at one location (QMCP-SB45). PCBs were not detected in soil at Julio Company/Former Amoco Bulk Fuel Terminal. No groundwater, pore water, or sediment samples analyzed for PCBs exceeded criteria or screening values in the study area.

- The shallow and subsurface soil and groundwater analytical results for the Julio Properties – Dollar Bay SI contained a number of COCs at concentrations at or above applicable regulatory criteria. Results by subarea include:

    - Julio Company/Former Amoco Bulk fuel Terminal
        - Soil – No exceedances.
        - Groundwater – Exceeded Residential and Nonresidential DWC and GSIC for inorganics, and GSIC for VOCs and SVOCs.

    - Julio Marine
        - Soil – Exceeded Residential and Nonresidential DWPC, GSIPC, Residential and Nonresidential VSIC, and/or Residential and Nonresidential DCC for VOCs, SVOCs, inorganic compounds, and/or PCBs at multiple sample locations.
        - Groundwater – Exceeded Residential and Nonresidential DWC and GSIC (for inorganics) and GSIC for SVOCs. LNAPL was measured and/or observed in multiple monitoring locations.

- At Julio Marine, QMCP-MW10 contained between 0.6 ft and 2 ft of LNAPL over the course of monitoring, QMCP-MW9 contained 0.21 ft of LNAPL in 2019, and LNAPL was also observed in the water sample collected at QMCP-SB48. The source and limits of LNAPL have not been identified. LNAPL was measured in a monitoring wells within 50 ft of the Portage Canal.

- During the targeted inspection activities completed at Julio Marine, numerous tanks and drums were identified. Water samples were collected and analyzed from an observed vat. The analysis results detected inorganics, VOCs, and SVOCs but the concentrations did not exceed regulatory criteria. PCBs were not detected in the vat water.

- Sediment – Copper and SVOCs were detected at or in excess of applicable screening values offshore from Julio Marine. Copper concentrations exceeded the ESV, TEC, and PEC, while SVOCs exceeded the ESVs and TECs. Sediment results may be indicative of historic offshore waste deposits and/or venting groundwater impacts.

- Pore Water – Inorganic COCs were detected at or in excess of applicable screening values offshore from Julio Marine. Concentrations of copper, lead, manganese, and silver exceeded Residential and Nonresidential DWC, GSIC, chronic ESVs and/.or acute ESVs.

The analytical results summarized above provide sufficient analytical data and lines of evidence to conclude that the Julio Properties – Dollar Bay parcels are each a Facility as defined in Section 20101(1)(s) of the NREPA. The following table provides a summary of the affected environmental media, applicable regulatory criteria, and potential receptors within the Julio Properties – Dollar Bay.

Julio Properties – Dollar Bay – Media, Criteria, Potential Receptor Summary															
Media	Soil			Groundwater			Air		Sediment	Pore Water		Building Materials, Asbestos and Abandoned Containers			
Criteria / Potential Receptor	Drinking Water Protection	Groundwater Surface Water Interface	Direct Contact	Drinking Water Protection	Groundwater Surface Water Interface	Flammability and Explosivity	Volatilization	Particulate Inhalation	Ecological	Ecological	Human Health	Particulate Inhalation	Flammability and Explosivity	Environmental	Human Health
Residential Human	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓			✓
Nonresidential Human	✓	✓	✓	✓	✓		✓		✓	✓	✓	✓			✓
Water Column Organism															
Benthic Organism															
COCs exceeding applicable regulatory criteria in one or more sample	ASBESTOS, ARSENIC, COPPER, LEAD, MANGANESE, SILVER TOTAL PCBS, 1,2,4-TRIMETHYLBENZENE, 1,3,5,-TRIMETHYLBENZENE, 2-METHYLNAPHTHALENE (VOC), BENZENE, ETHYLBENZENE, NAPHTHALENE (VOC), N-BUTYLBENZENE, N-PROPYLBENZENE, SEC-BUTYLBENZENE, XYLENE-TOTAL, 2-METHYLNAPHTHALENE (SVOC), ACENAPHTHYLENE, BENZO(A)ANTHRACENE, BENZO(A)PYRENE, BENZO(B)FLUORANTHENE, BENZO(K)FLUORANTHENE, CHRYSENE, DIBENZO(A,H)ANTHRACENE, FLUORATHENE, FLUORENE, INDENO(1,2,3-CD)PYRENE, NAPHTHALENE (SVOC), PHENANTHRENE, PYRENE													

Although relevant, EGLE drinking water and groundwater/surface water interface pathway criteria exceedances for metals are excluded from the soil and groundwater evaluation in the detailed findings. The rationale for this exclusion is twofold:

- The Project investigation and anticipated response actions are being undertaken pursuant to Part 201 of Michigan's NREPA, being PA 451 of 1994, as amended. The concentrations of metals in excess of EGLE drinking water and surface water pathway criteria are ubiquitous in the study area and are predominantly the result of the presence of stamp sands. Stamp sands are not defined as a hazardous substance nor are they subject to regulation under Part 201 unless the property otherwise contains hazardous substances in excess of concentrations that satisfy the cleanup criteria for unrestricted residential use; and,

- The study area is part of OU 2 for which the EPA ROD remedy called for No Action. The EPA's ROD OU 2 includes groundwater, surface water, submerged tailings and sediments in Torch Lake, Portage Lake, the Portage Canal, and other area water bodies. Note that EPA's No Action determination relies on the following to mitigate the effects of stamp sand to the extent practicable:

  - The reduction of stamp sand loading to surface water bodies expected as a result of the remedial action taken at OU 1 and OU 3.
  - Ongoing natural sedimentation and detoxification.
  - Institutional programs and practices controlling potential future exposure to site-affected drinking water that were intended to be administered at the county and state level.
  - The long-term monitoring and the five-year review process monitoring requirements of the remedy selected for OU 1 and OU 3 under the 1992 ROD.

Note that metals criteria for other relevant pathways, and organic and cyanide contaminants for all pathways were included in the evaluation.

In addition to the evaluation of analytical results collected from the study area, the following provides a summary of findings derived from the assessment of the Julio Properties – Dollar Bay with respect to the goals and objectives for the Project:

- Terrestrial sources of contamination are present in the form of inorganic COCs, SVOCs, VOCs, and asbestos in the study area. LNAPL was identified within 50 feet of the Portage Canal;
- In-lake sources of contamination in the form of inorganic COCs and SVOCs in the study area sediments and inorganic COCs in some areas of pore water. The detection of SVOCs in sediment may be indicative of a terrestrial source area;
- No in-lake or terrestrial uncharacterized waste deposits were identified in the study area;
- PCBs exceeded Residential and Nonresidential DCC in a surface soil sample at Julio Marine. No groundwater, pore water, or sediment samples analyzed for PCBs exceeded criteria or screening values in the study area; and,
- ACM was identified at numerous locations at Julio Marine. Four of the five ACM samples were friable and exposed to the elements.

8.2 RECOMMENDATIONS

The conclusions outlined in the preceding subsection establish that the two parcels within the Julio Properties – Dollar Bay are Facilities. The following is an outline of options for managing potential exposure risks at the Julio Properties – Dollar Bay and the Portage Canal.

Section 20107a of Part 201 of NREPA describes the duties of owners or operators of a Facility, regardless of their liability, including: prevent unacceptable exposures, prevent exacerbation, and take reasonable precautions against the foreseeable actions of third parties. Some exceptions may apply; in any case, owners and operators of contaminated properties should become familiar with Section 20107a and the associated Rules.

Future property users could conduct a risk assessment based on current and anticipated future land-use to help identify remedial goals for properties where potential risks may be present. Assessment based on current and future land-use contributes to the beneficial and safe re-use and potential redevelopment of any given property by clarifying applicability of regulatory statutes, as traditional property zoning (residential versus nonresidential) is generally undefined in the study area.

Once property-specific exposure risks have been evaluated, remedial objectives can be established with appropriate land use restrictions that minimize or eliminate potential exposure risks. These land-use restrictions, or administrative controls, could be employed to ensure that exposures are reliably restricted by a restrictive covenant, institutional control, or other mechanism allowed for under Part 201.

By copy of this SI Report, the Project findings were provided to RRD SFS which is responsible for monitoring EPA's remedy for the Torch Lake Superfund Site. RRD SFS should evaluate whether any remedy modifications are necessary

in the Portage Canal and Dollar Bay or terrestrial areas previously addressed by EPA in light of the additional information provided by the Project.

EGLE should continue to provide new study data to governmental stakeholders responsible for implementation and monitoring EPA's remedy for the terrestrial and in-lake portion of the Torch Lake Superfund Site so they can determine if any remedy modifications are necessary in light of the additional information provided by the Project. Responsible stakeholders should verify that administrative controls for areas that have been previously remediated by the EPA have been employed to ensure that EPA's selected remedy is performing as designed and those institutional controls, where required, have been recorded and are being enforced.

Additionally, EGLE should continue to provide new study data to property owners and governmental stakeholders responsible for assessing potential public health impacts and making recommendations to the public, property owners, and other state agencies.

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FIGURES

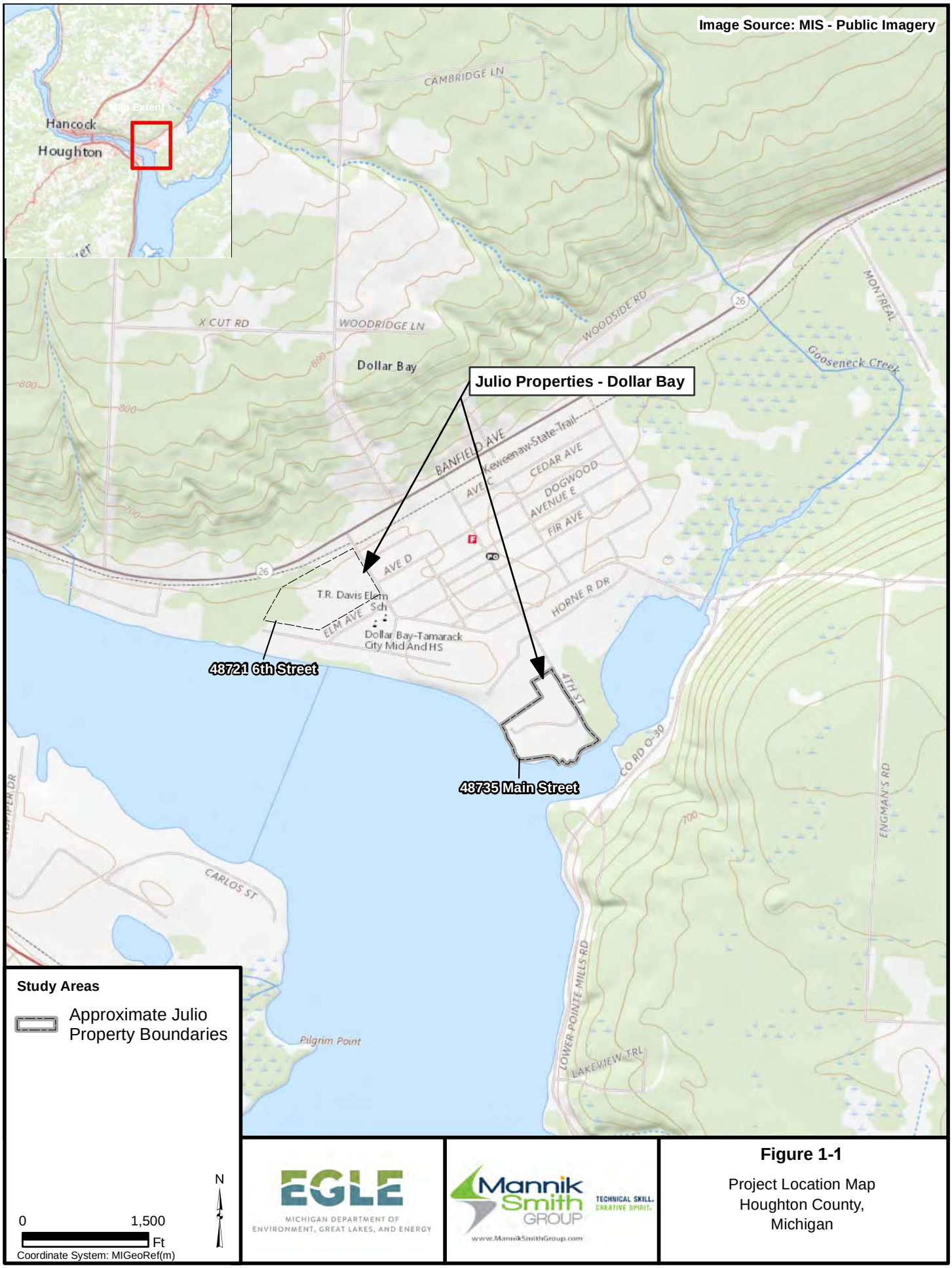

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Figure 1-1

Project Location Map
Houghton County, Michigan

Image Source: MIS - Public Imagery

AREA	Year	Historical Operations
Julio Company/ Former Amoco Bulk Fuel Terminal		Bulk Oil Storage Other historic land use and/or operations unknown.
Julio Marine Dollar Bay	1907 1917, 1928 1949	Tamarack & Osceola Copper Manufacturing Co. John A Roebling's Sons Copper Manufacturing Foley Copper Products Co. Copper Wire Mill

DOLLAR BAY

Julio Company/Former Amoco Bulk Fuel Terminal
48721 6th Street

Approximate Location of Sampled Vats

Julio Marine Dollar Bay
48735 Main Street

Approximate 1865 Shoreline
MDNR Property
EPA Cap Boundary

Approximate Parcel Boundaries
Features Identified on Sanborn Maps

Notes:
- *MDNR = Michigan Department of Natural Resources*
Historic land use and/or operations refer to noted years on available Sanborn Maps.

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Figure 1-2
Area Features Map
Julio Properties - Dollar Bay
Houghton County, Michigan

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TABLES

Table 2-1
Summary of Historic Operations
Julio Properties - Dollar Bay
Houghton County, Michigan

Area	Year	Historical Operations	Potential Contaminant Sources
Julio Company/Former Amoco Bulk Fuel Terminal		Bulk Oil Storage Other historic land use and/or operations unknown.	-Potential petroleum contamination from oil storage.
Julio Marine	1907 1917, 1928 1949	Tamarack & Osceola Copper Manufacturing Co. John A Roebling's Sons Copper Manufacturing Foley Copper Products Co. Copper Wire Mill	- Observations of suspect ACM insulation and roofing material, abandoned containers, compressed gas cylinders, industrial ruins, ASTs, potentially PCB containing transformer -Potential for the use of oils and lubricants for maintenance of equipment. -A portion of the property was capped as part of the EPA's Torch Lake Superfund Site Dollar Bay remedial action.

