ADDENDUM 1 TO THE SITE ASSESSMENT REPORT FOR THE IRONWOOD MANUFACTURED GAS PLANT SITE IRONWOOD, GOGEBIC COUNTY, MICHIGAN

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region V Emergency Response Branch
2984 Shawano Avenue
Green Bay, WI 54313-6727

Prepared by:

WESTON SOLUTIONS, INC.
600 East Lakeshore Drive, Suite 200
Houghton, MI 49931

Date Prepared:	July 13, 2012
Technical Direction Document No.:	S05-0001-1011-003
Document Control No.:	1273-2A-AWBY
Contract No.:	EP-S5-06-04
WESTON START Project Manager:	Daniel Liebau
Telephone No.:	906-482-2361
U.S. EPA On-Scene Coordinator:	Kathy Halbur

ADDENDUM 1 TO THE SITE ASSESSMENT REPORT FOR THE IRONWOOD MANUFACTURED GAS PLANT SITE IRONWOOD, GOGEBIC COUNTY, MICHIGAN

Prepared for:

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
Region V Emergency Response Branch
2984 Shawano Avenue
Green Bay, WI 54313-6727

Prepared by:

WESTON SOLUTIONS, INC.
600 East Lakeshore Drive, Suite 200
Houghton, MI 49931

July 13, 2012

Prepared by: _____ Date: 7/13/2012
Christine Tufts
WESTON START Associate Geoscientist

Reviewed and Approved by: _____ Date: 7/13/12
Daniel Liebau
WESTON START Project Manager

TABLE OF CONTENTS

1. INTRODUCTION 1

2. SITE BACKGROUND 3

2.1 SITE DESCRIPTION 3

2.2 SITE BACKGROUND 4

2.3 POTENTIAL COCS 6

2.4 ASSESSMENT ACTIVITIES PERFORMED TO DATE 6

3. SUPPLEMENTAL SITE ASSESSMENT ACTIVITIES 9

3.1 SUBSURFACE SOIL CHARACTERIZATION 10

3.1.1 Subsurface Soil Borings 10

3.1.2 Test Pits 10

3.2 GROUNDWATER WELL INSTALLATION AND SAMPLING 11

3.3 SURFACE WATER AND SEDIMENT SAMPLING 12

3.3.1 Surface Water Sampling 13

3.3.2 Sediment Sampling 13

3.4 POTABLE WELL SAMPLING 14

4. FIELD SCREENING AND ANALYTICAL RESULTS 15

4.1 SUBSURFACE SOIL CHARACTERIZATION 15

4.1.1 Subsurface Soil Borings 15

4.1.2 Test Pits 16

4.1.3 Waste Characterization Sample Analytical Results 17

4.1.4 Geotechnical Sample Analytical Results 19

4.2 GROUNDWATER SAMPLE ANALYTICAL RESULTS 20

4.3 SURFACE WATER AND SEDIMENT ANALYTICAL RESULTS 22

4.3.1 Surface Water Sample Analytical Results 22

4.3.2 Sediment Sample Analytical Results 23

4.4 POTABLE WELL SAMPLE ANALYTICAL RESULTS 25

4.5 PRELIMINARY CONCEPTUAL SITE MODEL 25

5. THREATS TO HUMAN HEALTH AND THE ENVIRONMENT 28

6. CONCLUSIONS 31

7. REFERENCES 36

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

LIST OF FIGURES

Figure 2-1 Site Location Map

Figure 2-2 Site Layout and Historical Features Map

Figure 3-1 Soil Boring and Temporary Monitoring Well Location Map

Figure 3-2 Test Pit Location Map

Figure 3-3 Surface Water and Sediment Sampling Location Map

Figure 3-4 Residential Well Sampling Location Map

Figure 4-1 VOC and SVOC Groundwater Analytical Results Exceeding GSI and Direct Contact Screening Criteria

Figure 4-2 Inorganic Groundwater Analytical Results Exceeding GSI and Direct Contact Screening Criteria

Figure 4-3 VOC and SVOC Sediment Analytical Results Exceeding GSI and Direct Contact Screening Criteria

Figure 4-4 Inorganic Sediment Analytical Results Exceeding GSI and Direct Contact Screening Criteria

Figure 4-5 Preliminary Conceptual Site Model Cross-Sectional Transects

Figure 4-6 Preliminary Conceptual Site Model – East-West Profile

Figure 4-7 Preliminary Conceptual Site Model – North-South Profile

Figure 6-1 Source Area Extent of Contamination Map

LIST OF TABLES

Table 4-1a Waste Characterization Soil Sample Analytical Results (Soil)

Table 4-1b Waste Characterization Groundwater Sample Analytical Results (Water)

Table 4-2 Groundwater Sample Analytical Results - April 2012

Table 4-3 Surface Water Sample Analytical Results - April 2012

Table 4-4 Sediment Sample Analytical Results - April 2012

Table 4-5 Residential Well Sample Analytical Results - April 2012

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

LIST OF ATTACHMENTS

Attachment A Photographic Documentation

Attachment B Boring Logs

Attachment C Test Pit Logs

Attachment D Laboratory Analytical Reports

Attachment E Geotechnical Report

Attachment F Residential Water Well Records

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

LIST OF ABBREVIATIONS AND ACRONYMS

µg/kg	Microgram per kilogram
µg/L	Micrograms per liter
%	Percent
ATV	All-terrain vehicle
bgs	Below ground surface
C. dubia	*Ceriodaphnia dubia*
C. tentans	*Chironomus tentan*s
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
COC	Chemical of concern
CWG	Carbureted water gas
ESL	Ecological Screening Level
FSP	Field Sampling Plan
ft	Foot
ft^2	Square foot
ft^3	Cubic foot
GSI	Groundwater-surface water interface
H. azteca	*Hyalella azteca*
MDEQ	Michigan Department of Environmental Quality
mg/kg	Milligram per kilogram
MGP	Manufactured Gas Plant
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NYSDEC	New York State Department of Environmental Conservation
OSC	On-Scene Coordinator
Pace	Pace Analytical Services, Inc.
PCB	Polychlorinated biphenyl
POTW	Publically owned treatment works
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RDWC	Residential Drinking Water Criteria

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

LIST OF ABBREVIATIONS AND ACRONYMS (CONTINUED)

SA	Site Assessment
SI	Site Inspection
START	Superfund Technical Assessment and Response Team
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leaching Procedure
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile organic compound
WESTON	Weston Solutions, Inc.
WDNR	Wisconsin Department of Natural Resources
WQV	Water Quality Value
WWTP	Wastewater treatment plant

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

1. INTRODUCTION

Under Technical Direction Document No. S05-0001-1011-003, the United States Environmental Protection Agency (U.S. EPA) tasked the Weston Solutions, Inc. (WESTON®), Superfund Technical Assessment and Response Team (START) to perform a Supplemental Site Assessment (SA) at the Ironwood Manufactured Gas Plant (MGP) Site in Ironwood, Gogebic County, Michigan (the Site). Specifically, the U.S. EPA On-Scene Coordinators (OSCs), Ms. Kathy Halbur and Jacob Hassan, tasked WESTON START with the following activities:

- Installation of additional soil borings to determine the horizontal and vertical extent of subsurface contamination associated with buried MGP waste from the Site
- Excavation of test pits to locate and evaluate shallow MGP structures, piping, activity areas, and the nature and magnitude of waste and process residual wastes present in the subsurface
- Collection of soil and groundwater samples from the test pits for waste characterization analysis
- Collection of groundwater samples from temporary monitoring wells to delineate potential groundwater impacts north of the Site
- Collection of surface water and sediment samples to assess biological toxicity and determine the downstream extent of impacts to the Montreal River
- Collection of groundwater samples from residential wells north of the Site to determine if the Site is impacting drinking water in the wells
- Mapping activities to accurately locate Site features and investigative locations

WESTON START, accompanied by the Michigan Department of Environmental Quality (MDEQ) and Wisconsin Department of Natural Resources (WDNR), performed field activities at the Site under the direction of U.S. EPA OSC Halbur.