Notes:
AST = Above ground storage tank
PCB = Polychlorinated Biphenyls
EPA = United States Environmental Protection Agency
ACM = Asbestos containing material

Table 3-1
Sampling and Analysis Summary
Julio Properties - Dollar Bay
Houghton County, Michigan

Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses								Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Company/Former Amoco Bulk Fuel Terminal																																		
QMCP-SS56	9/28/2018	QMCP-SS56-0-3"	1810006	-88.5116759	47.1190723	Evidence of tank release.	Stained soil near fuel tank	--		Hand Tools	X							X	X																Lawrence Julio
QMCP-SB56	9/9/2018	QMCP-SB56 0-6"	1809099	-88.5121188	47.1183267	Data Gap - Area L	SAND, Fine to medium, brown, saturated at 4.5 feet	--	Metal analysis limited to lead only. PCB and cyanide analysis omitted.	Soil Core		X					X	X		X																Lawrence Julio
	9/9/2018	QMCP-SB56 6"-4'	1809099			Data Gap - Area L	SAND, Fine to medium, brown, saturated at 4.5 feet	--	Metal analysis limited to Lead only. PCB and cyanide analysis and duplicate sample omitted.	Soil Core		X					X	X		X																Lawrence Julio
QMCP-SB57	9/9/2018	QMCP-SB57 0-4'	1809099	-88.5088152	47.1190733	Data Gap - Area L	SAND, Fine to medium, brown, dry	--	Refusal at 4 feet in 3 locations. Metal analysis limited to lead only. PCB and cyanide analysis omitted.	Soil Core		X					X	X		X																Lawrence Julio
		QMCP-SB57 a_2-b_2"				Data Gap - Area L		--	Sample not collected.	Soil Core		X																								Lawrence Julio
QMCP-SB58	9/9/2018	QMCP-SB58 0-6"	1809099	-88.5102436	47.1184590	Data Gap - Area L	SAND, Fine to medium, brown, dry	--	Metal analysis limited to lead only. PCB and cyanide analysis omitted.	Soil Core		X					X	X		X																Lawrence Julio
	9/9/2018	QMCP-SB58 6"-5'	1809099			Data Gap - Area L	SAND, Fine to medium, brown, dry	--	Refusal at 5 feet in 3 locations. Metal analysis limited to Lead only. PCB and cyanide analysis omitted.	Soil Core		X					X	X		X																Lawrence Julio
QMCP-SB59	9/9/2018	QMCP-SB59 0-6"	1809099	-88.5109629	47.1191560	Data Gap - Area L	SAND, Fine to medium, brown, saturated at 4.5 feet	--	Metal analysis limited to lead only. Cyanide and PCB analysis omitted.	Soil Core		X					X	X		X																Lawrence Julio
	9/9/2018	QMCP-SB59 6"-4'	1809099			Data Gap - Area L	SAND, Fine to medium, brown, saturated at 4.5 feet	--	Metal analysis limited to lead only. PCB and cyanide analysis and duplicate sample omitted.	Soil Core		X					X	X		X																Lawrence Julio
QMCP-SB60	9/9/2018	QMCP-SB60 0-6"	1809099	-88.5095513	47.1196517	Data Gap - Area L	SAND and GRAVEL	--	Metal analysis limited to lead only. Cyanide and PCB analysis omitted.	Soil Core		X					X	X		X																Lawrence Julio
	9/9/2018	QMCP-SB60 6"-6'	1809099			Data Gap - Area L	SAND, Fine to medium, brown, saturated at 7 feet	--	Metal analysis limited to lead only. Cyanide and PCB analysis and duplicate sample omitted.	Soil Core		X					X	X		X																Lawrence Julio
QMCP-SB70		QMCP-SB70 a_1-b_1"		-88.5108065	47.1173148	Data Gap - Downgradient from Area L		--	Location not sampled.	Soil Core		X																								Houghton County ROW
		QMCP-SB70 a_2-b_2"				Data Gap - Downgradient from Area L		--	Location not sampled.	Soil Core		X																								Houghton County ROW
QMCP-SB71		QMCP-SB71 a_1-b_1"		-88.5100713	47.1172716	Data Gap - Downgradient from Area L		--	Location not sampled.	Soil Core		X																								Houghton County ROW
		QMCP-SB71 a_2-b_2"				Data Gap - Downgradient from Area L		--	Location not sampled.	Soil Core		X																								Houghton County ROW
QMCP-SB72		QMCP-SB72 a_1-b_1"		-88.5095796	47.1176712	Data Gap - Downgradient from Area L		--	Geoprobe rods broke at 16 feet. Sample not collected.	Soil Core		X																								Houghton County ROW
		QMCP-SB72 a_2-b_2"				Data Gap - Downgradient from Area L		--	Sample not collected.	Soil Core		X																								Houghton County ROW

Table 3-1
Sampling and Analysis Summary
Julio Properties - Dollar Bay
Houghton County, Michigan

Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses							Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Company/Former Amoco Bulk Fuel Terminal (Continued)																																		
QMCP-SB73		QMCP-SB73 a_1-b_1"		-88.5086971	47.1180535	Data Gap - Downgradient from Area L		--	Sample not collected. Groundwater sample only.	Soil Core		X																						Houghton County ROW
		QMCP-SB73 a_2-b_2'				Data Gap - Downgradient from Area L		--	Sample not collected.	Soil Core		X																						Houghton County ROW
QMCP-GW56		QMCP-GW56 a_1-b_1"		-88.5121188	47.1183267	Data Gap - Area L		--	No groundwater sample collected.	Low-Flow Sampling			X																					Lawrence Julio
QMCP-GW57		QMCP-GW57 a_1-b_1"		-88.5088152	47.1190733	Data Gap - Area L		--	Refusal at 4 feet at 3 locations. No groundwater sample collected.	Low-Flow Sampling			X																					Lawrence Julio
QMCP-GW58		QMCP-GW58 a_1-b_1"		-88.5102436	47.1184590	Data Gap - Area L		--	Refusal at 5 feet at 3 locations. No groundwater sample collected.	Low-Flow Sampling			X																					Lawrence Julio
QMCP-GW59	9/9/2018	QMCP-GW59 5-9	1809102	-88.5109629	47.1191560	Data Gap - Area L		--	Metal analysis limited to lead only. PCB analysis omitted.	Low-Flow Sampling			X				X	X	X	X					15.5	0.036	54.3	6.30	NM						Lawrence Julio
QMCP-GW60	9/9/2018	QMCP-GW60 7-11	1809102	-88.5095513	47.1196517	Data Gap - Area L		--	Metal analysis limited to lead only. PCB analysis omitted. Duplicate omitted.	Low-Flow Sampling			X				X	X		X					16.3	0.600	3.7	6.39	NM						Lawrence Julio
QMCP-GW70		QMCP-GW70 a_1-b_1"		-88.5108065	47.1173148	Data Gap - Downgradient from Area L		--	Location not sampled.	Low-Flow Sampling			X																					Houghton County ROW
QMCP-GW71		QMCP-GW71 a_1-b_1"		-88.5100713	47.1172716	Data Gap - Downgradient from Area L		--	Location not sampled.	Low-Flow Sampling			X																					Houghton County ROW
QMCP-GW72	9/11/2018	QMCP-GW72 a_1-b_1"		-88.5095796	47.1176712	Data Gap - Downgradient from Area L		--	Geoprobe rods broke at 16 feet. Attempted to collect a groundwater sample. Sample not collected.	Low-Flow Sampling			X												NM	NM	NM	NM	NM						Houghton County ROW
QMCP-GW73	9/11/2018	QMCP-GW73 22-24	1809119	-88.5086971	47.1180535	Data Gap - Downgradient from Area L		--		Low-Flow Sampling			X				X	X	X	X					15.0	0.219	51.1	6.75	NM						Houghton County ROW
QMCP-ASBBLK40	9/28/2018	QMCP-ASBBLK40A-092818	240-102329-1	-88.5091887	47.1201519	Suspect ACM	Black tar paper with fibers	friable		Hand Tools						X					X												Lawrence Julio
	9/28/2018	QMCP-ASBBLK40B-092818	240-102329-1			Suspect ACM	Black tar paper with fibers	friable		Hand Tools						X					X												Lawrence Julio
QMCP-ASBBLK41	9/28/2018	QMCP-ASBBLK41A-092818	240-102329-1	-88.5115938	47.1190606	Suspect ACM	Tank insulation	friable		Hand Tools						X					X												Lawrence Julio
	9/28/2018	QMCP-ASBBLK41B-092818	240-102329-1			Suspect ACM	Tank insulation	friable		Hand Tools						X					X												Lawrence Julio
Julio Marine																																		
QMCP-SS27	9/6/2018	QMCP-SS-27-0-6"	1808080	-88.5005659	47.1146144	Data Gap - Area N	Brown to grey medium SAND with some gravel and slag	--		Hand Tools	X							X		X	X												Lawrence Julio
QMCP-SS28	9/6/2018	QMCP-SS-28-0-6"	1808080	-88.5010066	47.1141822	Data Gap - Area N	Brown medium SAND with some gravel	--		Hand Tools	X							X		X	X												Lawrence Julio
QMCP-SS29	9/6/2018	QMCP-SS-29-0-6"	1808080, 240-100981-1	-88.4994808	47.1140892	Data Gap - Area N	Black fine stamp SAND, oily residue 3" down, odor	--		Hand Tools	X							X		X	X	X											Lawrence Julio
QMCP-SS30	9/6/2018	QMCP-SS-30-0-6"	1808080, 240-100981-1	-88.4985553	47.1146037	Data Gap - Area N	Black fine SAND with some gravel	--	Duplicate omitted.	Hand Tools	X							X		X	X	X											Lawrence Julio

Table 3-1
Sampling and Analysis Summary
Julio Properties - Dollar Bay
Houghton County, Michigan

Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses							Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
QMCP-SS31	9/6/2018	QMCP-SS-31-0-6"	1809081	-88.4984946	47.1152081	Data Gap - Area N	Brown fine to coarse SAND with gravel, 5-6" black fine SAND	--	Duplicate collected: QMCP-SS-31-0-6" DUP4	Hand Tools	X							X		X	X										X		X	X	Lawrence Julio
QMCP-SS57	10/1/2018	QMCP-SS57-0-3"	1810006	-88.4978044	47.1144618	Apparent burn residue.	Black soot	--		Hand Tools	X							X	X	X	X													Lawrence Julio
QMCP-SS58	10/1/2018	QMCP-SS58-0-3"	1810006	-88.4975211	47.1145457	Apparent burn pile.	Burn pile residue	--		Hand Tools	X							X	X	X	X													Lawrence Julio
QMCP-SS59	10/1/2018	QMCP-SS59-0-3"	1810006	-88.4974173	47.1144855	Apparent burn pile.	Burn pile residue	--		Hand Tools	X							X	X	X	X													Lawrence Julio
QMCP-SS60	10/1/2018	QMCP-SS60-0-3"	1810006	-88.4974631	47.1144100	Apparent burn pile.	Burn pile residue	--		Hand Tools	X							X	X	X	X													Lawrence Julio
QMCP-SS221		QMCP-SS221-0-3"		-88.4994808	47.1140892	Resample QMCP-SS29 for PCB analysis		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS222	8/17/2019	QMCP-SS222-0-3"	1908279	-88.4994775	47.1141388	North of QMCP-SS29-0-6in, arsenic, copper, and PNA exceedances		--	PCBs and lead analysis added	Hand Tools	X							X	X					X	X										Lawrence Julio
QMCP-SS223		QMCP-SS223-0-3"		-88.4994795	47.1140617	South of QMCP-SS29-0-6in, arsenic, copper, and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS224		QMCP-SS224-0-3"		-88.4994406	47.1140900	East of QMCP-SS29-0-6in, arsenic, copper, and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS225		QMCP-SS225-0-3"		-88.4995209	47.1140883	West of QMCP-SS29-0-6in, arsenic, copper, and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS226		QMCP-SS226-0-3"		-88.4985553	47.1146037	Resample QMCP-SS30 for PCB analysis		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS227	8/17/2019	QMCP-SS227-0-3"	1908280	-88.4985440	47.1143906	North of QMCP-SS30-0-6in, arsenic and PNA exceedances		--	PCBs and lead analysis added	Hand Tools	X								X	X				X	X										Lawrence Julio
QMCP-SS228	8/17/2019	QMCP-SS228-0-3"	1908280	-88.4983430	47.1145432	South of QMCP-SS30-0-6in, arsenic and PNA exceedances	fuel oil spill, fresh prod.	--	Arsenic analysis omitted, VOCs analysis added, "fuel oil spill, fresh prod."	Hand Tools	X						X	X																Lawrence Julio
QMCP-SS229		QMCP-SS229-0-3"		-88.4985152	47.1146045	East of QMCP-SS30-0-6in, arsenic and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS230		QMCP-SS230-0-3"		-88.4985955	47.1146028	West of QMCP-SS30-0-6in, arsenic and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS231		QMCP-SS231-0-3"		-88.5012183	47.1142389	North of QMCP-SB44 0-6in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS232		QMCP-SS232-0-3"		-88.5012157	47.1141841	South of QMCP-SB44 0-6in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS233		QMCP-SS233-0-3"		-88.5011769	47.1142124	East of QMCP-SB44 0-6in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS234		QMCP-SS234-0-3"		-88.5012572	47.1142106	West of QMCP-SB44 0-6in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS235	8/17/2019	QMCP-SS235-0-3"	1908279	-88.5006265	47.1137650	North of QMCP-SB45 0-6in, PCB detection, arsenic, VOC, and PNA exceedances		--	VOCs analysis omitted, lead analysis added	Hand Tools	X							X	X					X	X										Lawrence Julio
QMCP-SS236	8/17/2019	QMCP-SS236-0-3"	1908280	-88.5005115	47.1145443	South of QMCP-SB45 0-6in, PCB detection, arsenic, VOC, and PNA exceedances		--	VOCs analysis omitted, lead analysis added	Hand Tools	X							X	X					X	X										Lawrence Julio
QMCP-SS237		QMCP-SS237-0-3"		-88.5006634	47.1137357	East of QMCP-SB45 0-6in, PCB detection, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio
QMCP-SS238		QMCP-SS238-0-3"		-88.5007437	47.1137340	West of QMCP-SB45 0-6in, PCB detection, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Hand Tools	X																								Lawrence Julio

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Sampling and Analysis Summary
Julio Properties - Dollar Bay
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Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses							Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
QMCP-SS239	8/17/2019	QMCP-SS239-0-3"	1908279	-88.4998113	47.1140110	North of QMCP-SB47 0-6in, arsenic and PNA exceedances		--	PCBs and lead analysis added	Hand Tools	X							X	X				X	X										Lawrence Julio
QMCP-SS240	8/17/2019	QMCP-SS240-0-3"	1908279	-88.4998962	47.1139363	South of QMCP-SB47 0-6in, arsenic and PNA exceedances		--	Lead analysis added	Hand Tools	X							X	X				X	X										Lawrence Julio
QMCP-SS241		QMCP-SS241-0-3"		-88.4997283	47.1137942	East of QMCP-SB47 0-6in, arsenic and PNA exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS242		QMCP-SS242-0-3"		-88.4998086	47.1137924	West of QMCP-SB47 0-6in, arsenic and PNA exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS243	8/17/2019	QMCP-SS243-0-3"	1908279	-88.4993867	47.1145237	North of QMCP-SB48 0-6in, arsenic and lead exceedances		--	SVOCs and PCBs analysis added.	Hand Tools	X							X	X				X	X										Lawrence Julio
QMCP-SS244		QMCP-SS244-0-3"		-88.4998717	47.1145715	South of QMCP-SB48 0-6in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS245		QMCP-SS245-0-3"		-88.4998328	47.1145998	East of QMCP-SB48 0-6in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS246		QMCP-SS246-0-3"		-88.4999131	47.1145980	West of QMCP-SB48 0-6in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS247		QMCP-SS247-0-3"		-88.5005659	47.1146144	Resample QMCP-SS27 for PCB analysis		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS248		QMCP-SS248-0-3"		-88.5010066	47.1141822	Resample QMCP-SS28 for PCB analysis		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS249		QMCP-SS249-0-3"		-88.4984946	47.1152081	Resample QMCP-SS31 for PCB analysis		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS250		QMCP-SS250-0-3"		-88.4978057	47.1144892	North of QMCP-SS57-0-3in, arsenic, lead, and PNA exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS251		QMCP-SS251-0-3"		-88.4978031	47.1144344	South of QMCP-SS57-0-3in, arsenic, lead, and PNA exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS252		QMCP-SS252-0-3"		-88.4977642	47.1144626	East of QMCP-SS57-0-3in, arsenic, lead, and PNA exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS253		QMCP-SS253-0-3"		-88.4978445	47.1144609	West of QMCP-SS57-0-3in, arsenic, lead, and PNA exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS254		QMCP-SS254-0-3"		-88.4975224	47.1145731	North of QMCP-SS58-0-3in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS255		QMCP-SS255-0-3"		-88.4975198	47.1145183	South of QMCP-SS58-0-3in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS256		QMCP-SS256-0-3"		-88.4974810	47.1145465	East of QMCP-SS58-0-3in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS257		QMCP-SS257-0-3"		-88.4975613	47.1145448	West of QMCP-SS58-0-3in, arsenic exceedance		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS258		QMCP-SS258-0-3"		-88.4974185	47.1145129	North of QMCP-SS59-0-3in, arsenic, lead, and zinc exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS259		QMCP-SS259-0-3"		-88.4974160	47.1144580	South of QMCP-SS59-0-3in, arsenic, lead, and zinc exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS260		QMCP-SS260-0-3"		-88.4973771	47.1144863	East of QMCP-SS59-0-3in, arsenic, lead, and zinc exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS261		QMCP-SS261-0-3"		-88.4974574	47.1144846	West of QMCP-SS59-0-3in, arsenic, lead, and zinc exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS262		QMCP-SS262-0-3"		-88.4974644	47.1144374	North of QMCP-SS60-0-3in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio

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Houghton County, Michigan

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											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
QMCP-SS263		QMCP-SS263-0-3"		-88.4974618	47.1143826	South of QMCP-SS60-0-3in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS264		QMCP-SS264-0-3"		-88.4974229	47.1144109	East of QMCP-SS60-0-3in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SS265		QMCP-SS265-0-3"		-88.4975032	47.1144091	West of QMCP-SS60-0-3in, arsenic and lead exceedances		--	Location not sampled.	Hand Tools	X																							Lawrence Julio
QMCP-SB43		QMCP-SB43 a_1-b_1"		-88.4989900	47.1160167	Data Gap - Area N, within historic mining operation location		--	Location not sampled.	Soil Core		X																						Lawrence Julio
		QMCP-SB43 a_2-b_2"				Data Gap - Area N, within historic mining operation location		--	Location not sampled.	Soil Core		X																						Lawrence Julio
QMCP-SB44	9/10/2018	QMCP-SB44-0-6"	1809100	-88.5012170	47.1142115	Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
	9/10/2018	QMCP-SB44-6"-4'	1809100			Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
QMCP-SB45	9/10/2018	QMCP-SB45-0-6"	1809100	-88.5007035	47.1137349	Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
	9/10/2018	QMCP-SB45-6"-5'	1809100			Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted. Duplicate omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
QMCP-SB46	9/10/2018	QMCP-SB46-0-4'	1809100	-88.5003187	47.1141015	Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
		QMCP-SB46 a_2-b_2"				Data Gap - Area N, within historic mining operation location		--	Location not sampled.	Soil Core		X																						Lawrence Julio
QMCP-SB47	9/10/2018	QMCP-SB47 0-6"	1809100	-88.4997684	47.1137933	Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 5 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
	9/10/2018	QMCP-SB47 6"-5'	1809100			Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 5 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
QMCP-SB48	9/10/2018	QMCP-SB48 0-6"	1809100	-88.4998730	47.1145989	Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
	9/10/2018	QMCP-SB48 6"-5'	1809100			Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 4 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
QMCP-SB49	9/10/2018	QMCP-SB49 0-6"	1809100	-88.4986758	47.1143048	Data Gap - Area N, proximal to historic oil house	SAND and GRAVEL with debris	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
	9/10/2018	QMCP-SB49 6"-4'	1809100			Data Gap - Area N, proximal to historic oil house	SAND and GRAVEL with debris	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
QMCP-SB50	9/10/2018	QMCP-SB50 0-2'	1809100	-88.4981735	47.1138279	Data Gap - Area N, within historic mining operation location	SAND, Medium to coarse, brown, saturated at 2 feet	--	Cyanide analysis omitted.	Soil Core		X					X	X	X	X														Lawrence Julio
		QMCP-SB50 a_2-b_2"				Data Gap - Area N, within historic mining operation location		--	Location not sampled.	Soil Core		X																						Lawrence Julio
QMCP-SB94		QMCP-SB94 a_1-b_1"		-88.5007595	47.1138077	North of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																						Lawrence Julio
		QMCP-SB94 a_2-b_2"				North of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																						Lawrence Julio
QMCP-SB95		QMCP-SB95 a_1-b_1"		-88.5007660	47.1138475	South of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																						Lawrence Julio
		QMCP-SB95 a_2-b_2"				South of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																						Lawrence Julio

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Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses								Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
QMCP-SB96		QMCP-SB96 a_1-b_1"		-88.5007164	47.1138544	East of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB96 a_2-b_2"				East of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB97		QMCP-SB97 a_1-b_1"		-88.5006853	47.1138437	West of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB97 a_2-b_2"				West of QMCP-SB45 6in-5ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB98		QMCP-SB98 a_1-b_1"		-88.4998109	47.1138606	North of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB98 a_2-b_2"				North of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB99		QMCP-SB99 a_1-b_1"		-88.4998303	47.1138963	South of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB99 a_2-b_2"				South of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB100		QMCP-SB100 a_1-b_1"		-88.4998494	47.1138632	East of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB100 a_2-b_2"				East of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB101		QMCP-SB101 a_1-b_1"		-88.4997749	47.1138860	West of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB101 a_2-b_2"				West of QMCP-SB47 6in-5ft, arsenic, VOC, and PNA exceedances		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB102		QMCP-SB102 a_1-b_1"		-88.4998742	47.1146263	North of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB102 a_2-b_2"				North of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB103		QMCP-SB103 a_1-b_1"		-88.4998717	47.1145715	South of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB103 a_2-b_2"				South of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB104		QMCP-SB104 a_1-b_1"		-88.4998328	47.1145998	East of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB104 a_2-b_2"				East of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB105		QMCP-SB105 a_1-b_1"		-88.4999131	47.1145980	West of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB105 a_2-b_2"				West of QMCP-SB48 6in-5ft, VOC exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB106		QMCP-SB110 a_1-b_1"		-88.5011493	47.1143187	North of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB110 a_2-b_2"				North of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB107		QMCP-SB111 a_1-b_1"		-88.5011318	47.1143002	East of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB111 a_2-b_2"				East of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio

Table 3-1
Sampling and Analysis Summary
Julio Properties - Dollar Bay
Houghton County, Michigan

Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses								Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
QMCP-SB108		QMCP-SB112 a_1-b_1"		-88.5011087	47.1142680	South of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB112 a_2-b_2"				South of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-SB109		QMCP-SB113 a_1-b_1"		-88.5011502	47.1142880	West of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
		QMCP-SB113 a_2-b_2"				West of QMCP-SB44 0.5-4ft, arsenic exceedance		--	Location not sampled.	Soil Core		X																							Lawrence Julio
QMCP-GW43	9/10/2018	QMCP-GW43 6-10	1809102	-88.4989900	47.1160167	Data Gap - Area N, within historic mining operation location		--		Low-Flow Sampling			X				X	X	X	X					14.1	0.308	25.6	6.09	NM						Lawrence Julio
QMCP-GW44	9/10/2018	QMCP-GW44 4-8	1809102	-88.5012170	47.1142115	Data Gap - Area N, within historic mining operation location		--		Low-Flow Sampling			X				X	X	X	X					14.4	0.225	1.8	6.22	NM						Lawrence Julio
QMCP-GW45	9/10/2018	QMCP-GW45 5-9	1809102	-88.5007035	47.1137349	Data Gap - Area N, within historic mining operation location		--		Low-Flow Sampling			X				X	X	X	X					18.6	0.076	1.4	5.63	NM						Lawrence Julio
QMCP-GW46	9/10/2018	QMCP-GW46 4-8'	1809102	-88.5003187	47.1141015	Data Gap - Area N, within historic mining operation location		--		Low-Flow Sampling			X				X	X	X	X					15.3	0.101	3.0	6.20	NM						Lawrence Julio
QMCP-GW47	9/10/2018	QMCP-GW47 5-9	1809102	-88.4997684	47.1137933	Data Gap - Area N, within historic mining operation location		--		Low-Flow Sampling			X				X	X	X	X					14.8	0.295	2.6	6.37	NM						Lawrence Julio
QMCP-GW48	9/10/2018	QMCP-GW 48-7-9'	1809855	-88.4998730	47.1145989	Data Gap - Area N, within historic mining operation location		--	NAPL present, no sample submitted to MDEQ lab. Fingerprint analysis completed.	Low-Flow Sampling			X												NM	NM	NM	NM	NM						Lawrence Julio
QMCP-GW49	9/10/2018	QMCP-GW49 5-9	1809102	-88.4986758	47.1143048	Data Gap - Area N, proximal to historic oil house		--		Low-Flow Sampling			X				X	X	X	X					15.6	0.257	10.5	6.60	NM						Lawrence Julio
QMCP-GW50	9/10/2018	QMCP-GW50 2-6	1809102	-88.4981735	47.1138279	Data Gap - Area N, within historic mining operation location		--	Duplicate omitted.	Low-Flow Sampling			X				X	X	X	X					17.6	0.233	2.5	6.13	NM						Lawrence Julio
MW7	10/16/2019	MW-7	1910241	-88.4987487	47.1142809	Downgradient of QMCP-GW48, free product observation		--	Previously proposed as QMCP-MW14, PCB analysis added	Low-Flow Sampling			X				X	X	X						13.0	0.293	2.5	6.62	28.0						Lawrence Julio
MW8	10/16/2019	MW-8	1910241	-88.4997004	47.1138901	Downgradient of QMCP-GW48, free product observation		--	Previously proposed as QMCP-MW12, PCB analysis added	Low-Flow Sampling			X				X	X	X						11.9	0.147	10.4	6.54	4.16						Lawrence Julio
MW9	10/16/2019	MW-9	1910241	-88.5008183	47.1137938	Downgradient of QMCP-GW45, PNA exceedance		--	Previously proposed as QMCP-MW17, PCB analysis added, 0.21 ft of product measured in well	Low-Flow Sampling			X				X	X	X						12.3	0.121	0.9	6.33	49.4						Lawrence Julio
MW10		MW-10		-88.5007104	47.1142580	Downgradient of QMCP-GW48, free product observation		--	Previously proposed as QMCP-MW15. Location not sampled: product in well, 0.6 ft of product measured in well	Low-Flow Sampling			X																						Lawrence Julio
MW11	10/16/2019	MW-11	1910241	-88.5009853	47.1141353	Downgradient of QMCP-GW48, free product observation		--	Additional MW installed in Area N. Note from sampling: "11 had slight staining on the tubing in the well"	Low-Flow Sampling			X				X	X							11.7	0.277	1.0	6.28	5.92						Lawrence Julio
MW12	10/17/2019	MW-12	1910241	-88.5005722	47.1152600	Upgradient of QMCP-GW48, free product observation		--	Previously proposed as QMCP-MW19	Low-Flow Sampling			X				X	X							11.7	0.179	8.4	6.98	5.06						Lawrence Julio
MW13	10/16/2019	MW-13	1910241	-88.4993375	47.1145159	In vicinity of observed processing vats and soil staining		--	Previously proposed as QMCP-MW18	Low-Flow Sampling			X				X	X							11.2	0.138	16.8	6.72	5.56						Lawrence Julio
QMCP-MW13		QMCP-MW13		-88.4992603	47.1141693	Downgradient of QMCP-GW48, free product observation		--	Not installed in planned location	Low-Flow Sampling			X																						Lawrence Julio
MW14	10/16/2019	MW-14	1910241	-88.5001971	47.1146642	Downgradient of QMCP-GW48, free product observation		--	Previously proposed as QMCP-MW16. No product detected w/ product probe	Low-Flow Sampling			X				X	X							12.2	0.317	27.5	6.07	3.05						Lawrence Julio

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Houghton County, Michigan

Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses								Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
MW15	10/17/2019	MW-15	1910241	-88.4999515	47.1146115	QMCP-GW48, free product observation		--	Additional MW installed in Area N. No product detected in well w/ product probe. Duplicated collected: MW-15 DUP	Low-Flow Sampling			X				X	X							10.8	0.129	29.9	5.49	4.16	X					Lawrence Julio
QMCP-ASBBLK42	10/01/2018	QMCP-ASBBLK42A-100118	240-102329-1	-88.4987122	47.1145744	Suspect ACM	White TSI on pipe	friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK42B-100118	240-102329-1			Suspect ACM	White TSI on pipe	friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK43	10/01/2018	QMCP-ASBBLK43A-100118	240-102329-1	-88.4986861	47.1145737	Suspect ACM	Red roofing on ground	non-friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK43B-100118	240-102329-1			Suspect ACM	Red roofing on ground	non-friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK44	10/01/2018	QMCP-ASBBLK44A-100118	240-102329-1	-88.4986667	47.1145678	Suspect ACM	Tan/red brick siding	non-friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK44B-100118	240-102329-1			Suspect ACM	Tan/red brick siding	non-friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK45	10/01/2018	QMCP-ASBBLK45A-100118	240-102329-1	-88.4987431	47.1145884	Suspect ACM	Black tar paper with multi-colored specks	friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK45B-100118	240-102329-1			Suspect ACM	Black tar paper with multi-colored specks	friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK46	10/01/2018	QMCP-ASBBLK46A-100118	240-102329-1	-88.4987259	47.1145174	Suspect ACM	Tan brick siding	non-friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK46B-100118	240-102329-1			Suspect ACM	Tan brick siding	non-friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK47	10/01/2018	QMCP-ASBBLK47A-100118	240-102329-1	-88.4987075	47.1144933	Suspect ACM	Black tar paper	friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK47B-100118	240-102329-1			Suspect ACM	Black tar paper	friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK48	10/01/2018	QMCP-ASBBLK48A-100118	240-102329-1	-88.4985629	47.1144541	Suspect ACM	Silver painted mastic	non-friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK48B-100118	240-102329-1			Suspect ACM	Silver painted mastic	non-friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK49	10/01/2018	QMCP-ASBBLK49A-100118	240-102329-1	-88.4991891	47.1145896	Suspect ACM	Silver painted roofing, damaged/deteriorated	friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK49B-100118	240-102329-1			Suspect ACM	Silver painted roofing, damaged/deteriorated	friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK50	10/01/2018	QMCP-ASBBLK50A-100118	240-102329-1	-88.4975336	47.1143592	Suspect ACM	Black shingle, burn pile, 10SF	non-friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK50B-100118	240-102329-1			Suspect ACM	Black shingle, burn pile, 10SF	non-friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK51	10/01/2018	QMCP-ASBBLK51A-100118	240-102329-1	-88.4975336	47.1143592	Suspect ACM	Black tar paper, 10SF	non-friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK51B-100118	240-102329-1			Suspect ACM	Black tar paper, 10SF	non-friable		Hand Tools						X						X												Lawrence Julio
QMCP-ASBBLK52	10/01/2018	QMCP-ASBBLK52A-100118	240-102329-1	-88.4974372	47.1144986	Suspect ACM	White fibers in burn pile	friable		Hand Tools						X						X												Lawrence Julio
	10/01/2018	QMCP-ASBBLK52B-100118	240-102329-1			Suspect ACM	White fibers in burn pile	friable		Hand Tools						X						X												Lawrence Julio

Table 3-1
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Houghton County, Michigan

Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses								Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
Julio Marine (Continued)																																		
QMCP-ASBBLK53	10/01/2018	QMCP-ASBBLK53A-100118	240-102329-1	-88.5011089	47.1141632	Suspect ACM	Silver coated roofing, damaged/deteriorated	friable		Hand Tools						X						X													Lawrence Julio
	10/01/2018	QMCP-ASBBLK53B-100118	240-102329-1			Suspect ACM	Silver coated roofing, damaged/deteriorated	friable		Hand Tools						X						X													Lawrence Julio
QMCP-ASBBLK54	10/01/2018	QMCP-ASBBLK54A-100118	240-102329-1	-88.5011528	47.1141994	Suspect ACM	Red roofing, damaged/deteriorated	non-friable		Hand Tools						X						X													Lawrence Julio
	10/01/2018	QMCP-ASBBLK54B-100118	240-102329-1			Suspect ACM	Red roofing, damaged/deteriorated	non-friable		Hand Tools						X						X													Lawrence Julio
QMCP-ASBBLK55	10/01/2018	QMCP-ASBBLK55A-100118	240-102329-1	-88.5012360	47.1141890	Suspect ACM	Green roofing	non-friable		Hand Tools						X						X													Lawrence Julio
	10/01/2018	QMCP-ASBBLK55B-100118	240-102329-1			Suspect ACM	Green roofing	non-friable		Hand Tools						X						X													Lawrence Julio
QMCP-ASBBLK56	10/01/2018	QMCP-ASBBLK56A-100118	240-102329-1	-88.5010628	47.1142952	Suspect ACM	Building concrete	non-friable		Hand Tools						X						X													Lawrence Julio
	10/01/2018	QMCP-ASBBLK56B-100118	240-102329-1			Suspect ACM	Building concrete	non-friable		Hand Tools						X						X													Lawrence Julio
QMCP-ASBBLK57	10/01/2018	QMCP-ASBBLK57A-100118	240-102329-1	-88.5010596	47.1142030	Suspect ACM	Brown insulation in drum	friable		Hand Tools						X						X													Lawrence Julio
	10/01/2018	QMCP-ASBBLK57B-100118	240-102329-1			Suspect ACM	Brown insulation in drum	friable		Hand Tools						X						X													Lawrence Julio
QMCP-east vat	8/20/2019	QMCP-east vat water	1908277	-88.4992900	47.1144920	Standing water inside processing vats		--		Bailers							X	X	X	X															Lawrence Julio
QMCP-middle vat	8/20/2019	QMCP-middle vat water	1908277	-88.4993330	47.1144750	Standing water inside processing vats		--		Bailers							X	X	X	X															Lawrence Julio
QMCP-west vat	8/20/2019	QMCP-west vat water	1908277	-88.4993770	47.1144570	Standing water inside processing vats		--		Bailers							X	X	X	X															Lawrence Julio
In Lake - Surface Water																																		
QMCP-SW09		QMCP-SW09 a-b'		-88.5029253	47.1152426	Offshore from Area M		--	Location not sampled.	Low-Flow Sampling				X																					State of Michigan
QMCP-SW10		QMCP-SW10 a-b'		-88.4998632	47.1135537	Offshore from Area N		--	Location not sampled.	Low-Flow Sampling				X																					State of Michigan
QMCP-SW11		QMCP-SW11 a-b'		-88.4965812	47.1144752	Offshore from Area N		--	Location not sampled.	Low-Flow Sampling				X																					State of Michigan
QMCP-SW12		QMCP-SW12 a-b'		-88.4959901	47.1179606	Offshore from Area O		--	Location not sampled.	Low-Flow Sampling				X																					State of Michigan
QMCP-SW13		QMCP-SW13 a-b'		-88.4925184	47.1184816	Outlet of creek, offshore from Area P		--	Location not sampled.	Low-Flow Sampling				X																					State of Michigan
QMCP-SW14		QMCP-SW14 a-b'		-88.4963341	47.1136151	Offshore of beach area		--	Location not sampled.	Low-Flow Sampling				X																					State of Michigan