This Supplemental SA Report is organized into the following sections:

- **Introduction –** Provides a brief description of the objectives and scope of the Supplemental SA activities
- **Site Background** – Details the Site description, historical background, potential chemicals of concern (COC) based on the Site history, and assessment activities performed to date

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

- **Supplemental SA Activities –** Discusses the field screening methods and sampling techniques implemented during the field activities
- **Field Screening and Analytical Results –** Discusses the results of field screening and laboratory analysis of samples collected during the field activities
- **Threats to Human Health and the Environment –** Identifies Site-related conditions that warrant a removal action under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)
- **Conclusions –** Summarizes Supplemental SA findings based on the Supplemental SA results
- **References –** Lists references used to prepare this report

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

2. SITE BACKGROUND

This section discusses the Site description, historical background, potential COCs, and assessment activities performed to date.

2.1 SITE DESCRIPTION

The Site does not have a physical address. It is located on the northwest corner of Hemlock Street and West Ayer Street in Ironwood, Gogebic County, Michigan (**Figure 2-1**). The Site coordinates are 46.4517 North latitude and -90.1778 West longitude. The Site lies in the southern portion of Section 21, Township 47 North, and Range 47 West. The Site's Gogebic County Property Tax Identification Numbers are 2752-21-477-010 (northern portion) and 2752-21-478-010 (southwestern portion).

The City of Ironwood presently owns the Site, and historical records identify the City of Ironwood as the owner and operator of the former Ironwood Gas Works. The Site is accessible from Hemlock Street and is bounded to the west by the Montreal River; to the north by the former Chicago and Northwestern Railroad right-of-way (now an all-terrain vehicle (ATV) trail); to the south by residential properties and Fahrner Excavating, which occupies a historical building associated with electric trolley car operations; and to the east by residential properties.

The Site property encompasses approximately 2.1 acres and currently is vacant. The building on an adjacent property owned by Fahrner Excavating existed during plant operations and reportedly was used as a storage and maintenance facility for electric trolley cars. Operations at Fahrner Excavating appear to have infringed onto the Site's property boundaries, including debris, rock, and soil piles placed on the northern portion of the Site and household debris and equipment placed west of the Fahrner Excavating building. A small, concrete structure measuring approximately 6 by 6 feet (ft) is located between the building and the Montreal River. This structure potentially extends below grade. **Figure 2-2** shows the Site layout and historical features, including the approximate limits of the debris, rock, and soil piles and the approximate locations of historical buildings.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

The topography of the Site is relatively flat. Debris, rock, and soil piles more than 4 ft high are located across the northern portion of the Site property. A steep grade along the northern Site boundary rises up to the former railroad grade. Similarly, along the western boundary of the Site, the grade slopes steeply down to the Montreal River. The elevation of the Montreal River is approximately 10 ft lower than the ground surface in the northern portion of the Site. The Montreal River flows from north to south toward Lake Superior.

Groundwater in the Site area generally flows west-northwest toward the Montreal River. The depth to groundwater beneath the Site was estimated to range from several ft below ground surface (bgs) along the eastern Site boundary to more than 5 ft bgs along the western portion of the Site.

2.2 SITE BACKGROUND

Site background information was obtained from the following sources (see Section 7 for full citations):

- MDEQ files, including communications and documentation related to the Site (MDEQ 2010a)
- Technical guidance, including case studies and investigative rationale related to MGP sites developed by the New York State Department of Environmental Conservation (NYSDEC) (NYSDEC 2010)
- Technical guidance, including case studies and characterization and remediation rationale related to MGP sites developed by the U.S. EPA (U.S. EPA 1999)
- Aerial photographs and Sanborn Fire Insurance Maps obtained by MDEQ

The Site is the location of a former coal gasification plant. Reportedly, the plant was constructed in 1911 and operated using a carbureted water gas (CWG) process. The excerpt below describes the CWG process (NYSDEC 2010).

> "This process, CWG, was first introduced in the 1870s. A variety of water gas processes were developed, all of which involved a first step in which coke or coal was heated in a closed vessel or retort into which steam was injected. A chemical reaction took place which produced a flammable gas mixture of methane and carbon monoxide. Petroleum products were then sprayed into the hot gas mixture, creating another chemical reaction

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

in which petroleum constituents were "cracked" to form methane, which increased the heating and lighting value of the gas."

A review of Sanborn maps indicates that the processes at the Site were consistent with the processes described in the excerpt above. Identifiable features on the Sanborn map include a retort room; coke, coal, and crude oil storage areas; and gas storage areas. In addition to gas production, the Site also served as the center of the gas distribution system for the communities of Ironwood and Hurley, Wisconsin. The gas was piped to properties and used for heating and cooking.

The on-site plant reportedly operated 24 hours a day, and by 1928, the plant had enough storage capacity for 160,000 cubic feet (ft^3) of manufactured gas. The production of manufactured gas resulted in the generation of waste products, some of which were recycled in the process, sold, or otherwise disposed of at the plant location. The excerpts below describe these waste products (NYSDEC 2010).

- "A dense, oily liquid known as coal tar would condense out of the gas at various stages during its production, purification and distribution. Although most of the tar was collected for sale or reuse, recovery was incomplete. Most plants had tar/water separators, which sometimes could not fully separate the two liquids. The resulting tar/water emulsion was often discharged to a nearby surface water body. Over the decades during which many of these MGPs operated, substantial amounts of tar also leaked from storage and processing facilities and contaminated surface soils, subsurface soils, and groundwater."

- "Another byproduct, purifier waste, was made up of either lime or wood chips treated with iron oxides, and was used to remove cyanide and sulfur from the manufactured gas. Once it had become saturated with impurities, purifier waste was often discarded or used as a fill material."

The plant continued operations and distribution of manufactured gas until the late 1950s, when natural gas pipelines and service became more readily available in the area. By 1956 the plant was for sale and based on accounts of the Wisconsin Public Service Commission, by 1961 had discontinued service to Hurley, including the removal of meters from residential properties after plant abandonment. Although a record has not been discovered, it is logical to presume that the plant discontinued operations in the early to mid-1960s.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

After plant operations were discontinued, the historical record for the Site is less definitive. Interviews conducted by the MDEQ with local residents indicate that the on-site buildings were removed before the gasometers. Based on historical accounts, surface structures at the Site were demolished and removed during the 1970s and 1980s. After removal of the surface structures, the Site reportedly was used by the City of Ironwood to store inoperable equipment and debris. Fahrner Excavating later contributed to the placement of debris in stockpiles at the Site, eventually transforming the Site into the area of accumulated debris, rock, and soil piles present at the Site today.

2.3 POTENTIAL COCs

Based on the Site's historical operations and on investigation activities conducted at the Site by the MDEQ, a variety of COCs are present in soil and groundwater. As a result of the MGP operations and undocumented demolition activities at the Site, gross tar contamination is present in the subsurface at the Site. Gross tar and process waste (MGP waste) contamination was present in the subsurface in the vicinity of subsurface structures associated with the gasometers, buildings, and subsurface gas and waste conduits. COCs typically associated with MGP sites include volatile organic compounds (VOC), semivolatile compounds (SVOC), and inorganic compounds.

Based on a Site Inspection (SI) conducted by the MDEQ in 2010, soil, sediment, surface water, and groundwater were considered relevant media for sampling related to the potential transport and migration of COCs from the Site (WESTON 2011). Although considered during development of the MDEQ SI Work Plan, ambient air was not considered a relevant pathway and was not sampled (MDEQ 2010b). It is acknowledged that wastes typically associated with MGP sites often produce strong odors, and it is possible that particulates in surface soil may be transported as airborne particulates during any potential removal actions at the Site.