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Proposed Sampling Location	Sample Date	Field Sample Identification	Laboratory Work Order Number	Longitude	Latitude	Sampling Rationale	Sample Description	Friable/ Non-Friable	Sample Notes	Sampling Method	Sample Type/Matrix						Sample Analyses							Water Quality Parameters					Duplicate Analyses					Property Ownership
											Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment	Drums, Containers, & SACM	VOCs	SVOCs	PCBs	Metals	Cyanide	Asbestos	Lead	Arsenic	Temperature (C°)	Conductivity (mS/cm)	Dissolved Oxygen (%)	pH	Turbidity (nTu)	VOCs	SVOCs	PCBs	Metals	Cyanide	
In Lake - Pore Water, Sediments, and Submerged Drum Content Samples																																		
QMCP-PS10	9/12/2018	QMCP-PS10	1809097	-88.49986642	47.11352579	Collected near QMCP-SD10 where sediments indicated signs of contamination (sheen and/or odor)	No odor or anything else remarkable noted (GSU Email)	--		Low-Flow Sampling			X				X	X	X						16.8	224.4	1.3	7.22	78.4						State of Michigan
QMCP-PS45	9/12/2018	QMCP-PS45	1809097	-88.50117709	47.11380566	Collected offshore of terrestrial location QMCP-SB45/GW45 that indicated potential contamination.	No odor or anything else remarkable noted (GSU Email)	--		Low-Flow Sampling			X				X	X	X						15.8	490	0.8	6.94	37.6						State of Michigan
QMCP-SD09	9/6/2018	QMCP-SD09-0-6"	1809079	-88.50300745	47.11520776	Offshore from Area M	SANDY GRAVEL, Dark brown, few fines and wood debris	--		Vibracore Sampler					X		X	X	X																State of Michigan
		QMCP-SD09 a_2-b_2'				Offshore from Area M		--	Sample not collected.	Vibracore Sampler					X																				State of Michigan
QMCP-SD10	9/6/2018	QMCP-SD10-0-4"	1809079	-88.499874	47.113501	Offshore from Area N	FINES, Dark brown-black, organics (wood), soft, loose	--	First core attempt in location was abandoned due to poor recovery; however, the fines had oily sheen.	Vibracore Sampler					X		X	X	X																State of Michigan
	9/6/2018	QMCP-SD10-4-11"	1809079			Offshore from Area N	SAND, Dark brown, medium grain, well sorted	--	Metals analysis added. Duplicate omitted.	Vibracore Sampler					X		X	X	X																State of Michigan
QMCP-SD11	9/6/2018	QMCP-SD11-0-6"	1809079	-88.49667141	47.11454763	Offshore from Area N	SAND, Dark brown, medium grain, well sorted	--		Vibracore Sampler					X		X	X	X																State of Michigan
	9/6/2018	QMCP-SD11-6-12"	1809082			Offshore from Area N	SAND, Dark brown, medium grain, some organics (roots), well sorted	--	Duplicate collected: QMCP-SD 11-6-12" FD	Vibracore Sampler					X		X	X	X																State of Michigan
QMCP-SD12	9/6/2018	QMCP-SD12-0-12"	1809082	-88.49596223	47.11793862	Offshore from Area O	FINES, Brown, with organics (mostly in top 1 ft), cohesive, nonplastic, loose	--		Vibracore Sampler					X		X	X	X																State of Michigan
	9/6/2018	QMCP-SD12-12-23"	1809082			Offshore from Area O	FINES, Brown, with organics (mostly in top 1 ft), cohesive, nonplastic, loose	--	Metals analysis added.	Vibracore Sampler					X		X	X	X																State of Michigan
QMCP-SD13	9/7/2018	QMCP-SD13-0-7"	1809082	-88.49253192	47.11852565	Outlet of creek, offshore from Area P	SAND, Dark brown, coarse grain, organics, trace gravel	--		Vibracore Sampler					X		X	X	X																State of Michigan
	9/7/2018	QMCP-SD13-7-38"	1809082			Outlet of creek, offshore from Area P	PEAT, Peat-like organics with fines; FINES, dark brown, pudding like texture, organics, cohesive, nonplastic, very soft	--	Metals analysis added.	Vibracore Sampler					X		X	X	X																State of Michigan
QMCP-SD14	9/7/2018	QMCP-SD14-0-12"	1809082	-88.49607782	47.11364307	Offshore of beach area	SAND, Dark brown, medium grain, well sorted, moist	--		Vibracore Sampler					X		X	X	X																State of Michigan
	9/7/2018	QMCP-SD14-12-36"	1809082			Offshore of beach area	SAND, Brown, medium grain, well sorted, moist	--	Metals analysis added.	Vibracore Sampler					X		X	X	X																State of Michigan
										Total Sample Count	18	21	30	0	28	36	43	95	74	76	9	38	7	7	20	20	20	20	10	1	2	1	2	1	
										Proposed Sample Count	55	66	34	14	31	36																		

Notes:

QMCP = Quincy Mining Company Mason Operations Area
PCBs = Polychlorinated Biphenyls
SACM = Suspect Asbestos Containing Material
SVOC = Semi-Volatile Organic Compound
VOC = Volatile Organic Compound
ROW = Right of Way
PNA = Polynuclear Aromatic Hydrocarbon
X = Completed sample based on the sampling rationale
°C = Degrees Celsius
mS/cm = millisiemens per centimeter

pH = pH acid-base scale
nTU = Nephalometric Turbidity Units
TSI = Thermal Systems Insulation
NM = Not Measured
-- = Not Applicable
in = inches
ft = feet
% = Percentage
EGLE = Michigan Department of Environment, Great Lakes, and Energy

For the purposes of this investigation, sediments include residues and waste material associated with chemical containers and deposits on the lake bottom historically discarded in Torch Lake and the Canal.
In areas that have been resurfaced or capped, analytical samples were collected from directly beneath the cap/resurfacing medium (i.e. soil cap, beach sand, gravel, etc...) so that samples are representative of historical waste deposits.
Samples described in this evaluation may actually refer to stamp sands or to other mining waste from the historic mining and reclamation processes conducted in the area.
Evaluation based on EGLE Criteria at time of Project completion.

SIDE SCAN SONAR IMAGERY

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Amy Keranen, Project Manager, Calumet Office
Remediation and Redevelopment Division

FROM: Brian Eustice, Geologist, Geological Services Unit
Program Support Section, Remediation and Redevelopment Division

DATE: January 9, 2018

SUBJECT: Quincy Mining Company Portage, Houghton County, SITE ID #31000098
Bathymetric Investigation-Side Scan Sonar

This memorandum summarizes the findings of a marine investigation requested by the Department of Environmental Quality (DEQ), Remediation and Redevelopment Division's (RRD's), Calumet office for the subject site. On August 18, 2017, RRD's Geological Services Unit (GSU) conducted side scan sonar surveys of three areas to identify potential targets for future investigation.

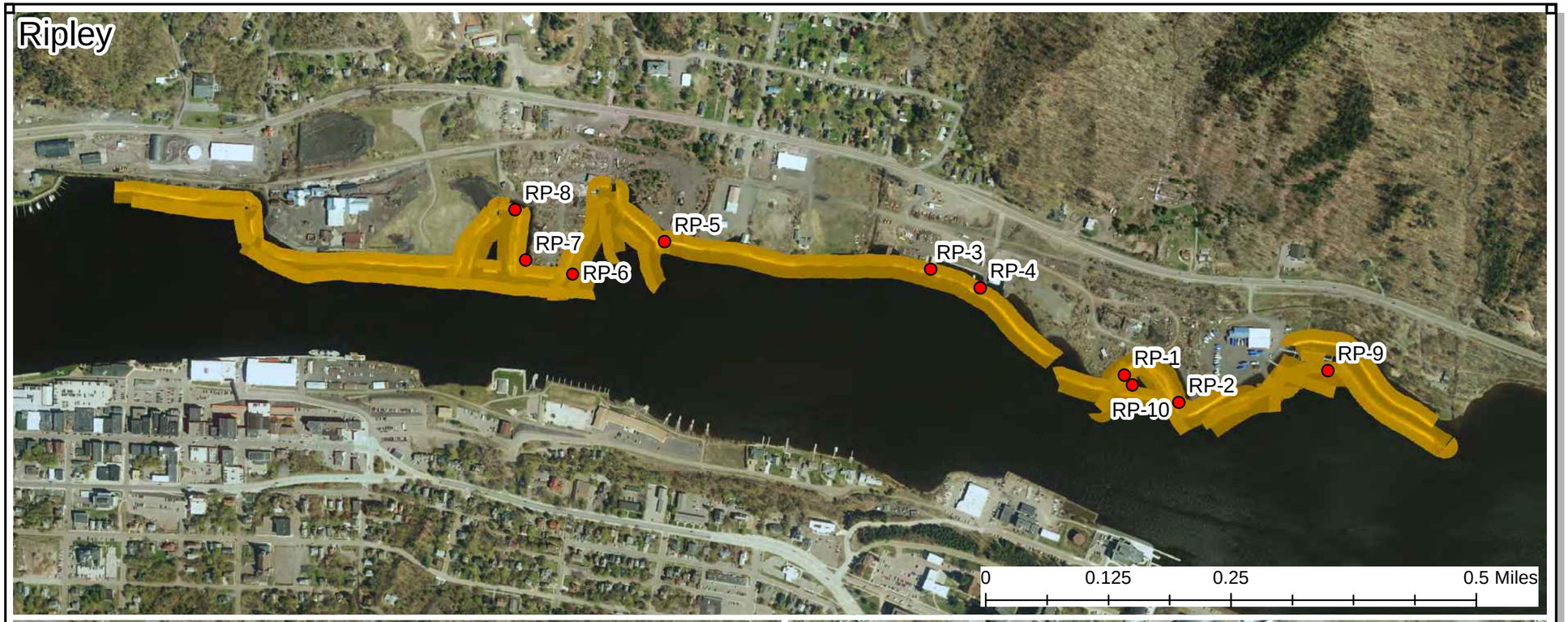
The three investigation areas are located in the Keweenaw Waterway offshore from the communities of Ripley and Dollar Bay, Section 36, T55N-R34W and Sections 31, 32 and 33, T55N-R33W, Houghton County, Michigan (Fig 1).

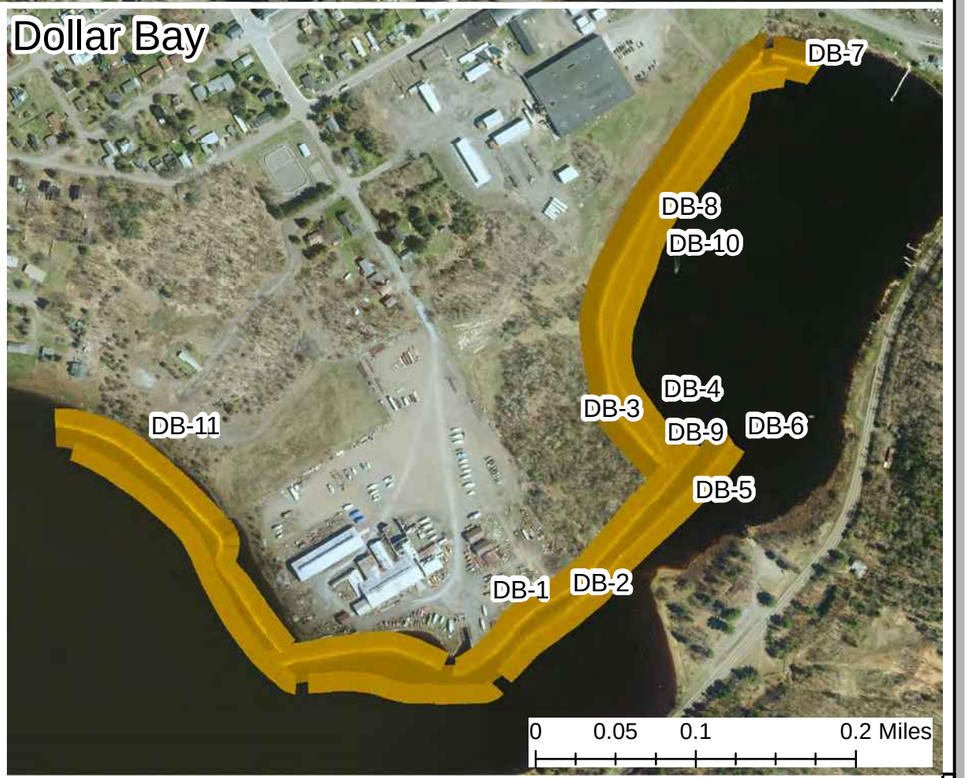
The GSU collected side scan sonar data using a Humminbird 797c^2 equipped with an external global positioning system (GPS) antenna. Potential targets were identified and selected during post processing using HYPACK 2016. Target locations for each investigation area are shown on Figure 1 and target coordinates are presented in Table 1.

If you have any questions, contact me at 517-242-1170.

Attachments

cc: Burrell P. Shirey, DEQ





LEGEND

- Sidescan Sonar Targets
- Sidescan Sonar Tracks

DATUM - NAD83
PROJECTION: MICHIGAN GEOREF

AERIAL PHOTO SOURCE: MIS PUBLIC IMAGERY
BEST AVAILABLE MOSAIC

N
W E
S

Sidescan Sonar Survey of Ripley, Dollar Bay, and Former Coal Dock

FRANKLIN & OSCEOLA TOWNSHIPS, HOUGHTON COUNTY
T55N R34W SECTION 36, T55N R33W SECTIONS 31, 32, 33

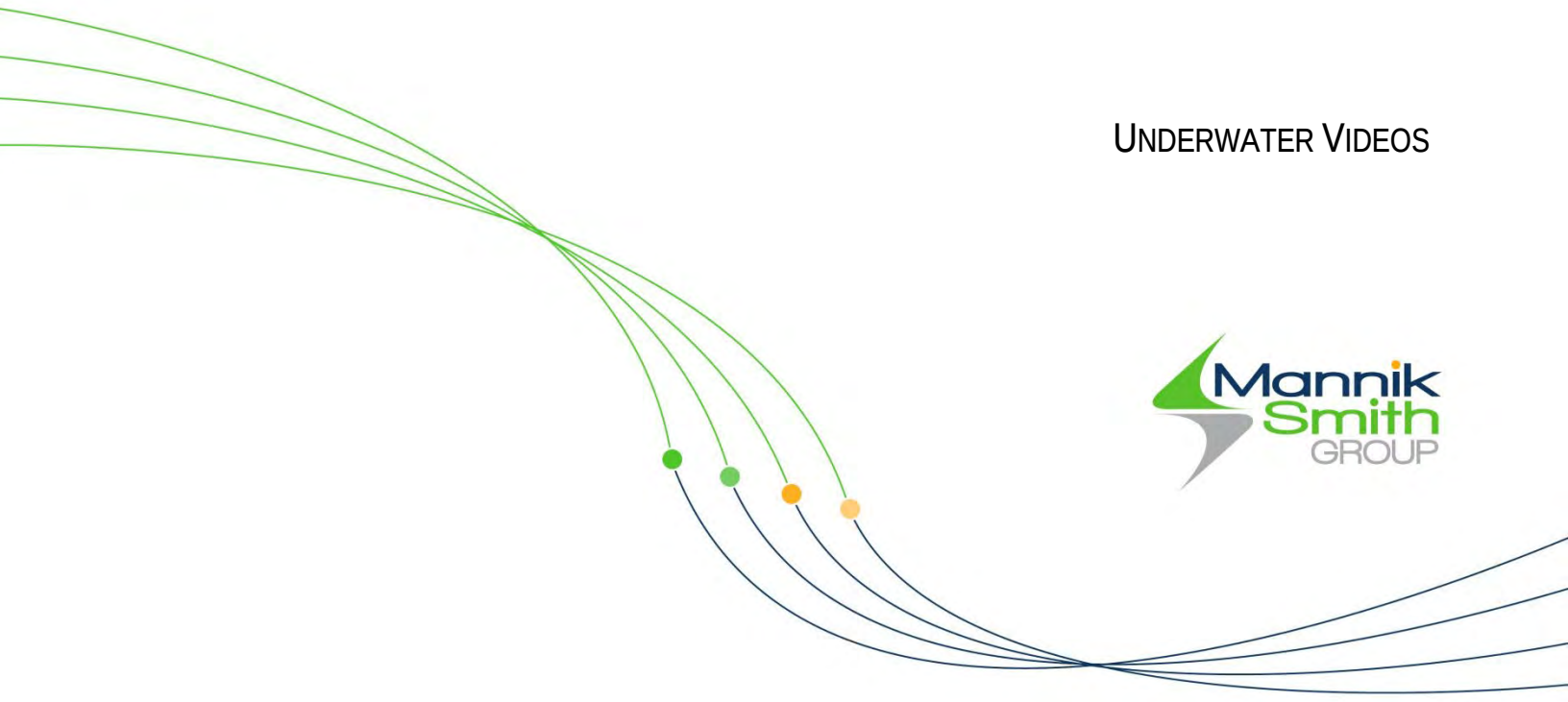
SIDESCAN SONAR TARGET MAP

GEOLOGIST		CREATION DATE
Brian Eustice Geological Services Unit		January 2018
Remediation and Redevelopment Division	DEQ	FIGURE 1

Quincy Mining Company,
Houghton County

Target ID	X (Michigan GeoRef)	Y (Michigan GeoRef)	Latitude	Longitude
RP-1	25861646.2	857045.8	47.1232818	-88.54664454
RP-2	25861941.6	856900.2	47.12289849	-88.5454468
RP-3	25860596.4	857600.8	47.12474689	-88.55090417
RP-4	25860862.9	857505.2	47.12449913	-88.54982636
RP-5	25859161.2	857731	47.12502666	-88.55667838
RP-6	25858668.2	857548.5	47.12449985	-88.55864392
RP-7	25858413.9	857622.3	47.12468843	-88.55967105
RP-8	25858353.1	857892.7	47.12542635	-88.5599366
RP-9	25862741.2	857083.6	47.1234439	-88.54224994
RP-10	25861690.9	856992.1	47.12313699	-88.54646081
DB-1	25873771.8	853416.9	47.11397278	-88.49767185
DB-2	25873817.1	853439.8	47.1140379	-88.49749169
DB-3	25874109.1	854013.9	47.11562672	-88.49636272
DB-4	25874117.3	854079.3	47.11580641	-88.49633475
DB-5	25874221.9	853745.2	47.114896	-88.49588941
DB-6	25874393.9	853956.4	47.11548383	-88.49521475
DB-7	25874591.22	855186.18	47.11886506	-88.49451551
DB-8	25874107.6	854681.7	47.11745719	-88.49641937
DB-9	25874208	853936.2	47.11541885	-88.4959597
DB-10	25874134	854583.9	47.11719047	-88.49630594
DB-11	25872425.2	853957.3	47.11538423	-88.50312011
CD-1	25868754.4	854711.2	47.11725902	-88.51791806
CD-2	25868850	854693.9	47.11721662	-88.51753284
CD-3	25867565.9	855065.3	47.11816717	-88.52271793

UNDERWATER VIDEOS



Appendix B

The underwater videos are available here: QMCP Torch Lake - YouTube

APPENDIX C

PHYSICAL HAZARDS INVENTORY

APENDIX C
Reconnaissance, Targeted Sampling, and Potential Chemical and Physical Hazards Inventory
Julio Properties - Dollar Bay

Area: L

Property (Common Name): Julio Company/Former Amoco Bulk Fuel Terminal

Property Identification Number/Owner: 009-033-037-00, 006-032-026-00/Lawrence Julio

Inspection Date: 9/27/2018

General Property Description (Significant Landscape Features, Topography, Cover, Etc.,) : Area L was not identified on available Sanborn Maps; however, according to Monette's Dollar Bay, Michigan, Fifty-Fourth of a Local History Series (Monette, 2000), Dollar Bay Terminal Company erected three storage tank onsite in May of 1945. It was reported the welded steel gasoline tanks each had a capacity of 840,000 gallons, with dimensions of forty feet high and sixty feet in diameter. Dikes or firewalls surrounded each tank, while lake tankers were used to transport the product from Chicago refineries. Three additional tanks were added to the site, which increased storage for kerosene, diesel fuel, and three grades of gasoline. In May 1984, the owner/operator Amoco Oil Company closed the facility, selling the property to Julio Contracting Company of Ripley. The six tanks were dismantled in October 1994 after a tug-barge was used to drain the tanks. The tug-barge has also been observed at another Julio property along the Portage Canal. Other historic land use and/or mining operations are unknown. The current usage of the area is unknown, although it appears to be inactive. This property is bound to the south and east by residential properties. The Copper Heritage Trail is located to the north of the property, while an undeveloped wooded lot is located to the west. There is one building at the north corner on the property that includes a garage. Semi-tractor trailers, heavy equipment, fuel tanks of varying sizes and construction material are staged throughout the property. Sand, gravel and stamp sand piles are observed, along with large piles of sandstone construction debris. The topography is relatively flat towards the north; however, undulating hills that appear to be overgrown cobbler/boulder piles are observed to the southeast and central portions of the property. Access to the property is restricted by fencing.

Not Intact = filled with scrap, appears or is visibly empty, carcass, major holes, rusted with holes, split seams

		Potentially Abandoned Containers																													
		1-25 gallon container		35-40 gallon drums		55 gallon drums		>55 gallon drums	ASTs/USTs 25-200 gallons		ASTs/USTs >200 gallons		Pressurized Vessel/ Compressed Cylinders	Auto/Boat Fuel Tanks	Batteries	Fire Extinguishers	Other Items	Suspect Asbestos Containing Material	Residual Process Material	Potential PCB/Mercury Containing Equipment	Waste Pile	Outfalls	Soil Staining/ Stressed Vegetation	Physical Hazards	Field Sample Recommendation	Field Sampled 2018-2019	Targeted Sample ID	Asbestos Friable/Non-friable	Container Count per Obs. Area	Recon Latitude	Recon Longitude	Observation Number
Description	**Notes:**	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact, carcass	Intact	Intact	Not Intact	Intact	Not Intact																					
2- 55 gallon drum, rusted, intact, one split at bottom, bulged at bottom White Transite siding, black tar paper on building, deteriorated and on ground Pipe from building to ground, vent on top of building, suspect UST	Drums may require characterization					2					1							2							N	Y	QMCP-ASBBLK40	Friable	3	47.120173	-88.509221	Cont121
1- 200 gallon fuel tank, cut on side, debris, trash inside										1															N	N			1	47.119888	-88.508936	Cont122
3- Electrical components, switches and bulbs on sheet metal, 2 on ground nearby (3 total) Gray metal meter on ground 1- Crushed rusted drum with orange pump at top Potential mercury light on building							1													4					N	N			1	47.119804	-88.508833	SHg005
1- red drum, appears intact, "synthetic blend engine oil" 1- black rectangular fuel tank 2- battery chargers with batteries 2- black 5 gallon pails 1- Empty drum carcass nearby concrete foundation 1- white 55 gallon drum with liquid down driveway	May require characterization	2				2	1		1						2										N	N			6	47.119975	-88.509411	Cont123
3- riveted tanks, 9'x20' approximately 1- red tank with manholes at top Open pipe with tar, releases on ground, soil staining in front, white and black insulation material 1- green 200 gallon diesel fuel tank, release on ground 1- orange tank	SACM								1		4						1						1		Y	Y	QMCP-ASBBLK41 QMCP-SS56	Friable	5	47.119132	-88.511541	Cont124
Fuel tank, 10'x25', appears intact	May require characterization										1														N	N			1	47.118684	-88.511429	Cont125
3- fuel tanks, 25'x10'd 1- green 200 gallon fuel tank on side									1		3														N	N			4	47.118911	-88.511202	Cont126
	Total Item Count:	2	0	0	0	4	2	0	3	1	9	0	0	0	2	0	1	2	0	4	0	0	1	0	3				21			

APPENDIX C
Reconnaissance, Targeted Sampling, and Potential Chemical and Physical Hazards Inventory
Julio Properties - Dollar Bay

Area: N

Property (Common Name): Julio Marine Dollar Bay

Property Identification Number/Owner: 009-033-055-00/Lawrence Julio

Inspection Date: 9/26/2018, inaccessible areas inspected 12/3/2019 and 11/4/2020.

General Property Description (Significant Landscape Features, Topography, Cover, Etc.,) : The parcel was identified as Tamarack and Osceola Copper Manufacturing Company on the 1907 Sanborn Map. It was the location of John A. Roebling's Sons Copper Manufacturing and Foley Copper Products Company Copper Wire Mill in 1928 and 1949, respectively. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of Area M, N, and O. Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2004) indicate that the cap was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2002; however, the Dollar Bay parcel has not been deleted from the NPL. The capped areas are subject to an on-going DEQ O&M plan. The balance of the areas were not addressed as part of the Torch Lake Superfund Site remedial action. The area is currently the location of mining-era buildings; however, specific present day use is unknown. The property includes portions of the former wire mill operations. The parcel is bound by the Portage Canal to the west and south, by wooded property to the east and residential and privately owned properties to the north and north-west. Many mining-era buildings, some that appear to be used for boat storage, are present in the central portion of the property. Additional boats, heavy equipment and other vehicles are located north of the property buildings. Suspect asbestos containing materials, including roofing, thermal insulation material are observed throughout. Abandoned containers with unknown contents, fuel tanks of various sizes, including a tanker trailer along the shoreline, are also observed both inside and outside of property buildings. A large pile that appears to be building construction material is located near the shoreline. Topography is relatively flat, sloping gently to the Portage Canal and Lake. Public access to the property is restricted by a fence and gate.

Not Intact = filled with scrap, appears or is visibly empty, carcass, major holes, rusted with holes, split seams		Potentially Abandoned Containers																														
		1-25 gallon container		35-40 gallon drums		55 gallon drums		>55 gallon drums	ASTs/USTs 25-200 gallons		ASTs/USTs >200 gallons		Pressurized Vessel/ Compressed Cylinders	Auto/Boat Fuel Tanks	Batteries	Fire Extinguishers	Other Items	Suspect Asbestos Containing Material	Residual Process Material	Potential PCB/Mercury Containing Equipment	Waste Pile	Outfalls	Soil Staining/ Stressed Vegetation	Physical Hazards	Field Sample Recommendation	Field Sampled 2018-2019	Targeted Sample ID	Asbestos Friable/Non-friable	Container Count per Obs. Area	Recon Latitude	Recon Longitude	Observation Number
Description	**Notes:**	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact, carcass	Intact	Intact	Not Intact	Intact	Not Intact																					
Burn area with tree branch debris, household trash, plastic, roofing, at least one area with white TSI material on ground, evidence of past burn pile with overgrown weeds to the east, darkened coarse soil	SACM, SS																	1			1		1			Y	Y	QMCP-SS57 QMCP-SS58 QMCP-SS59 QMCP-SS60 QMCP-ASBBLK50 QMCP-ASBBLK51 QMCP-ASBBLK52	Non-Friable Non-Friable Friable	0	47.124186	-88.547661	WP005
White fibrous material on ground, deteriorated, 6SF Black tar roofing nearby, 2SF	none																	1								Y	N			0	47.113733	-88.498270	SACM035
3- propane tanks 12- 55 gallon drums, appear intact, some gray, some rusted 1- 40 gallon blue drum with holes in top	Drums may require characterization			1		12							3											3	N	N			16	47.113845	-88.499022	Cont106
2 -55 gallon drums as vacuum 1- white 6000 gallon truck tanker 2- yellow 500 gallon fuel tanks Black Tar paper SACM on ground, 3SF 1- green heating oil tank on side 6- hot water tanks, gray 3- hot water tanks, white w insulation Black and white deteriorated material attached to board, 100SF Silver mastic on pipe, 3SF 1- crushed, rusted drum, unknown contents 1- black and rusted, partially crushed drum 1- red, rusted drum, appears open at end	Honeycomb piping observed					4	1				4						9	2								N	N			9	47.113772	-88.500516	Cont107
Inside shed: white vacuum vessel, Yellow filter, 100 gallon Oblong tank, 100 gallon Gray smooth sided drum 55 gallon Rusted fuel tank 500 gallon Black tar material on pipe, 9x25' 7- truck fuel tanks, various sizes Rusted drum, appears intact Black w silver roofing on ground and building roof Silver truck tanks White TSI material on ground Crushed drum 3-55 gallon drums, 1-40 gallon drum, appears intact Red roofing on ground Yellow brick siding				1		5	1		2			1	1	7				1						1	Y	N			18	47.114166	-88.500502	Cont108

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Property (Common Name): Julio Marine Dollar Bay

Property Identification Number/Owner: 009-033-055-00/Lawrence Julio

Inspection Date: 9/26/2018, inaccessible areas inspected 12/3/2019 and 11/4/2020.

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Not Intact = filled with scrap, appears or is visibly empty, carcass, major holes, rusted with holes, split seams		Potentially Abandoned Containers												Batteries	Fire Extinguishers	Other Items	Suspect Asbestos Containing Material	Residual Process Material	Potential PCB/Mercury Containing Equipment	Waste Pile	Outfalls	Soil Staining/ Stressed Vegetation	Physical Hazards	Field Sample Recommendation	Field Sampled 2018-2019	Targeted Sample ID	Asbestos Friable/Non-friable	Container Count per Obs. Area	Recon Latitude	Recon Longitude	Observation Number
		1-25 gallon container		35-40 gallon drums		55 gallon drums		>55 gallon drums	ASTs/USTs 25-200 gallons		ASTs/USTs >200 gallons		Pressurized Vessel/ Compressed Cylinders	Auto/Boat Fuel Tanks																		
Description	**Notes:**	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact, carcass	Intact	Intact	Not Intact	Intact	Not Intact																			
2-55 gallon drums, one upright with tree, second on side, suspect white SACM filled 2-50 gallon tanks, partially buried	SACM in drum					3	1										1							Y	Y	QMCP-ASBBLK57	Friable	4	47.114198	-88.501053	Cont109
Area on south end of building used for boat storage, debris piles of building material Black roofing with silver paint Red roofing Black tar paper Concrete side of building																	1							Y	Y	QMCP-ASBBLK53 QMCP-ASBBLK54 QMCP-ASBBLK55 QMCP-ASBBLK56	Friable Non-Friable Non-Friable Non-Friable	0	47.114210	-88.500974	SACM036
Fuel tank on shoreline, two open vents, 21'x9'	May require characterization											1												N	N			1	47.114358	-88.501332	Cont110
4 fuel tanks welded together to form two barges, 18'x4.5'dia, sound empty												4												N	N			4	47.115267	-88.500026	Cont111
Silver/gray riveted tank, 10'x3'd 2-Rusted riveted tanks, 19'x4'd, 16'x4'd, 21'x6'd, 5'x2.5'd Silver fuel tank, 200 gallon Yellow fuel tank, 200 gallon Larger rusted, riveted tank, 31'x7'd 2-Rusted fuel tank, 6'x4'd Black rusted fuel tank, 5'x3.5'd Black/silver fuel tank, 18'x64"d Fuel tank w white end, 9'x64" 200 gall fuel tank in concrete Black fuel tank, 20.5'x8', 8000gallon Rusted fuel tank, 23'x10.5'd	May require characterization								3		13													N	N			16	47.114511	-88.500617	Cont112
3- 200 gallon fuel tanks, 1 open at top 1- 100 gallon tank black residue at end 6- 55 gallon drums, 1-200 gallon fuel tank inside building 13- 55 gallon drums, 9 appear intact, unknown contents, rest open or split	Drums may require characterization					15	4		4	1														N	N			24	47.114541	-88.500338	Cont113
31- 55 gallon drums, most appeared intact	Drum may require characterization					31																		N	N			31	47.114349	-88.499013	Cont114
2- 55 gallon drums, one green with holes, one red bulging "hydraulic"	May require characterization					1	1																	N	N			2	47.114698	-88.498739	Cont115
Steam pipe with white TSI coming out of ground, also at west end of building, roofing, siding	SACM																1							N	Y	QMCP-ASBBLK42 QMCP-ASBBLK43 QMCP-ASBBLK44 QMCP-ASBBLK45 QMCP-ASBBLK46 QMCP-ASBBLK47 QMCP-ASBBLK49	Friable Non-Friable Non-Friable Friable Non-Friable Friable Friable	0	47.114650	-88.498539	SACM037

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Julio Properties - Dollar Bay

Area: N

Property (Common Name): Julio Marine Dollar Bay

Property Identification Number/Owner: 009-033-055-00/Lawrence Julio

Inspection Date: 9/26/2018, inaccessible areas inspected 12/3/2019 and 11/4/2020.

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Description	**Notes:**	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact, carcass	Intact	Intact	Not Intact	Intact	Not Intact																					
White TSI in pumphouse	Inaccessible																	1							N	N			0	47.114550	-88.498687	SACM038
1- green 200 gallon fuel tank 1- silver propane tank Silver painted material on metal building 1- rusted black 200 gallon fuel tank 1- Green/red 200 gallon fuel tank 2- 55 gallon drum, rusted, appear intact 12- 55 gallon drums, 2 open or rusted at top, rest appear intact, newer 4- rusted 200 gallon fuel tank, appear intact 4- Texaco drums, 27"x14" 'Marfak heavy duty 2' 1- black steel tank, 34"x16"x14" 22- 55 gallon drums, appear intact		4		1		34	2		8				1					1						1	N	N			50	47.114556	-88.498376	Cont116
Silver painted material on metal arch building Tan brick and tan an red brick material on adjacent building, with black board underneath Red roofing	SACM																	1							Y	Y	QMCP-ASBBLK48	Non-Friable	0	47.114452	-88.498569	SACM039
Boat Control panels, potentially PCB Containing	Note to open up																			1					Y	N			0	47.114355	-88.498615	SPCB017
Main Garage & Connected Buildings: 26 - compressed gas cylinders 15 - 55 gallon drums, used oil (reported empty) 14- 55 gallon drums w/ potential contents 15 - 55 gallon drums with contents, 6 bulged 11 - 55 gallon drums on pallets, "used motor oil" 33 - 5 gallon buckets w/ visible or potential contents 5 - 35 gallon plastic drums 24 - 35 gallon drums 1 - large fuel tank for used oil burner (used for heat) 1 - large fuel tank "diesel oil" (reported empty) 3 - fuel tanks 1 - auto parts cleaner (unknown if cleaner has contents) 400 LF - Pipewrap (approximately 100+ LF/room) Various pieces of roofing among snow Gaskets 2 - pallets of gallons of silver BrewerCote roof coating 3 - rectangular oil tanks (approx. 30 gallons)	SACM Drums may require characterization. Stained soils inside warehouse area. Reported-trenches in cement floor area of warehouse have been filled in. Oil running to apparent floor drain in auto shop.	33		29		40	15		3		2		26					4					1	26					148	47.114222	-88.499730	IA025

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Property Identification Number/Owner: 009-033-055-00/Lawrence Julio

Inspection Date: 9/26/2018, inaccessible areas inspected 12/3/2019 and 11/4/2020.