2.4 ASSESSMENT ACTIVITIES PERFORMED TO DATE

This section summarizes the findings of assessment activities performed at the Site to date based on the SI and analytical data from samples collected by MDEQ in October 2010 (MDEQ 2010b), the findings from a preliminary assessment and SI conducted by the WDNR in October 2010

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

(WDNR 2011), and the visual inspections conducted by WESTON START personnel in November 2010 (WESTON 2011). Previous visual inspections of the Site by the MDEQ indicated a significant potential for contamination of soil and groundwater at the Site. Historical and other Site-related documents also were reviewed as discussed in Section 2.2.

Subsurface and surface soil sampling conducted by the MDEQ and the WDNR determined that contaminants, including VOCs, SVOCs, and metals, are present in soil at concentrations exceeding MDEQ Generic Cleanup Criteria under Part 201 of the 1994 Natural Resources and Environmental Protection Act, as amended. Moreover, the observation of process waste and free product in subsurface soil at the Site confirmed that gross contamination is present and leaching contaminants into groundwater and nearby surface-water pathways. The MDEQ SI analytical results indicate that surface and subsurface soil primarily located in the historical operating area at the Site contains VOCs, SVOCs, and inorganic contaminant at concentrations exceeding the MDEQ Part 201 Residential Direct Contact Criteria. Similarly, shallow soil samples collected from four locations along the west (Wisconsin) bank of the Montreal River up to 2,500 ft downstream of the Site confirm that MGP COCs are present in sediment along the banks of the Montreal River. The WDNR installed temporary monitoring wells and collected groundwater samples from three Geoprobe® locations within 25 ft of the river.

The surface-water pathway not only is impacted by the erosion of surface soil at the Site but also is impacted by groundwater discharge into the Montreal River. A groundwater-surface water interface (GSI) study completed by the MDEQ as part of the SI confirmed that groundwater at the Site is discharging to the Montreal River. Groundwater samples collected by the MDEQ during the SI contained VOCs, SVOCs, and metals consistent with the wastes observed at the Site. Further, the concentrations of contaminants in groundwater exceed select MDEQ Part 201 Cleanup Criteria and are negatively impacting the Montreal River. Soil samples collected from the Wisconsin (west) side of the Montreal River by the WDNR on October 19, 2010 confirmed that SVOC contaminant concentrations in the upper 2 ft of the river bank exceed residual contamination levels to be set by the revised Natural Resources 720 *Wisconsin Administrative Code* for non-industrial direct contact.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Surface water and sediment samples collected from the Montreal River showed that contaminants from the Site are migrating downriver. In addition, gross contamination, including process waste, has been observed along the river downgradient of the Site. Hazardous discharges from the Site's subsurface will continue to impact the Montreal River as long as the source material remains at the Site.

Screening and sampling results for environmental media at the Site suggested that most of the source materials, including tar and process waste, are confined to the northern portion of the Site and bordered on the west by the Montreal River.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

3. SUPPLEMENTAL SITE ASSESSMENT ACTIVITIES

Unknown factors identified in the SA Report included the nature and extent of contamination as a result of limited operational information and undocumented changes at the Site after the shut-down of the gas plant (WESTON 2011). These factors are critical in defining the limits of the source area and off-site impacts, understanding contaminant migration at the Site, and understanding the overall distribution of process wastes and their associated COCs. Therefore, a Supplemental SA was performed at the Site. The findings of this Supplemental SA are based on analytical data collected by WESTON START in April 2012. The previous SA determined that soil and groundwater at the Site are contaminated. WESTON START's Supplemental SA activities were conducted to gather additional data related to further delineate the nature and extent of MGP waste at the Site. The Supplemental SA was conducted in accordance with the site-specific Field Sampling Plan (FSP) dated April 6, 2012.

The Supplemental SA activities performed by WESTON START were implemented with the intent of filling the aforementioned data gaps. In general, the Supplemental SA included the following tasks:

- Installation of additional soil borings to determine the horizontal and vertical extent of subsurface contamination associated with buried MGP waste from the Site
- Excavation of test pits to locate and evaluate shallow MGP structures, piping, activity areas, and the nature and magnitude of waste and process residual wastes present in the subsurface
- Collection of soil and groundwater samples from the test pits for waste characterization analysis
- Collection of groundwater samples from temporary monitoring wells to delineate potential groundwater impacts north of the Site
- Collection of surface water and sediment samples to assess biological toxicity and determine the downstream extent of impacts to the Montreal River
- Collection of groundwater samples from residential wells north of the Site to determine if the Site is impacting drinking water
- Mapping activities to accurately locate Site features and investigative locations

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Attachment A provides a photographic log of Site observations and Supplemental SA activities. The following subsections provide a detailed summary of the WESTON START Supplemental SA activities.

3.1 SUBSURFACE SOIL CHARACTERIZATION

Previous investigations indicate buried wastes at the Site. WESTON START installed soil borings north of the Site and excavated test pits at the Site to determine the horizontal and vertical extent of subsurface contamination associated with buried MGP waste from the Site. The following subsections describe the sampling procedures and investigative strategies implemented during the Supplemental SA to characterize the extent of soil impacts.

3.1.1 Subsurface Soil Borings

On April 9 and 10, 2012 WESTON START and their subcontractor, Coleman Engineering Company of Iron Mountain, Michigan, advanced seven soil borings at the Site using direct-push boring techniques (B01 through B07). **Figure 3-1** shows the soil boring locations. Five soil borings (B01 through B05) were planned for installation. However, based on field observations in boring B05, two additional borings (B06 and B07) were installed. Soil borings were advanced using a track-mounted Geoprobe® 6610DT drill rig. The borings were advanced to 10 ft bgs, and continuous soil cores were collected using a macro-core sampler. Dedicated, disposable liners were used to reduce the possibility of cross contamination between boring locations. After extraction of the soil cores from the ground, boring observations and descriptions were recorded on field data sheets and the field logbook. Each soil core was divided into two intervals, and a representative sample from each interval was placed into a resealable bag for headspace screening using a MultiRAE® photoionization detector. Headspace screening results were recorded on field data sheets and the field logbook. Soil samples were not collected for laboratory analysis from any of the soil borings. **Attachment B** presents the soil boring logs.

3.1.2 Test Pits

Test pits were excavated to locate and evaluate shallow (less than 15 ft bgs) MGP structures, piping, activity areas, and the nature and magnitude of waste and process residuals present in the subsurface. A total of 28 test pits (TP01 through TP28) were excavated at the Site and the

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

adjacent property to the east. **Figure 3-2** shows the test pit locations and the approximate locations of the former MGP structures. On April 11 and 12, 2012 Veolia Environmental Services of Norway, Michigan, excavated the test pits using a CAT® 307 excavator. Test pits were excavated to depths ranging from 3 to 10 ft bgs. The test pits systematically were backfilled to ensure that contaminated materials in the subsurface were not left exposed. During test pit excavation, observations and descriptions of subsurface conditions were recorded on field data sheets and the field logbook. **Attachment C** provides the test pit logs.

A soil sample was collected from test pit location TP17 for laboratory analysis. A groundwater sample was collected from test pit location TP16. These locations were chosen to represent the impacted area of the Site. Both the soil and groundwater samples were submitted under chain of custody to Pace Analytical Services, Inc. (Pace), in Minneapolis, Minnesota, for waste characterization analysis. In addition, a bulk soil sample was collected from test pit location TP09 for testing of geotechnical parameters for use in remedial alternative planning.

3.2 GROUNDWATER WELL INSTALLATION AND SAMPLING

As outlined in the FSP, WESTON START installed five temporary monitoring wells in select boring locations (B01 through B05) to evaluate groundwater conditions north of the Site (WESTON 2012). **Figure 3-1** shows the temporary monitoring well locations. **Attachment B** provides the temporary monitoring well construction diagrams. The temporary monitoring wells were installed where historical operations may have impacted groundwater downgradient of the former operational areas of the Site and downstream along the Montreal River. As noted in Section 3.1.1, two additional soil borings (B06 and B07) were installed along the Montreal River based on field observations in boring B05. Observations and field screening results from borings B06 and B07 indicated that contaminants were not present in subsurface soil in these borings. Therefore, temporary wells were not installed in borings B06 and B07.