General Property Description (Significant Landscape Features, Topography, Cover, Etc.,) : The parcel was identified as Tamarack and Osceola Copper Manufacturing Company on the 1907 Sanborn Map. It was the location of John A. Roebling's Sons Copper Manufacturing and Foley Copper Products Company Copper Wire Mill in 1928 and 1949, respectively. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of Area M, N, and O. Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2004) indicate that the cap was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2002; however, the Dollar Bay parcel has not been deleted from the NPL. The capped areas are subject to an on-going DEQ O&M plan. The balance of the areas were not addressed as part of the Torch Lake Superfund Site remedial action. The area is currently the location of mining-era buildings; however, specific present day use is unknown. The property includes portions of the former wire mill operations. The parcel is bound by the Portage Canal to the west and south, by wooded property to the east and residential and privately owned properties to the north and north-west. Many mining-era buildings, some that appear to be used for boat storage, are present in the central portion of the property. Additional boats, heavy equipment and other vehicles are located north of the property buildings. Suspect asbestos containing materials, including roofing, thermal insulation material are observed throughout. Abandoned containers with unknown contents, fuel tanks of various sizes, including a tanker trailer along the shoreline, are also observed both inside and outside of property buildings. A large pile that appears to be building construction material is located near the shoreline. Topography is relatively flat, sloping gently to the Portage Canal and Lake. Public access to the property is restricted by a fence and gate.

Not Intact = filled with scrap, appears or is visibly empty, carcass, major holes, rusted with holes, split seams		Potentially Abandoned Containers												Batteries	Fire Extinguishers	Other Items	Suspect Asbestos Containing Material	Residual Process Material	Potential PCB/Mercury Containing Equipment	Waste Pile	Outfalls	Soil Staining/ Stressed Vegetation	Physical Hazards	Field Sample Recommendation	Field Sampled 2018-2019	Targeted Sample ID	Asbestos Friable/Non-friable	Container Count per Obs. Area	Recon Latitude	Recon Longitude	Observation Number
		1-25 gallon container		35-40 gallon drums		55 gallon drums		>55 gallon drums	ASTs/USTs 25-200 gallons		ASTs/USTs >200 gallons		Pressurized Vessel/ Compressed Cylinders	Auto/Boat Fuel Tanks																		
Description	**Notes:**	Intact	Not Intact	Intact	Not Intact	Intact	Not Intact, carcass	Intact	Intact	Not Intact	Intact	Not Intact																			
Boat House: 1 - Transformer, suspect PCBs, may still have power 6 - 55 gallon drums, appear empty 2 - 55 gallon drum with potential contents 2 - gas cans 3 - fire extinguishers 1 - antique spotlight (PCBs?) 3 - large vats from lean-to (reported empty) 2 - 5 gallon buckets, one labeled "aluminum roof coating"	Drums may require characterization	4				2	6					3				3				2								15	47.114425	-88.500630	IA026
Tan Garage: 1- compressed gas cylinder 1 - 55 gallon drum 3 - 35 gallon drums, 1 appears empty 3 - gas cans 1 - 5 gallon container w/ potential contents	Drums may require characterization	4		2	1	1							1			3							1					9	47.113858	-88.500353	IA027
White Trailer	No items of environmental concern identified																											0	47.113724	-88.500233	IA028
White Explosives Shed	Explosives removed prior to recon. No items of environmental concern identified.																											0	47.113862	-88.501028	IA029
North Tan Building: 1 - 55 gallon drum, empty 11 - 5 gallon plastic buckets, empty 1 - refrigerator (potential freon) Crushed 9x9" floor tile Approx. 50 - 5 gallon plastic buckets, empty Particle board ceiling, deteriorated			61				1									1	2											62	47.114644	-88.498655	IA030
South Tan Building: Collapsed wood debris in main room Asbestos wrapped pipes, pile of shingles Refrigerator (potential freon), crushed 9x9 floor tile																1	2											0	47.114532	-88.498553	IA031
White House Trailer	No items of environmental concern identified																											0	47.114643	-88.498446	IA032

Note: Total Item Count is included on the last page of the table.

APPENDIX C
Reconnaissance, Targeted Sampling, and Potential Chemical and Physical Hazards Inventory
Julio Properties - Dollar Bay

Area: N

Property (Common Name): Julio Marine Dollar Bay

Property Identification Number/Owner: 009-033-055-00/Lawrence Julio

Inspection Date: 9/26/2018, inaccessible areas inspected 12/3/2019 and 11/4/2020.

General Property Description (Significant Landscape Features, Topography, Cover, Etc.,) : The parcel was identified as Tamarack and Osceola Copper Manufacturing Company on the 1907 Sanborn Map. It was the location of John A. Roebling's Sons Copper Manufacturing and Foley Copper Products Company Copper Wire Mill in 1928 and 1949, respectively. The EPA as part of the Torch Lake Superfund Site remedial action capped portions of Area M, N, and O. Dollar Bay Torch Lake EPA Superfund Site as-built drawings (USDA NRCS, 2004) indicate that the cap was placed as part of the Torch Lake Superfund Site Dollar Bay remedial action. The Fourth Five-Year Review Report for the Torch Lake Superfund Site (USEPA, 2018) indicated that construction was completed in 2002; however, the Dollar Bay parcel has not been deleted from the NPL. The capped areas are subject to an on-going DEQ O&M plan. The balance of the areas were not addressed as part of the Torch Lake Superfund Site remedial action. The area is currently the location of mining-era buildings; however, specific present day use is unknown. The property includes portions of the former wire mill operations. The parcel is bound by the Portage Canal to the west and south, by wooded property to the east and residential and privately owned properties to the north and north-west. Many mining-era buildings, some that appear to be used for boat storage, are present in the central portion of the property. Additional boats, heavy equipment and other vehicles are located north of the property buildings. Suspect asbestos containing materials, including roofing, thermal insulation material are observed throughout. Abandoned containers with unknown contents, fuel tanks of various sizes, including a tanker trailer along the shoreline, are also observed both inside and outside of property buildings. A large pile that appears to be building construction material is located near the shoreline. Topography is relatively flat, sloping gently to the Portage Canal and Lake. Public access to the property is restricted by a fence and gate.

Not Intact = filled with scrap, appears or is visibly empty, carcass, major holes, rusted with holes, split seams		Potentially Abandoned Containers																																	
		1-25 gallon container		35-40 gallon drums		55 gallon drums		>55 gallon drums	ASTs/USTs 25-200 gallons		ASTs/USTs >200 gallons		Pressurized Vessel/ Compressed Cylinders	Auto/Boat Fuel Tanks	Batteries	Fire Extinguishers	Other Items	Suspect Asbestos Containing Material	Residual Process Material	Potential PCB/Mercury Containing Equipment	Waste Pile	Outfalls	Soil Staining/ Stressed Vegetation	Physical Hazards	Field Sample Recommendation	Field Sampled 2018-2019	Targeted Sample ID	Asbestos Friable/Non-friable	Container Count per Obs. Area	Recon Latitude	Recon Longitude	Observation Number
		Intact	Not Intact	Intact	Not Intact	Intact	Not Intact, carcass	Intact	Intact	Not Intact	Intact	Not Intact																							
Description	**Notes:**																																		
Cream Trailer in Parking Lot	No items of environmental concern identified																																		
White Tractor Trailer "PAK Technologies"	No items of environmental concern identified																																		
Silver Air Conditioning Unit	Appears empty																																		
Three Sheds - East side of property: Green Shed - includes fiberglass insulation Gray Shingled Shed - includes electrical equipment White Shed w/ Red Shingles - empty	No items of environmental concern identified																																		
Silver Trailer - East side of property: 3 - 55 gallon drums (two labeled "oil," "diesel") 4 - 5 gallon metal containers, empty 15 - 5 gallon buckets w/ oil/material (7 felt empty) 4 - empty 5 gallon plastic gas containers 3 - 1 gallon paint cans fire extinguisher insulation on floor 1 gallon tread cutting oil - partially filled		12	15			3										1		1						Y			30								
Brick Pump House Building w/ Silver roofing	Contains insulation, SACM silver roofing																	2						Y											
Wood Shed with Fire Hydrant: fire hose - deteriorated																		1																	
Open Building Portion: 1 - 55 gallon blue/white drum, contains roofing paper Shingle material, wood debris 5 - 55 gallon drums, empty and crushed or open 1 - 35 gallon drum, unknown contents, open at top 2 yellow fuel boxes, empty 3 toolboxes, empty				1			6											1						Y			7								
Gray Metal Building near north side of property: Approx. 12 Black Meters Electrical switch/breaker boxes																			2																
Light Green Tractor Trailer with scrap tin	No items of environmental concern identified																																		
Red Trailers along north side of property near entrance	No items of environmental concern identified																																		
	Total Item Count:	57	76	35	1	151	38	0	20	1	19	9	32	7	0	4	11	24	2	3	1	0	2	32	20		409								

PHOTOGRAPHIC LOG

Photo 1: View of debris piles located throughout the property. Photo taken 9/27/2018.

Photo 2: View of a 55-gallon drum labeled "synthetic blend engine oil," identified as Observation Number CONT123. Photo taken 9/27/2018.

Photo 3: View of 55-gallon drums with potential unknown contents, identified as Observation Number CONT121. Photo taken 9/27/2018.

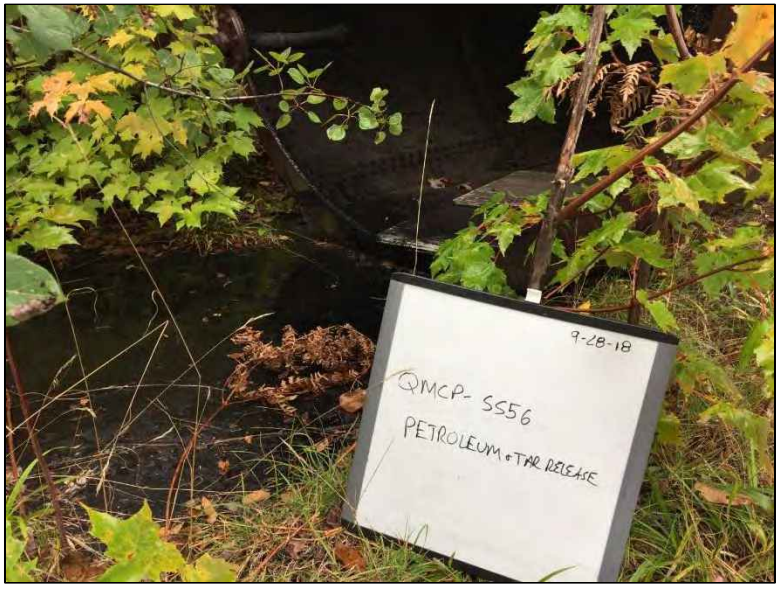


Photo 4: View of a petroleum and tar release sampled as QMCP-SS56. Photo taken 9/28/2018.

Photo 5: View looking down to stained soils, identified as Container Area CONT124. Photo taken 9/27/2018.

Photo 6: View of potential mercury containing electrical components, identified as observation SHg005. Photo taken 9/27/2018.

Photo 7: View looking northwest to the scrap dump bin outside the gates. Photo taken 09/24/2019.

Photo 8: View looking southwest to the area outside the gates closed to access and dumping. Photo taken 10/28/2019.

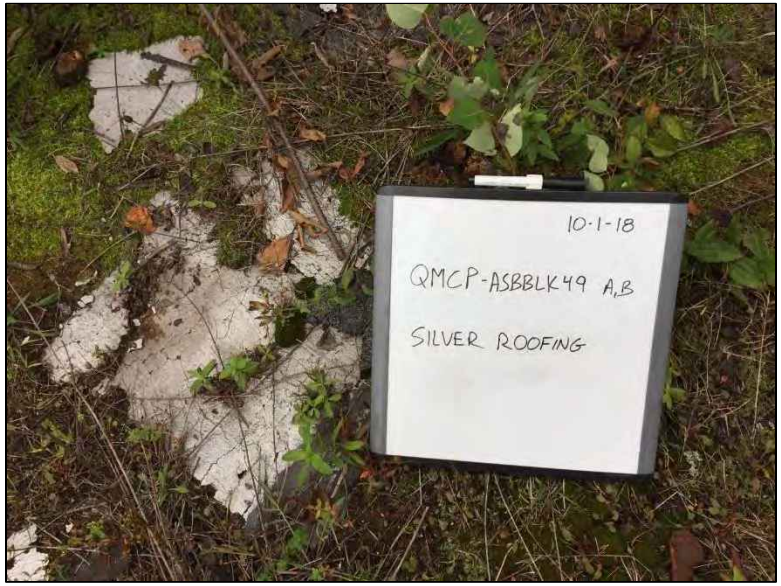


Photo 1: View of silver roofing material sampled as QMCP-ASBBLK49. Photo taken 10/1/2018.

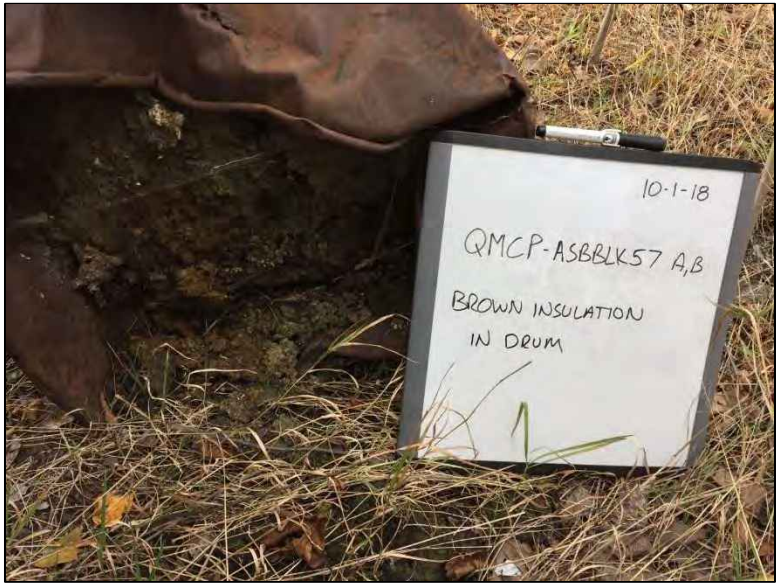


Photo 2: View of brown asbestos insulation stored in an open drum sampled as QMCP-ASBBLK57. Photo taken 10/1/2018.

Photo 3: View of 55-gallon drums with potential unknown contents, identified as Observation Number CONT106. Photo taken 9/26/2018.

Photo 4: View looking northeast to a tanker with potential unknown contents along the southern shoreline. Photo taken 9/26/2018.

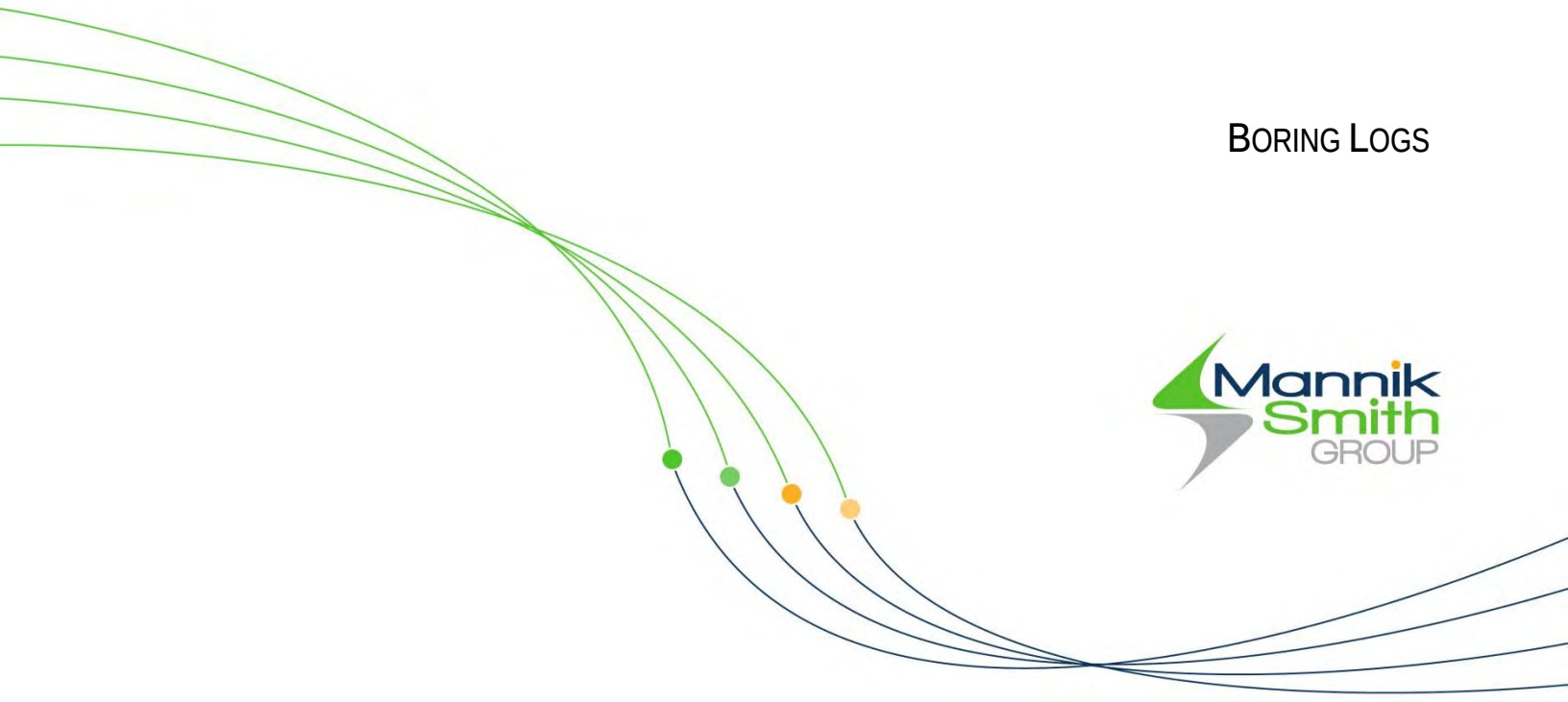
Photo 5: View of debris pile with suspect asbestos containing materials, identified as Observation Number SACM036. Photo taken 9/26/2018.

Photo 6: View of black soot material sampled as QMCP-SS57. Photo taken 10/1/2018.

Photo 7: View of a leaking processing vat and stained soil on the ground. Photo taken 7/25/2019.

Photo 8: View of the "No Dumping" sign placed outside the gate to the property. Photo taken 10/7/2019.

BORING LOGS



EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

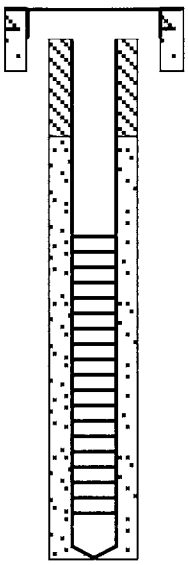
BOREHOLE LOG

BORING/WELL: MW-7

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, east of main building

DATE: 8-19-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 – 1000)
		Grd.	0				
		NO CUTTINGS					
			5				
		E.O.B.	10				
			15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 100.3
T.O.C.: 100.00
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.114280875
LONGITUDE: -88.498748746
DATUM: MichGeoRef
NORTHING: 732165.076
EASTING: 310290.297

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

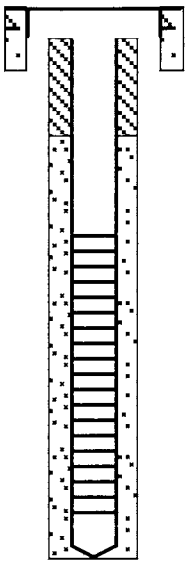
BOREHOLE LOG

BORING/WELL: MW-8

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, south of main building

DATE: 8-19-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 – 1000)
		Grd. NO CUTTINGS E.O.B.	0 5 10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 101.22
T.O.C.: 100.72
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.113890118
LONGITUDE: -88.499700383
DATUM: MichGeoRef
NORTHING: 732123.964
EASTING: 310216.750

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

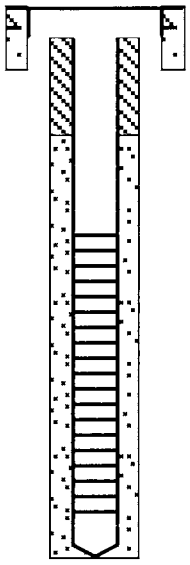
BOREHOLE LOG

BORING/WELL: MW-9

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, west of main building

DATE: 8-19-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 – 1000)
		Grd.	0				
		NO CUTTINGS	5				
		E.O.B.	10				
			15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 100.75
T.O.C.: 100.54
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.113793843
LONGITUDE: -88.500818338
DATUM: MichGeoRef
NORTHING: 732115.968
EASTING: 310131.631

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

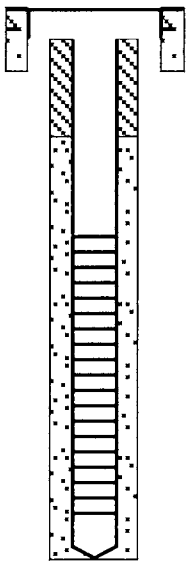
BOREHOLE LOG

BORING/WELL: MW-10

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, south side of north warehouse

DATE: 8-19-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd. NO CUTTINGS E.O.B.	0 5 10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 101.82
T.O.C.: 101.79
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.114257953
LONGITUDE: -88.500710366
DATUM: MichGeoRef
NORTHING: 732167.263
EASTING: 310141.460

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

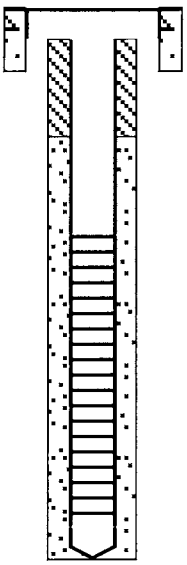
BOREHOLE LOG

BORING/WELL: MW-11

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, west side of north warehouse

DATE: 8-20-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd. NO CUTTINGS	0 5				
		E.O.B.	10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 101.28
T.O.C.: 101.02
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.114135337
LONGITUDE: -88.500985281
DATUM: MichGeoRef
NORTHING: 732154.306
EASTING: 310120.178

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

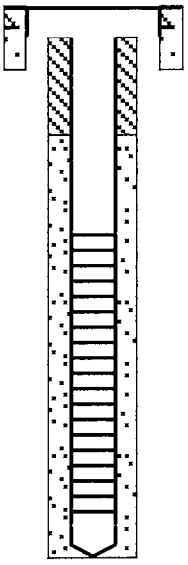
BOREHOLE LOG

BORING/WELL: MW-12

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, center of north fence line

DATE: 8-20-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd. NO CUTTINGS	0 5				
		E.O.B.	10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 99.82
T.O.C.: 99.32
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.115260028
LONGITUDE: -88.500572219
DATUM: MichGeoRef
NORTHING: 732278.245
EASTING: 310155.479

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

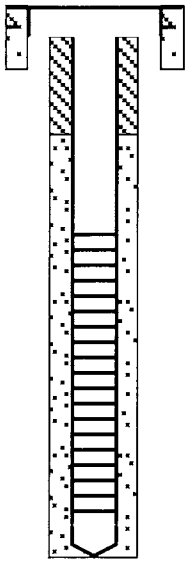
BOREHOLE LOG

BORING/WELL: MW-13

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, east side of main shop

DATE: 8-20-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 – 1000)
		Grd. NO CUTTINGS E.O.B.	0 5 10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 102.66
T.O.C.: 102.23
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.114515875
LONGITUDE: -88.499337469
DATUM: MichGeoRef
NORTHING: 732192.601
EASTING: 310246.483

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

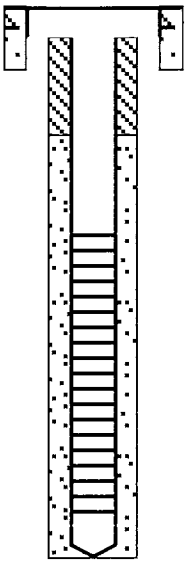
BOREHOLE LOG

BORING/WELL: MW-14

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Boat Yard, east side norh warehouse

DATE: 8-20-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd. NO CUTTINGS E.O.B.	0 5 10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 102.34
T.O.C.: 101.86
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.114664181
LONGITUDE: -88.500197119
DATUM: MichGeoRef
NORTHING: 732211.150
EASTING: 310181.817

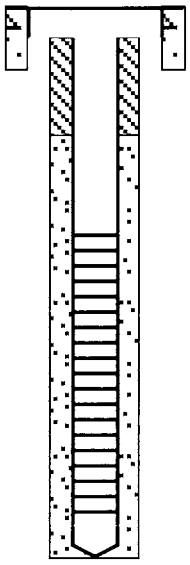
EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: MW-15

SITE: Ripley Waterfront - Julio's Properties

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 33
DATE: 8-20-19
DRILLER: Scott Densteadt
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8.5 feet
LOCATION DESCRIPTION: Julio's Boat Yard, near NE corner of shop building
ERNIE#: 31000063

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd. NO CUTTINGS	0 5				
		E.O.B.	10 15				

VERTICAL DATUM: Relative to T.O.C. of MW-7
GRD. ELEVATION: 102.63
T.O.C.: 102.34
S.W.L.: NA
CASING: 2-inch pvc
SCREEN: 2-inch x 5-foot pvc
WELL DEPTH: 8.5 feet
COMPLETION NOTES: Sand to 2.5 feet, benseal to 1 foot, flush mount

LATITUDE: 47.114611514
LONGITUDE: -88.499951518
DATUM: MichGeoRef
NORTHING: 732204.707
EASTING: 310200.256

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: GW-43

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 10 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		NO CUTTINGS				No soil samples collected	
			5				
						Groundwater sample collected from 6' - 10'	
			10				
		E.O.B.					
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.115988300
LONGITUDE: -88.498881837
DATUM: MichGeoRef
NORTHING: 732355.066
EASTING: 310286.238

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: SB/GW-44

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Medium to coarse, brown, saturated at 4 feet				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	
			5			Soil samples collected from 0 - 6" and 6" -5'	
		NO CUTTINGS				Groundwater sample collected from 4' - 8'	
		E.O.B.					
			10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.114283990
LONGITUDE: -88.501128389
DATUM: MichGeoRef
NORTHING: 732171.165
EASTING: 310109.852

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: SB/GW-45

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 9 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Medium to coarse, brown, saturated at 4 feet				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	
			5			Soil samples collected from 0 - 6" and 6" - 5'	
		NO CUTTINGS				Groundwater sample collected from 5' - 9'	
		E.O.B.	10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.113818060
LONGITUDE: -88.500720932
DATUM: MichGeoRef
NORTHING: 732118.423
EASTING: 310139.103

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: SB/GW-46

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 8 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Medium to coarse, brown, saturated at 4 feet				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	
		NO CUTTINGS	5			Soil sample collected from 0 - 2' Groundwater sample collected from 4' - 8'	
		E.O.B.	10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.114064200
LONGITUDE: -88.500247928
DATUM: MichGeoRef
NORTHING: 732144.624
EASTING: 310175.843

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: SB/GW-47

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 9 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Medium to coarse, brown, saturated at 5 feet				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	
			5			Soil samples collected from 0 - 6" and 6" - 5'	
		NO CUTTINGS				Groundwater sample collected from 5' - 9'	
		E.O.B.	10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.113866670
LONGITUDE: -88.499808382
DATUM: MichGeoRef
NORTHING: 732121.620
EASTING: 310208.477

DEQ Remediation and Redevelopment Division

BORING/WELL: SB/GW-48

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 9 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 - 1000)
		Grd.	0				
		SAND Medium to coarse, brown, saturated at 4 feet				0 ppm Soil samples collected from 0 - 6" and 6" - 5" 0 ppm 0 ppm 0 ppm 0 ppm	
		NO CUTTINGS	5			Groundwater sample collected from 7' - 9' NAPL present - no sample submitted to the lab	
		E.O.B.	10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.114609100
LONGITUDE: -88.499941477
DATUM: MichGeoRef
NORTHING: 732204.414
EASTING: 310201.009

DEQ Remediation and Redevelopment Division

BORING/WELL: SB/GW-49

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 9 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND and GRAVEL with debris				Soil samples collected from 0 - 6" and 6" - 4'	
		SAND Medium to coarse, brown, saturated	5			Groundwater sample collected from 5' - 9'	
		NO CUTTINGS					
		E.O.B.	10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.114293390
LONGITUDE: -88.498742999
DATUM: MichGeoRef
NORTHING: 732166.452
EASTING: 310290.777

DEQ Remediation and Redevelopment Division

BORING/WELL: SB/GW-50

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Boat Yard

DATE: 9-10-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 6 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 - 1000)
		Grd.	0				
		SAND Medium to coarse, brown, saturated at 2 feet				0 ppm Soil sample collected from 0 - 2'	
						0 ppm	
						0 ppm Groundwater sample collected from 2' - 6'	
						0 ppm	
			5			0 ppm	
		NO CUTTINGS					
		E.O.B.					
			10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.113827920
LONGITUDE: -88.498173478
DATUM: MichGeoRef
NORTHING: 732113.372
EASTING: 310332.322

Remediation and Redevelopment Division

BORING/WELL: SB/GW-56

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 32
LOCATION DESCRIPTION: Julio's Dollar Bay Yard

DATE: 9-9-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 9 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Fine to medium, brown, saturated at 4.5 feet				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	
		NO CUTTINGS Possible Clay	5			No groundwater sample collected	
		E.O.B.	10				
			15				
			20				

Soil samples collected from 0 - 6" and 6" - 4'

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.118326650
LONGITUDE: -88.512118817
DATUM: MichGeoRef
NORTHING: 732747.837
EASTING: 309290.772

Remediation and Redevelopment Division

BORING/WELL: SB/GW-57

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Yard

DATE: 9-9-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Hand Auger
TOTAL DEPTH: 4 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Fine to medium, brown, dry Refusal at 4 feet at 3 locations				Soil sample collected from 0 - 4'	
		E.O.B.	5			No groundwater sample collected	
			10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.119073260
LONGITUDE: -88.508815207
DATUM: MichGeoRef
NORTHING: 732721.768
EASTING: 309543.926

DEQ Remediation and Redevelopment Division

BORING/WELL: SB/GW-58

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 32
LOCATION DESCRIPTION: Julio's Dollar Bay Yard

DATE: 9-9-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 5 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND Fine to medium, brown, dry				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	Soil samples collected from 0 - 6" and 6" - 5'
		Refusal at 5 feet at 3 locations	5				
		E.O.B.					No groundwater sample collected
			10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.118716810
LONGITUDE: -88.510405447
DATUM: MichGeoRef
NORTHING: 732686.025
EASTING: 309422.078

Remediation and Redevelopment Division

BORING/WELL: SB/GW-59

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Franklin
TOWN: 55N
RANGE: 33W
SECTION: 32
LOCATION DESCRIPTION: Julio's Dollar Bay Yard

DATE: 9-9-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 9 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 - 1000)
		Grd.	0				
		SAND Fine to medium, brown, saturated at 4.5 feet				0 ppm 0 ppm 0 ppm 0 ppm 0 ppm	
		NO CUTTINGS	5			Soil samples collected from 0 - 6" and 6" - 4' Groundwater sample collected from 5' - 9'	
		E.O.B.	10				
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.119155980
LONGITUDE: -88.510962921
DATUM: MichGeoRef
NORTHING: 732736.161
EASTING: 309381.366

DEQ Remediation and Redevelopment Division

BORING/WELL: SB/GW-60

SITE: AMW - Quincy Mining Company Portage

BOREHOLE LOG

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Julio's Dollar Bay Yard

DATE: 9-9-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 11 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm 0 1000
		Grd.	0				
		SAND and GRAVEL				0 ppm Soil samples collected from 0 - 6" and 6" - 6'	
						0 ppm	
						0 ppm	
		SAND Fine to medium, brown, saturated at 7 feet				1 ppm	
			5			5 ppm	
						5 ppm	
						170 ppm	
						125 ppm Groundwater sample collected from 7' - 11'	
		NO CUTTINGS				200 ppm	
			10				
		E.O.B.					
			15				
			20				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.119591020
LONGITUDE: -88.509501087
DATUM: MichGeoRef
NORTHING: 732780.945
EASTING: 309493.755

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: GW-72

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: North side of Dollar Bay Schools

DATE: 9-11-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 16 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 – 1000)
		Grd.	0				
		NO CUTTINGS Attempt to collect a groundwater sample Geoprobe rods broke at 16 feet.	5 10 15				
		E.O.B.	20 25 30				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.117696480
LONGITUDE: -88.509587198
DATUM: MichGeoRef
NORTHING: 732570.699
EASTING: 309480.502

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: GW-73

SITE: AMW - Quincy Mining Company Portage

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: North side of Dollar Bay Schools

DATE: 9-11-18
DRILLER: Zack Nichols
GEOLOGIST: Jeff Pincumbe
DRILL METHOD: Geoprobe
TOTAL DEPTH: 24 feet
ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS	PID ppm (0 – 1000)
		Grd.	0				
		NO CUTTINGS Groundwater sample only	5				
			10				
			15				
			20				
		E.O.B.				Groundwater sample collected from 22' - 24'	
			25				
			30				

VERTICAL DATUM: NA
GRD. ELEVATION: NA
T.O.C.: NA
S.W.L.: NA
CASING: NA
SCREEN: NA
WELL DEPTH: NA
COMPLETION NOTES: Backfilled with cuttings and bentonite

LATITUDE: 47.118075110
LONGITUDE: -88.508728168
DATUM: MichGeoRef
NORTHING: 732610.678
EASTING: 309546.984

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: QMCP-SB116

SITE: Abandoned Mining Wastes

COUNTY: Houghton
TOWNSHIP:
TOWN:
RANGE:
SECTION:
LOCATION DESCRIPTION: Dollar Bay