Temporary monitoring wells were of 5-ft-long, 1-inch-diameter polyvinyl chloride (PVC), with 0.010-inch slotted screens. The temporary monitoring wells were allowed to stabilize for 24 hours prior to sampling. A low-flow peristaltic pump with Teflon tubing was used to collect a groundwater grab sample from each temporary monitoring well. Grab groundwater samples

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

were collected using low-flow groundwater sampling techniques to ensure that the samples were representative of groundwater conditions in the geological formation. When minimal groundwater presence or slow recharge occurred, the available groundwater was sampled regardless of the purge volume or field parameter stability. The first temporary monitoring well sampled, B03, purged dry quickly. The well was allowed to recharge for approximately 12 hours and again purged dry. Similar conditions were observed in other temporary monitoring wells. Because of the limited volume of groundwater available in the temporary monitoring wells, samples were collected without measuring groundwater quality parameters or purging three well volumes prior to sampling.

Five groundwater samples (B01 through B05) were collected from the temporary monitoring wells. Sample aliquots were placed in coolers on ice and shipped under chain of custody to the MDEQ's Environmental Laboratory in Lansing, Michigan, under chain of custody for laboratory analyses for Target Analyte List (TAL) metals, total cyanide, available cyanide, VOCs, and SVOCs.

3.3 SURFACE WATER AND SEDIMENT SAMPLING

Surface water and sediment samples were collected from four locations to further assess impacts to the Montreal River and biota in the riverine system. Surface water and sediment samples collected from the Montreal River were analyzed for both chemical constituents and chronic toxicity to aquatic biota. **Figure 3-3** shows the surface water and sediment sampling locations. Samples for toxicity analyses were collected from the same locations as those sampled for chemical constituents. The collocation of the samples was intended to allow an understanding of chemical constituents versus toxicity measured in the surface water and sediment samples from the same locations along the river. One sample was collected upstream of the Site, one sample was collected adjacent to the Site, and two samples were collected downstream of the Site.

Near-shore sediment at sampling locations adjacent to and downstream of the Site had a hydrocarbon sheen and odor during sample collection. Surface water and sediment samples were collected along the shoreline of the river or from backwater areas and where the depositional environment favored the accumulation of sediment.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

The following sections discuss the surface water and sediment sampling techniques.

3.3.1 Surface Water Sampling

Surface water samples were collected before sediment samples at each sampling location. Four surface water samples (SW01 through SW04) were collected from the Montreal River (**Figure 3-3)**. The surface water samples were collected by immersing the sample container in the water body or using a dip sampler. The VOC sample aliquot was collected first and field-preserved with hydrochloric acid. After collection of the VOC sample aliquot, samples for the remaining analytes were collected, including total TAL metals, total cyanide, available cyanide, and SVOCs. The sample aliquots were preserved and placed in the laboratory-provided sample containers. At the time of sample collection, field measurements of temperature, conductivity, pH, oxidation/reduction potential, turbidity, and dissolved oxygen were recorded at all locations.

Samples collected for analysis for total TAL metals, total cyanide, available cyanide, VOCs, and SVOCs were shipped under chain of custody to MDEQ's Environmental Laboratory. Samples collected for biological toxicity testing were sent to the Wisconsin State Laboratory of Hygiene in Madison, Wisconsin, for chronic toxicity tests using *Ceriodaphnia dubia (C. dubia*) and fathead minnow specimens.

3.3.2 Sediment Sampling

After collection of the surface water sample, a sediment sample was collected from the same sampling location using a stainless-steel spoon or scoop. Four sediment samples (SED01 through SED04) collected (**Figure 3-3**). The VOC sample aliquot was collected first by immediate and direct transfer of the sample aliquot to the laboratory-provided sample container using a disposable syringe sampler. The sample bottle then was preserved with methanol. After collection of the VOC sample aliquot, the sediment was thoroughly mixed in a stainless-steel bowl using a stainless-steel spoon. After homogenization, samples for the remaining analytes were collected, including TAL metals, total cyanide, available cyanide, and SVOCs. The sample aliquots were placed in the laboratory-provided sample containers.

Samples collected for analysis for total TAL metals, total cyanide, available cyanide, VOCs, and SVOCs were shipped under chain of custody to MDEQ's Environmental Laboratory. Samples

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

collected for biological toxicity testing were sent to the Wisconsin State Laboratory of Hygiene for chronic toxicity tests using *Hyalella azteca (H. azteca)* and *Chironomus tentans (C. tentans)* specimens.

3.4 POTABLE WELL SAMPLING

Residential potable wells downgradient of the Site also were sampled to assess potential impacts to residential drinking water. **Figure 3-4** shows the residential well sampling locations. Potable wells in Wisconsin and Michigan were reviewed before mobilization to the Site, and up to six potable wells were identified for potential sampling. After field verification, three groundwater samples were collected from three residential wells. The selected properties are located in Ironwood Township, Michigan. No potable wells were identified within the city limits of Ironwood, and wells identified in Wisconsin either had been sampled previously by the WDNR or were determined to be beyond the limits of investigation.

Each groundwater sample was collected from a spigot located before the pressure tank in the basement of the residence. Groundwater was purged for 15 to 20 minutes before sample collection to ensure that a representative sample was obtained. The groundwater was collected directly into laboratory-provided sample containers, and the samples were placed in a cooler on ice for delivery under chain of custody to the MDEQ Drinking Water Laboratory in Lansing, Michigan for VOC and SVOC analyses.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

4. FIELD SCREENING AND ANALYTICAL RESULTS

The following subsections discuss the WESTON START field screening and sample analytical results for the Supplemental SA, followed by a discussion of the preliminary conceptual site model. **Attachment D** provides the laboratory analytical reports for sample collected during the Supplemental SA.

4.1 SUBSURFACE SOIL CHARACTERIZATION

This section discusses observations and analytical results from subsurface soil characterization activities performed at the Site.

4.1.1 Subsurface Soil Borings

As discussed in Subsection 3.1.1, seven soil borings were advanced at the Site (**Figure 3-1**). Soil samples for laboratory analyses were not collected from the soil borings. **Attachment B** provides the boring logs that summarize the observations and field screening results recorded at each boring. The borings were installed to 10 ft bgs, and groundwater was encountered at approximately 5 to 6 ft bgs. Soils in each boring generally consisted of brown, fine-grained sand to 10 ft bgs, with trace amounts of silt occurring below approximately 5 ft bgs. Observations and field screening results for all borings except boring B05 did not indicate evidence of contamination such as MGP waste, free product, or staining. Soil boring B05 contained evidence of contamination between 7 and 9 ft bgs, including blackish-gray staining, hydrocarbon odor, and sheen. Boring B05 was located approximately 20 ft east of the Montreal River and likely indicates buried, historical river bank waste. Signs of contamination were not observed along the bank of the river near boring B05.

The physical evidence of contamination observed at boring B05 prompted the installation of two additional soil borings (B06 and B07) closer to the river than borings B01 and B02 (**Figure 3-1**). The borings were advanced within approximately 20 ft of the river bank. Evidence of subsurface soil contamination was not observed in either boring B06 or B07.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

4.1.2 Test Pits

As discussed in Subsection 3.1.2, 28 test pits were excavated at the Site to determine subsurface conditions (**Figure 3-2**). Samples for laboratory analyses were not collected from the test pits except for soil and groundwater waste characterization samples and a geotechnical soil sample. **Attachment C** provides the test pit logs that summarize observations and measurements recorded at each boring.

Test pit excavation was initiated in the northwest corner of the Site where asphaltic tar deposits were observed along the ground surface. Test pit excavation then progressed south to assess the presence of process waste and coal tar along the western limits of the Site. Displacement and removal of surface debris and vegetation was minimized during test pit excavation, so the excavations generally followed open and cleared areas.

After the test pits reached the apparent southern extent of the contamination at test pit TP08, test pit excavation shifted east and generally progressed on a line oriented north to south. Similar deposits of fill, coal tar, and process waste were observed in the test pit excavations. Test pit TP14 demarcated the apparent limits of subsurface MGP waste deposits along the northern limits of the Site. However, household or construction solid wastes including wood and metal debris, steel cables, concrete, and rubble were observed in TP14 to approximately 8 ft bgs.

As the test pits were excavated eastward across the Site, similar subsurface conditions were encountered. Concrete foundations likely associated with former plant structures were encountered in the northeastern portion of the Site. Subsurface concrete structures were observed in test pits TP18, TP28, and TP19. Similarly, concrete gasometer foundations were unearthed in test pits TP12 and TP26. The gasometer foundations were observed at approximately 1 ft bgs and did not show obvious signs of coal tar waste along the surface of the structure. Additional excavation along the limits of the circular foundations of the gasometers revealed that the structures were approximately 4 ft thick and embedded in viscous coal tar and process waste.

Test pits TP20 through TP22 were excavated on the adjacent vacant property east of the Site to explore the potential for dumping or subsurface disposal of coal tar and process waste. The

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

upper 6 inches to 1 ft of these excavations generally contained a black soil horizon, likely evidence of the coal residuals. Historical records indicate that a rail spur once serviced the Site in the vicinity of these excavations. Therefore, these coal residuals probably are an artifact of coal storage and offloading for use in the MGP operations.

In general, the test pits located in the primary operational areas of the Site contained 0.5 to 3 ft of sand fill typically commingled with gravel and organic matter. The sand fill overlies the waste deposits, which generally consist of commingled coal tar, slag, and process waste material from 3 to 6 ft bgs. The observed waste deposits generally are located over a silty/clayey sand interval that typically showed no substantial signs of MGP contamination. Staining and observed contamination, if present, was located in the upper 6 inches to 1 ft of the low-permeability silty/ clayey sand layer.

Groundwater generally was not encountered during excavation of the test pits. Where present, the groundwater appeared perched and was observed draining from buried construction debris and rubble. In test pits TP02, TP03, TP04, and TP27 a tar/water mixture was observed seeping into the excavation from test pit side walls. The volume of liquid draining into the test pits was nominal and after several minutes collected in the bottom of the excavation in an oily puddle.

4.1.3 Waste Characterization Sample Analytical Results

One representative soil sample and one representative groundwater sample were collected from test pit TP17 for waste characterization purposes (**Figure 3-2**). **Table 4-1a** summarizes the analytical results for the waste characterization soil sample collected. The collected sample consisted of black coal tar waste comingled with soil representative of subsurface contamination at the Site. The soil waste characterization sample was analyzed for inorganic constituents, Toxicity Characteristic Leaching Procedure (TCLP) inorganic constituents, polychlorinated biphenyls (PCB), VOCs, SVOCs, and typical waste characterization parameters including flashpoint. Contaminants consistent with MGP waste were detected in the sample.

WESTON evaluated the following information and guidance related to the waste disposition and identification of disposal facilities for soil excavated from the Site:

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

- Federal
  - U.S. EPA, Hazardous Waste Division – Listing hazardous waste guidance
  - Title 40 of the *Code of Federal Regulations* (CFR) Part 261 – Characterizing and listing hazardous waste guidance
  - Resource Conservation and Recovery Act (RCRA) – Published on-line guidance related to waste disposition of contaminated soil

- State
  - MDEQ Waste and Hazardous Materials Division – Listing hazardous waste and inertness guidance

- County
  - Western Upper Peninsula Planning and Development Region – Authorizations for waste importing and exporting per the Solid Waste Management Plan

- Disposal Facility
  - Waste Management - K&W Landfill – Tipping fees and waste profiling and acceptance requirements

WESTON START evaluated the potential for the excavated soil to be considered characteristic hazardous waste, listed hazardous waste, or non-hazardous waste. Based on the analytical results from the waste characterization sample, the contaminated material at the Site was not determined to be characteristically hazardous. In addition, MGP waste is not a listed hazardous waste and, depending on state regulatory acceptance, may be exempt from TCLP analysis requirements.

In addition to the collection and analysis of a soil waste characterization sample, a groundwater sample also was collected from test pit location TP16. **Table 4-1b** summarizes the analytical results for the waste characterization groundwater sample collected. As noted in the Section 4.1.2, the groundwater appeared to be perched in a shallow subsurface zone of concrete, bricks, and construction debris. TP16, located in the north-central portion of the Site, also was believed to be representative of grossly impacted areas of the Site. The groundwater sample was collected using a peristaltic pump and submitted to the Pace Laboratory for waste characterization analysis. The groundwater waste characterization sample was analyzed for inorganic constituents, VOCs, SVOCs, and other waste characterization parameters required by the local publically owned treatment works (POTW), the Gogebic-Iron Wastewater Treatment Plant (WWTP). Similar to the soil sample, contaminants detected in the groundwater sample were consistent with that of MGP wastes. Based on the analytical results, it is anticipated that

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

groundwater at the Site is treatable and (pending receipt of waste acceptance) potentially can be disposed of at the Gogebic-Iron WWTP.

4.1.4 Geotechnical Sample Analytical Results

To allow for the characterization of subsurface soil properties, a bulk soil sample was collected from test pit TP09 for geotechnical analyses (**Figure 3-2**). **Attachment E** provides the geotechnical data report. The sample was collected from approximately 3 ft bgs for testing of geotechnical parameters for use in removal planning. Up to four geotechnical samples were planned for collection. However, observed subsurface conditions, including low-permeability soil underlying the apparent zone of contamination and the lack of groundwater in the test pit excavations, limited the number of samples collected for geotechnical analyses. Specifically, the observed subsurface conditions at the Site indicated that soil stability and structural considerations related to potential removal actions at the Site would be minimized.

The geotechnical soil sample was submitted to Pace Laboratory for laboratory testing, including Atterberg limits, grain size, specific gravity, organic content by loss-on-ignition, modified proctor testing, and moisture content testing. Results indicate that the sample consisted of poorly graded sand and gravel, specifically classified as SP under the Unified Soil Classification System and had a specific gravity of 2.635. Because of the low concentration of fine particles in the sample, the Atterberg limits test was not appropriate and therefore was not completed. Grain size distribution (percent composition) results for the sample are as follows:

- Clay: 0.5 percent (%)
- Silt: 0.0%
- Fine sand: 3.2%
- Medium sand: 4.1%
- Coarse sand: 36.0%
- Gravel: 56.2%

Depending on the final removal approach selected for the Site, the geotechnical data summarized above may be used to assist in the calculation of disposal quantities, backfill quantities, compaction properties, and similar components of a removal action.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

4.2 GROUNDWATER SAMPLE ANALYTICAL RESULTS

WESTON START installed temporary monitoring wells in select borings (B01 through B05) to evaluate groundwater conditions north of the Site. **Table 4-2** summarizes the groundwater sample analytical results. **Figures 4-1 and 4-2** show the temporary monitoring well locations and organic and inorganic contaminant concentrations, respectively, exceeding relevant MDEQ Part 201 Criteria. A summary of observations and laboratory analytical results that exceeded relevant MDEQ Part 201 criteria is provided below.