DATE: 9/26/20
DRILLER: Chris Coulter
GEOLOGIST: Adam Donne
DRILL METHOD: Geoprobe
TOTAL DEPTH: 10'

ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS PID Readings PPM	PID ppm 0 1000
		Grd.	0				
		Fine to medium sand with organics, with medium to coarse gravel, brown, moist				0	
		Medium sand, some fine sand, with fine to medium gravel, brown, moist				0	
						0	
		Fine to medium gravel, with fine to medium sand, trace coarse gravel, brown, moist				0	
			5			0	
		Fine to coarse gravel with large cobble at 6', brown to reddish brown, wet at 6.5'				0	
		Coarse sand to coarse gravel, brown to reddish brown, wet				0	
						0	Groundwater sample collected from 6-10'
		No recovery - screen pushed to 10'				0	
			10			0	

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN: Drop-Out Screen, 6-10'
WELL DEPTH: 10'
COMPLETION NOTES:

LATITUDE: 47.114557663
LONGITUDE: -88.498326018
DATUM: MiGeoRef
NORTHING: 732194.803
EASTING: 310323.332

EGLE
MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY

BOREHOLE LOG

BORING/WELL: QMCP-SB117

SITE: Abandoned Mining Wastes

COUNTY: Houghton
TOWNSHIP:
TOWN:
RANGE:
SECTION:
LOCATION DESCRIPTION: Dollar Bay

DATE: 9/26/20
DRILLER: Chris Coulter
GEOLOGIST: Adam Donne
DRILL METHOD: Geoprobe
TOTAL DEPTH: 17'

ERNIE#: 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE ID	SAMPLE TYPE	FIELD SCREENING RESULTS PID Readings PPM	PID ppm 0 1000
		Grd.	0			0	
		Fine silty sand with organics, dark brown, moist				0	
		Fine to medium poorly sorted sand with silt, some fine to medium gravel. Fine to coarse gravel seam at 2.5', brown to dark brown, moist	5			0	
		Fine to medium poorly sorted sand with fine to coarse gravel, brown, moist				0	
		Fine to medium sand with fine gravel, brown to dark brown, wet (possible perched water)	10			0	
		Silty, sandy organic matter (primarily wood), black, moist				0	
		Organic matter with silty clay, blackish gray, wet				0	
		Fine to medium sand, brown, wet	15			0	
		Fine to medium sand with fine to medium gravel, brown, wet				0	
		E.O.B.	20			Groundwater sample taken from 13-17'	

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN: Drop-Out Screen, 13-17'
WELL DEPTH: 17'
COMPLETION NOTES:

LATITUDE: 47.114098534
LONGITUDE: -88.497910966
DATUM: MiGeoRef
NORTHING: 732142.800
EASTING: 310353.185

SEDIMENT CORE LOGS

Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: QMCP-SD09

SITE: Abandoned Mining Wastes Torch Lake

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Quincy Mining Company Portage

DATE: 9/6/2018
DRILLER: B. Lower
GEOLOGIST: B. Eustice
DRILL METHOD: Vibecore
TOTAL DEPTH: Unknown in 21.4' of water
ERNIE ID# 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE TYPE	SAMPLE ID	NOTES	Water Quality Meter
		Lake Bottom	0				
		SANDY GRAVEL Dark brown, few fines and wood debris.			QMCP-SD09-0-6"		
		E.O.B.					
			5				

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN:
WELL DEPTH:
COMPLETION NOTES:

LATITUDE: 47.115207764
LONGITUDE: -88.503007450
PROJECTION: MiGeoRef
NORTHING: 732278.321
EASTING: 309970.626

Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: QMCP-SD10

SITE: Abandoned Mining Wastes Torch Lake

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Quincy Mining Company Portage

DATE: 9/6/2018
DRILLER: B. Lower
GEOLOGIST: B. Eustice
DRILL METHOD: Vibecore
TOTAL DEPTH: 6' in 11.1' of water
ERNIE ID# 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE TYPE	SAMPLE ID	NOTES	Water Quality Meter
		Lake Bottom	0			First core attempt in location was abandoned due poor recovery; however, the fines had oily sheen.	
		FINES Dark brown - black, organics (wood), soft, loose.			QMCP-SD10-0-4"		
		SAND Dark brown, medium grain, well sorted.			QMCP-SD10-4-11"		
		No recovery					
			5				
		E.O.B.					

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN:
WELL DEPTH:
COMPLETION NOTES:

LATITUDE: 47.113501
LONGITUDE: -88.4998740
PROJECTION: MiGeoRef
NORTHING: 732081.158
EASTING: 310202.208

Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: QMCP-SD11

SITE: Abandoned Mining Wastes Torch Lake

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Quincy Mining Company Portage

DATE: 9/6/2018
DRILLER: B. Lower
GEOLOGIST: B. Eustice
DRILL METHOD: Vibecore
TOTAL DEPTH: 0.83' in 6.6' of water
ERNIE ID# 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE TYPE	SAMPLE ID	NOTES	Water Quality Meter
		Lake Bottom	0				
		SAND Dark brown, medium grain, well sorted.			QMCP-SD11-0-6"		
		SAND Dark brown, medium grain, some organics (roots), well sorted.			QMCP-SD11-6-12"		
		E.O.B.					
			5				

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN:
WELL DEPTH:
COMPLETION NOTES:

LATITUDE: 47.114547625
LONGITUDE: -88.496671411
PROJECTION: MiGeoRef
NORTHING: 732189.699
EASTING: 310448.771

Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: QMCP-SD12

SITE: Abandoned Mining Wastes Torch Lake

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Quincy Mining Company Portage

DATE: 9/6/2018
DRILLER: B. Lower
GEOLOGIST: B. Eustice
DRILL METHOD: Vibecore
TOTAL DEPTH: 5.1' in 7.5' of water
ERNIE ID# 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE TYPE	SAMPLE ID	NOTES	Water Quality Meter
		Lake Bottom	0				
		FINES Brown, with organics (mostly in top 1ft), cohesive, nonplastic, loose.			QMCP-SD12-0-12"		
					QMCP-SD12-12-23"		
		No recovery					
			5				
		E.O.B.					

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN:
WELL DEPTH:
COMPLETION NOTES:

LATITUDE: 47.117938616
LONGITUDE: -88.495962233
PROJECTION: MiGeoRef
NORTHING: 732564.678
EASTING: 310514.519

Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: QMCP-SD13

SITE: Abandoned Mining Wastes Torch Lake

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Quincy Mining Company Portage

DATE: 9/7/2018
DRILLER: B. Lower
GEOLOGIST: B. Eustice
DRILL METHOD: Gas Powered Post Pounder
TOTAL DEPTH: 8' in 3.8' of water
ERNIE ID# 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE TYPE	SAMPLE ID	NOTES	Water Quality Meter
		Lake Bottom	0				
		SAND Dark brown, coarse grain, organics, trace gravel.			QMCP-SD13-0-7"		
		PEAT Peat like organics with fines.					
		FINES Dark brown, pudding like texture, organics, cohesive, nonplastic, very soft.			QMCP-SD13-7-38"		
		No recovery	5				
		E.O.B.	10				

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN:
WELL DEPTH:
COMPLETION NOTES:

LATITUDE: 47.118525650
LONGITUDE: -88.492531923
PROJECTION: MiGeoRef
NORTHING: 732621.630
EASTING: 310776.703

DEQ Remediation and Redevelopment Division

BOREHOLE LOG

BORING/WELL: QMCP-SD14

SITE: Abandoned Mining Wastes Torch Lake

COUNTY: Houghton
TOWNSHIP: Osceola
TOWN: 55N
RANGE: 33W
SECTION: 33
LOCATION DESCRIPTION: Quincy Mining Company Portage

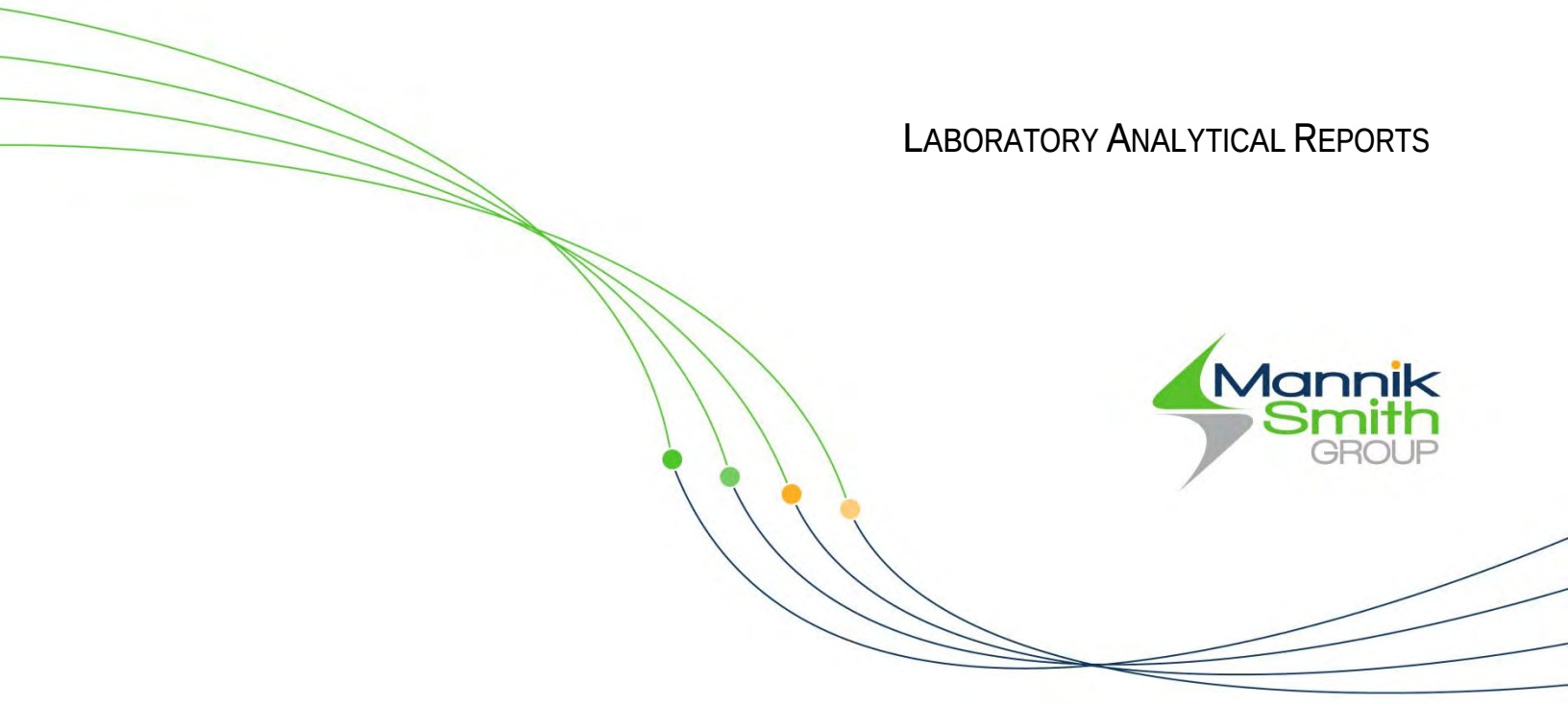
DATE: 9/7/2018
DRILLER: B. Lower
GEOLOGIST: B. Eustice
DRILL METHOD: Gas Powered Post Pounder
TOTAL DEPTH: 7' in 0.7' of water
ERNIE ID# 31000098

WELL CONSTRUCTION	LITHOLOGIC LOG	DESCRIPTION	DEPTH	SAMPLE TYPE	SAMPLE ID	NOTES	Water Quality Meter
		Lake Bottom	0				
		SAND Dark brown, medium grain, well sorted, moist.			QMCP-SD14-0-12"		
		SAND Brown, medium grain, well sorted, moist			QMCP-SD14-12-36"		
			5				
		No recovery					
		E.O.B.					
			10				

VERTICAL DATUM:
GRD. ELEVATION:
T.O.C.:
S.W.L.:
CASING:
SCREEN:
WELL DEPTH:
COMPLETION NOTES:

LATITUDE: 47.113643073
LONGITUDE: -88.496077822
PROJECTION: MiGeoRef
NORTHING: 732087.786
EASTING: 310490.592

LABORATORY ANALYTICAL REPORTS



Appendix G

Laboratory Analytical Reports

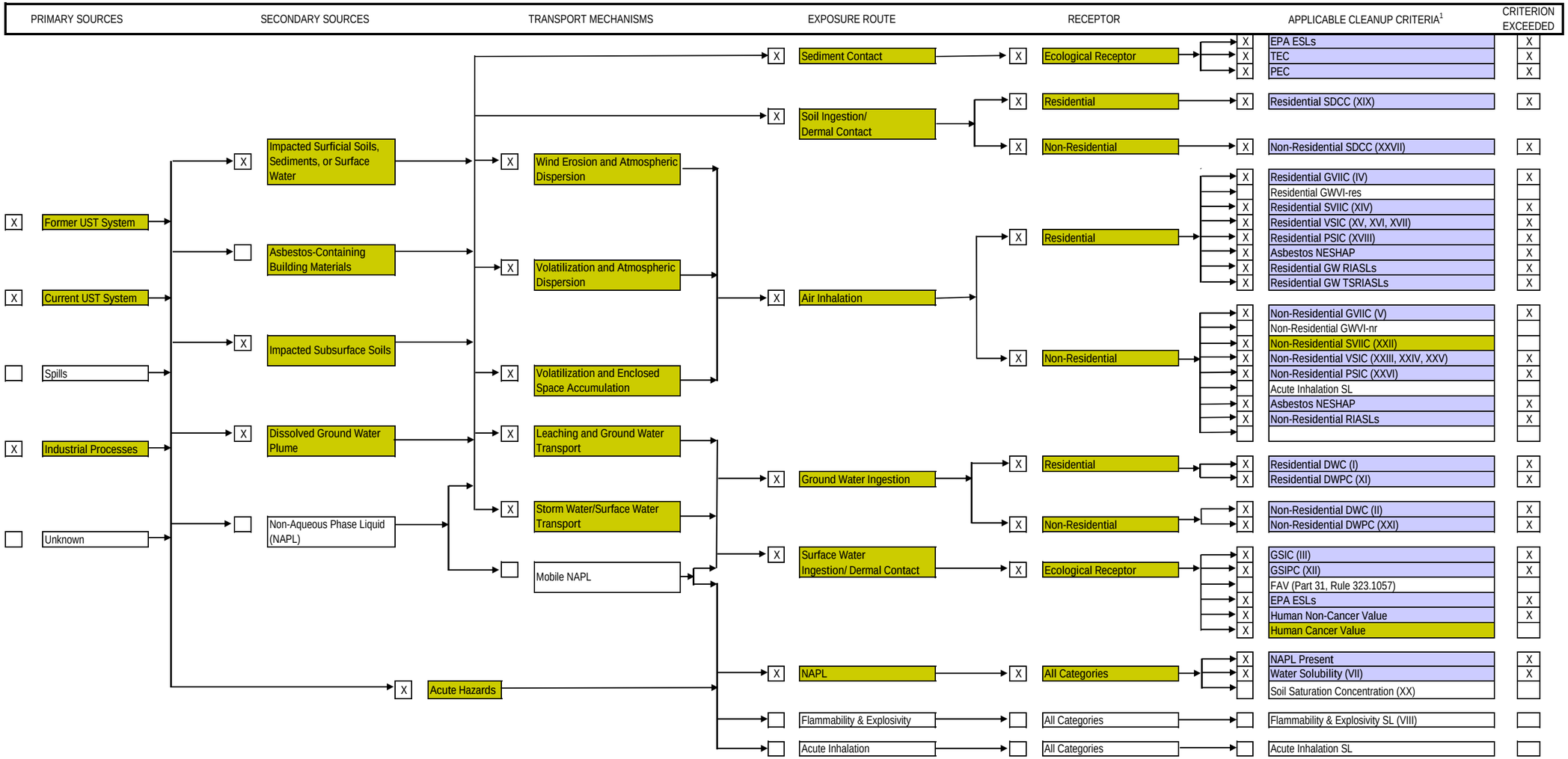
Bound Separately

CONCEPTUAL SITE MODEL – EXPOSURE PATHWAY EVALUATION

Conceptual Site Model - Exposure Pathway Evaluation

Quincy Mining Company Portage Operations Area

Abandoned Mining Wastes - Torch Lake Non-Superfund Site



Notes:

X Indicates this portion of exposure pathway is present at QMCP.

X Indicates this criterion is exceeded at QMCP.

[1] DEQ-RD Op Memo 1 (updated December 30, 2013), unless otherwise noted

Roman numerals indicate EGLE criterion number

[2] Classification (Adapted from EGLE Op Memo 3)

1 Immediate (Exposure is currently occurring).

2 Short term threat (between 0 and 2 years until exposure)

3 Long term threat (more than 2 years until exposure)

4 No demonstratable long-term threat

Future Classification - Classification expected if remedy is successful.

Drinking water and groundwater/surface water pathway criteria exceedances for metals are excluded from the evaluation.