- **B01:** No petroleum odor, sheen, or free product was observed during sample collection. VOC and SVOC COCs were not detected in the groundwater sample. The following inorganic contaminants exceeded applicable MDEQ Part 201 criteria:
  - Residential Drinking Water Criteria (RDWC) – Iron at 36,000 micrograms per liter (µg/L); aluminum at 26,000 µg/L; arsenic at 14 µg/L; lead at 64 µg/L; manganese at 820 µg/L; and vanadium at 62 µg/L
  - GSI Criteria – Arsenic at 14 µg/L, barium at 260 µg/L, copper at 130 µg/L, lead at 64 µg/L, nickel at 54 µg/L, silver at 0.21 µg/L, vanadium at 62 µg/L, and zinc at 130 µg/L
- **B02:** No petroleum odor, sheen, or free product was observed during sample collection. VOC and SVOC COCs were not detected in the groundwater sample. The following inorganic contaminants exceeded applicable MDEQ Part 201 criteria:
  - RDWC – Iron at 2,200 µg/L; aluminum at 1,700 µg/L; manganese at 240 µg/L; and vanadium at 6 µg/L
- **B03:** No petroleum odor, sheen, or free product was observed during sample collection. VOC and SVOC COCs and cyanide were not detected in the groundwater sample. A sample aliquot for inorganic contaminants was not collected because of the low recovery of groundwater from the temporary monitoring well.
- **B04:** No petroleum odor, sheen, or free product was observed during sample collection. VOC and SVOC COCs were not detected in the groundwater sample. The following inorganic contaminants exceeded applicable MDEQ Part 201 criteria:
  - RDWC – Iron at 67,000 µg/L; aluminum at 250,000 µg/L; arsenic at 26 µg/L; cobalt at 50 µg/L; lead at 67 µg/L; manganese at 2,100 µg/L; nickel at 200 µg/L; and vanadium at 240 µg/L
  - GSI Criteria – Arsenic at 26 µg/L; barium at 510 µg/L; beryllium at 2.2 µg/L; copper at 310 µg/L; lead at 67 µg/L; manganese at 2,100 µg/L; nickel at 200 µg/L; silver at 0.84 µg/L; vanadium at 240 µg/L; and zinc at 510 µg/L

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

- **B05:** A petroleum odor was observed during sample collection at a depth of 7 to 9 ft bgs. SVOC contaminants in the sample exceeded MDEQ Part 201 Groundwater Contact Criteria. Inorganic, SVOC, and VOC contaminants in the sample exceeded MDEQ Part 201 GSI Criteria. The following COCs exceeded applicable MDEQ Part 201 criteria:

  - RDWC – Iron at 11,000 µg/L; aluminum at 2,400 µg/L; manganese at 950 µg/L; vanadium at 14 µg/L; anthracene at 78 µg/L; benzo(a)anthracene at 52 µg/L; benzo(a)pyrene at 54 µg/L; benzo(b)fluoranthene at 39 µg/L; benzo(g,h,i)perylene at 23 µg/L; benzo(k)fluoranthene at 16 µg/L; chrysene at 49 µg/L; phenanthrene at 180 µg/L; and pyrene at 180 µg/L
  - GSI Criteria – Copper at 6.4 µg/L, lead at 6 µg/L, vanadium at 14 µg/L, 2-methylnaphthalene 130 µg/L, naphthalene 160 µg/L, acenaphthene at 110 µg/L, fluoranthene at 80 µg/L, fluorene at 61 µg/L, and phenanthrene at 180 µg/L
  - Residential Groundwater Contact Criteria – Anthracene at 78 µg/L, benzo(a)anthracene at 52 µg/L, benzo(a)pyrene at 54 µg/L, benzo(b)fluoranthene at 39 µg/L, benzo(g,h,i)perylene at 23 µg/L, benzo(k)fluoranthene at 16 µg/L, chrysene at 49 µg/L, indeno(1,2,3-cd)pyrene at 22 µg/L, and pyrene at 180 µg/L

Further assessment of the analytical results and the distribution of contaminants provides additional understanding of the distribution of contaminants in groundwater. The groundwater analytical results from the temporary monitoring well in boring B05 suggest that contaminants in groundwater may have migrated north of the Site along the Montreal River. Directly north of the Site in borings B01 through B04, VOCs and SVOCs were not detected in the groundwater samples. In addition, no evidence of soil contamination was observed or detected in the soil borings. Similarly, additional soil borings B06 and B07 installed closer to the Montreal River (west of borings B01 and B02) did not indicate soil contamination. Therefore, temporary monitoring wells were not installed in these borings.

Boring B05 was unique to the data set, both because soil VOC and SVOC contamination was observed in the boring and because VOC and SVOC COC concentrations exceed applicable Part 201 Criteria. In general, it may be presumed that a contaminated groundwater plume is migrating north from the Site along the Montreal River. Theoretically, this hypothesis also is supported by the observed petroleum odors and sheen documented during the construction of the Norrie Street Bridge in 2010. However, based on the groundwater sample results and observations for borings B01, B02, B03, B04, B06, and B07, this hypothesis is unlikely. The

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

borings all were installed to a similar depth at a similar distance from the river, but SVOC and VOC COCs were not detected.

4.3 SURFACE WATER AND SEDIMENT ANALYTICAL RESULTS

Surface water and sediment sampling activities were performed to assess the leaching or potential erosion and migration of contaminated media from the Site. Surface water and sediment samples collected from the Montreal River were analyzed for both chemical constituents and chronic toxicity to aquatic biota as discussed below.

4.3.1 Surface Water Sample Analytical Results

Four surface water samples were collected from the Montreal River. Surface water samples were collected at each sampling location prior to the collection of sediment samples. **Table 4-3** summarizes the surface water sample analytical results. No organic or inorganic contaminant concentrations exceeded relevant MDEQ Part 201 Criteria. A summary of the observations, toxicological assessment, and laboratory analytical results that exceeded relevant Rule 57 Water Quality Values (WQV) for surface water bodies used as a drinking water source (calculated by the MDEQ and updated December 5, 2011) is presented below.

- **SW01:** The surface water sample from this location was intended to be an upstream background sample. No petroleum odors or sheen were observed during sample collection. None of the COCs analyzed for exceeded MDEQ Rule 57 WQVs. The biological toxicity testing resulted in a 90% mean survival rate for the fathead minnow growth and survival test and a 100% adult survival for the *C. dubia* reproduction and survival test.
- **SW02:** This surface water sample was collected from next to the Site and was intended to be a characterization sample at the source. A sheen was observed on the surface of the water before sample collection. None of the COCs analyzed for exceeded Rule 57 WQVs. The biological toxicity testing resulted in a 100% mean survival for the fathead minnow growth and survival test and a 90% adult survival for the *C. dubia* reproduction and survival test.
- **SW03:** The surface water sample at this location was intended to be a non-impacted downstream sample. Poling of sediment in the vicinity of this sampling location indicated that petroleum odors and sheen were not present before sampling. None of the COCs analyzed for exceeded Rule 57 WQVs. The biological toxicity testing resulted in a 90% mean survival for the fathead minnow growth and survival test and a 100% adult survival for the *C. dubia* reproduction and survival test.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

- **SW04:** Poling of the sediment in the vicinity of the sampling location indicated the presence of petroleum odors and sheen. None of the COCs analyzed for exceeded Rule 57 WQVs. The biological toxicity testing resulted in a 90% mean survival for the fathead minnow growth and survival test and a 100% adult survival for the *C. dubia* reproduction and survival test.

No surface water samples collected during the Supplemental SA exceeded the "Human Cancer Value for Surface Water Used as a Drinking Water Source" criteria or "Human Non-Cancer Value for Surface Water Used as a Drinking Water Source" criteria. Further, toxicological testing showed no chronic impairment of biota due to contaminants in surface water.

4.3.2 Sediment Sample Analytical Results

Four sediment samples were collected from the surface water sampling locations. **Table 4-4** summarizes the sediment sample analytical results. **Figures 4-3 and 4-4** show the sampling locations and organic and inorganic contaminant concentrations, respectively, exceeding relevant MDEQ Part 201 Criteria. A summary of the observations, toxicological assessment, and laboratory analytical results that exceeded relevant U.S. EPA Region 5 RCRA Ecological Screening Levels (ESL) and MDEQ Part 201 criteria is provided below.

In general, sediment in the Montreal River was rocky and gravelly and did not have appreciable accumulations of sediment as is expected in a large, sandy river system. As discussed in subsection 4.3.1, surface water samples did not contain COCs, nor were they determined to be toxic to aquatic organisms. However, conditions in sediment along the Montreal River were markedly different, specifically at locations next to and downstream of the Site. Visual survey and poling along the river bank produced sheen and hydrocarbon odors when the shallow sediment was disturbed.

- **SED01:** No petroleum odor, sheen, or free product was observed during sample collection. VOC and SVOC COCs were not detected in the sample. Inorganic COCs were detected in the sample, including calcium, iron, magnesium, potassium, sodium, aluminum, arsenic, barium, beryllium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc. Only cyanide exceeded its RCRA ESL at a concentration of 0.3 milligram per kilogram (mg/kg). The biological toxicity testing resulted in a 95% mean survival for the *H. azteca* survival test and an 88.8% mean survival for the *C. tentans* survival test.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

- **SED02:** A strong petroleum odor and sheen were observed when the sediment was agitated during sample collection. Inorganic COCs were detected in the sample, including calcium, iron, magnesium, potassium, sodium, aluminum, antimony, arsenic, barium, beryllium, cadmium, chromium, cobalt, copper, lead, manganese, nickel, selenium, vanadium, and zinc. Only cyanide exceeded its RCRA ESL at a concentration of 5.2 mg/kg. VOCs and SVOCs also were detected in the sample, with the following compounds exceeding the RCRA ESLs:

  - Acenaphthene at 240,000 micrograms per kilogram (µg/kg); acenaphthylene at 28,000 µg/kg; anthracene at 400,000 µg/kg; benzo(a)anthracene at 88,000 µg/kg; benzo(a)pyrene at 79,000 µg/kg; benzo(b)fluoranthene at 62,000 µg/kg; benzo(g,h,i)perylene at 31,000 µg/kg; dibenzofuran at 20,000 µg/kg; fluoranthene at 200,000 µg/kg; fluorene at 140,000 µg/kg; and indeno(1,2,3-cd)pyrene at 25,000 µg/kg

  The biological toxicity testing resulted in a 20% mean survival for the *H. azteca* survival test and a 0% mean survival for the *C. tentans* survival test.

- **SED03:** No petroleum odor, sheen, or free product was observed during sample collection. Inorganic COCs were detected in the sample, including calcium, iron, magnesium, potassium, sodium, aluminum, arsenic, barium, beryllium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc. Only cyanide exceeded its RCRA ESL at a concentration of 0.1 mg/kg. Pyrene was detected at a concentration of 300 mg/kg, below any of the applicable criteria. The biological toxicity testing resulted in a 100% mean survival for the *H. azteca* survival test and a 92.5% mean survival for the *C. tentans* survival test.

- **SED04:** A strong petroleum odor and sheen were observed when the sediment was agitated during sample collection. Inorganic COCs were detected in the sample, including calcium, iron, magnesium, potassium, sodium, aluminum, arsenic, barium, beryllium, chromium, cobalt, copper, lead, manganese, nickel, vanadium, and zinc. Cyanide at a concentration of 0.2 mg/kg and mercury at a concentration 0.3 mg/kg exceeded the RCRA ESLs. SVOCs also were detected in the sample, with the following compounds exceeding the RCRA ESLs:

  - Anthracene at 1,300 µg/kg; benzo(a)anthracene at 2,500 µg/kg; benzo(a)pyrene at 2,400 µg/kg; dibenzo(a,h)anthracene at 3,100 µg/kg; fluoranthene at 3,600 µg/kg; and indeno(1,2,3-cd)pyrene at 3,300 µg/kg.

  The biological toxicity testing resulted in a 100% mean survival for the *H. azteca* survival test and an 88.8% mean survival for the *C. tentans* survival test.

Based on the analytical results, sediment samples collected from Montreal River, specifically from next to and downstream of the Site, have been impacted by former Site operations. SVOC

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

concentrations at two locations, SED02 (next to the Site) and SED04 (the next closest downstream sediment sampling location) exceeded the RCRA ESLs. Cyanide exceeded its RCRA ESLs at all sampling locations, with the upstream sampling location (SED01) having a higher cyanide concentration (0.3 mg/kg) than sampling locations SED03 and SED04. The highest cyanide concentration was detected at sampling location SED02 (5.2 mg/kg).

Statistical analyses indicated significant differences in survival and growth of *C. tentans* and *H. azteca* between sampling locations. Toxicological testing conducted on the four samples showed the greatest impacts at sampling location SED02 (no *C. tentans* survived). Survival of *H. azteca* only was affected at sampling location SED02, with only 10% survival. Although the *C. tentans* specimens were completely unable to survive in sediment from SED02, a few *H. azteca* did survive but apparently did not sustain growth.

In addition, the biological toxicity testing measured the weight of surviving organisms. The laboratory report noted a reduction in weight at SED04 for both *H. azteca* and *C. tentans* and at SED03 for *C. tentans*. These findings indicate that the ability of the organisms to thrive at these two locations may be affected by former Site operations, although not to the extent of the effects noted at sampling location SED02.

4.4 POTABLE WELL SAMPLE ANALYTICAL RESULTS

Three groundwater samples were collected from residential wells north of the Site (**Figure 3-4**). Table 4-5 summarizes the residential well sample analytical results. The analytical results were compared to MDEQ Part 201 RDWC. COCs were not detected in any of the samples collected from the potable wells. **Attachment F** provides the State of Michigan residential water well records for the wells.

4.5 PRELIMINARY CONCEPTUAL SITE MODEL

Analytical results and visual observations documented during the Supplemental SA indicate that contaminants have migrated from the Site and may be adversely impacting off-site receptors. Specifically, historical Site operations have resulted in the deposition and burial of MGP waste at and downstream of the Site. Historical literature indicates that former Site operations involved

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

the transportation of gas through a subsurface piping system to the communities of Hurley, Wisconsin, and Ironwood, Michigan. The lateral extent of the gas distribution system during plant operations is unknown. Further, the extent of the piping system is not fully understood, nor is it documented whether source contaminants are migrating along preferential pathways such as the historical piping distribution system.

These unknown factors, combined with the limited historical information related to the former gas plant operations, are critical factors in defining the limits of the source area and off-site impacts. Limited details of plant operations limit an overall understanding of the mobility and distribution of Site-related COCs, including waste disposal practices, the undocumented demolition of the MGP structures, and exacerbation of contamination at the Site by the current and neighboring property owners.

Test pit excavations at the Site have quantified the vertical and lateral extent of coal tar and residual process waste at the Site. Further, soil borings, monitoring wells, and surface soil samples collected by the State of Michigan have resulted in a relatively thorough understanding of subsurface conditions at the Site. Similarly, the investigation of the Montreal River and upland areas north of the Site have provided additional details related to contaminant distribution downstream of the Site. Investigative activities conducted by the WDNR verified that downstream sediment impacts more than 2,000 ft downstream of the Site.

Supplemental SA activities were conducted to quantify these observations and identify the limits of downstream and downgradient impacts to surface water, sediment, and groundwater. The sampling of temporary monitoring wells north of the Site has identified the limits of the contaminated groundwater plume at the Site. Further, potable well sampling has confirmed that drinking water wells in the vicinity of the Site are not impacted. Finally, surface water and sediment sample results confirm that downstream impacts are present along the banks of the Montreal River and may be causing negative impacts to biota.

Inorganic, VOC, and SVOC contaminants have been identified in surface and vadose zone soils, groundwater, surface water, and sediment. These contaminants could affect recreational users and consumers of the natural resources of the Montreal River. Biological toxicity testing of

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

sediment samples from the Montreal River showed negative effects on the survival and growth of the tested organisms, most notably in sediment samples collected from the river next to the Site. To date, the air pathway has not been evaluated. However, particulate migration and inhalation criteria should be considered during future assessments.

The Preliminary Conceptual Site Model for the Site was revised to incorporate the findings of the Supplemental SA. **Figure 4-5** presents the cross-sectional transects. **Figures 4-6** and **Figure 4-7** show the current understanding of Site conditions from a vertical perspective.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

5. THREATS TO HUMAN HEALTH AND THE ENVIRONMENT

Factors to be considered in determining the appropriateness of a potential removal action at a Site are defined in the NCP at 40 CFR 300.415(b)(2). A summary of the factors applicable to the Site is presented below:

- **Actual or potential exposure of nearby human populations, animals, or the food chain to hazardous substances or pollutants or contaminants**

  Investigative activities conducted at the Site by state and federal agencies have documented the presence of coal tar and residual process waste materials on the ground surface and in the shallow subsurface. During the Supplemental SA, soil samples collected from surface and subsurface soil contain contaminants at concentrations exceeding MDEQ Part 201 Residential Direct Contact Criteria for SVOCs typically associated with MGP wastes. Specifically, concentrations of benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene exceeded MDEQ Part 201 Residential Direct Contact Criteria in multiple soil samples collected from the Site. In addition, toxicity tests conducted during the Supplemental SA using sediment samples from the Montreal River next to the Site indicated a significant reduction in the survival and growth of the tested organisms.

  The Site is unsecured and accessible to trespassers. Inorganic COCs (including lead, arsenic, and cyanide) at the Site pose immediate threats to the public health or welfare of the United States or the environment based on factors that should be considered when evaluating potential future actions at the Site. Human and biological receptors are present at the Site based on the observation of footpaths, ATV tracks, and animals in the Site area. Further, potential receptors outside of the Site could be exposed to Site-related contaminants through the erosion of surface soil by weather and animal and human traffic in the area. These mechanisms could transport soil from the Site and increase the potential for exposure outside the Site.

- **Actual or potential contamination of drinking water supplies or sensitive ecosystems**

  The properties surrounding the Site generally are served by the municipal water supply. Municipal water wells are located several miles from the Site and currently are not believed to be threatened by contaminant migration from the Site. In addition, sampling and analysis of samples from potable wells in the Site area collected during the Supplemental SA indicated that contaminants from the Site have not adversely impacted the drinking water supply downstream of the Site.

  The Montreal River borders the Site to the west and based on observations and chemical data collected by state agencies is presumed to be connected to groundwater. Analytical results for water and sediment samples collected from the river during the Supplemental SA indicate that COCs are present in shallow sediment at and downstream of the Site.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Sheen and coal tar have been observed emanating from the river bank adjacent to the Site. In addition, toxicity tests conducted during the Supplemental SA using sediment samples collected from the Montreal River next to the Site identified a significant reduction in the survival and growth of the tested organisms

Surface soil at the Site is contaminated with inorganic, VOC, and SVOC COCs. Runoff from the Site is unmanaged. During rain events and spring snowmelt, contaminated soil and debris from the Site may be transported to both the Montreal River and surrounding properties. Further, an exposed open pipe along the west boundary of the Site was observed to contain tar and sheen. This pipe presents another possible contaminant migration pathway that could impact surface waters of the state and sensitive ecosystems.

- **Hazardous substances or pollutants or contaminants in drums, totes, containers, or other bulk storage containers that may pose a threat of release**

  Bulk storage containers were not observed at the Site. However, historical Site operations used containers stored both above and below grade. It is unclear at this time if subsurface containers remain at the Site. Test pit excavation activities during the Supplemental SA unearthed the locations of former gasometer foundations as well as foundations in other Site operational areas. The presence of these floors and foundations in the subsurface indicate that demolition activities may not have been completely thorough, resulting in the in-place abandonment of subsurface structures and containers. Further, in these operational areas where coal tar collected, waste deposits were observed, which likely are a contributing source to contaminant migration.

- **High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface that may migrate**

  Inorganic, VOC, and SVOC COCs in surface and shallow subsurface soil at the Site pose immediate threats to the public health or welfare of the United States or the environment. Investigative activities conducted by state and federal agencies at the Site suggest that tar and contaminated soil are in direct contact with the waters of the Montreal River. As discussed above, human and biological receptors are present at the Site. Further, potential receptors outside of the Site could be exposed to Site-related contaminants through the erosion of surface soil by weather and animal and human traffic in the area. These mechanisms could transport soil from the Site and increase the potential for exposure beyond the Site boundaries.

- **Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released**

  Gogebic County has an average annual snowfall of approximately 156 inches. Seasonal snowmelt results in the erosion and transport of surface soil. In addition, during seasonal snow melt, the Montreal River reportedly routinely overflows its banks and in some instances has resulted in the closure of the bridges connecting Hurley and Ironwood. The average annual rainfall for the county is 35 inches. The proximity of the Site to the

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Montreal River increases the potential for hazardous substances to be released to the waters of the state. Weather conditions, especially the erosive forces of wind and water, contributes to the potential migration of contaminated surface soil at the Site.

- **Threat of fire or explosion**

  Visual inspection and the use of utility-locating services at the Site indicate that the Site is not served by electricity or natural gas. An 8-inch-diameter subsurface gas main is located along the eastern Site boundary. The threat of fire or explosion is low. The building on the adjacent property still is used, and the potential for a fire at that building is more likely. A fire could produce toxic gases, irritants, and contaminated fire-water runoff, and result in the migration of contaminants from the Site.

- **The availability of other appropriate federal or state response mechanisms to respond to a release**

  The MDEQ requested U.S. EPA assistance in evaluating the Site for a potential removal action, which documents the need for federal involvement to address imminent endangerment posed by the Site.

- **Other situations or factors that may pose threats to public health or welfare of the United States or the environment**

  Physical hazards were observed at the Site. During the Supplemental SA, stockpiled mounds of rock, soil, and debris were observed. These piles reportedly had been placed there by the Site owner and the adjacent property owner. The stockpiles are subject to the erosive forces of weather, and controls are not in place to prevent runoff to the river or the adjacent roadway that borders the Site. Contaminants in soil at the Site could be migrating due to human and earthmoving activities at the Site.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

6. CONCLUSIONS

This section summarizes the findings of the Supplemental SA based on the findings of the SA Report dated April 2011 (WESTON 2011) and additional investigative activities conducted by WESTON START personnel in April 2012 during the Supplemental SA.

The observation of process waste and free product in soil borings and test pit excavations at the Site confirm that gross contamination is present and leaching contaminants into the groundwater and nearby surface-water pathways. Analytical results indicate that surface and subsurface soil primarily located in the historical Site operating area contains VOC, SVOC, and inorganic COCs at concentrations exceeding applicable MDEQ Part 201 Criteria.

The horizontal and vertical extent of grossly contaminated soil and tar in the subsurface was delineated during the Supplemental SA. Test pit excavations determined that the subsurface is generally composed of 0.5 to 3 ft of sand fill typically commingled with gravel and organic matter. The sand fill overlies the grossly contaminated soil and waste deposits, generally consisting of commingled coal tar, slag, and process waste material at depths ranging from 3 to 6 ft bgs. The observed waste deposits generally are present atop a silty/clayey sand interval that typically showed no substantial signs of MGP contamination. Staining and observed contamination, if any, is present in the upper 6 inches to 1 ft of the low-permeability silty/clayey sand. Groundwater generally was not encountered during test pit excavation. Where present, the groundwater appeared to be perched and was observed to be draining from buried construction debris and rubble.

Test pit excavations at the property east of the Site generally showed little evidence of impacts. Specifically, contamination was limited to the upper 6 inches to 1 ft of the subsurface. In general, the contamination was present as a black soil horizon, likely impacted by residual coal particles. Historical records indicate that a rail spur once served the Site in the vicinity of these excavations, and it is likely that these coal residuals are an artifact of coal storage and offloading for use in MGP operations.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

The soil waste characterization sample collected from a representative test pit excavation at the Site indicates that solid waste generated at the Site likely would be considered non-hazardous. Based on analytical results for the groundwater waste characterization sample, it is likely that the water would be treatable on-site prior to discharge or disposal at an off-site facility. Final disposal acceptance and pre-treatment requirements will be determined by the selected disposal method and/or facility. Further, the selected disposal facilities must be compliant with Section 121(d)(3) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). This section requires that CERCLA wastes only be placed in a facility operating in compliance with RCRA and other applicable federal or state requirements. Currently, neither K&W Landfill in Ontonagon, Michigan, nor the Gogebic-Iron WWTP are CERCLA-approved disposal facilities.

The Supplemental SA expanded upon the findings of the SA and incorporated an assessment of off-site receptors. The assessment included evaluating the migration of contaminated groundwater from the Site and potential downstream impacts along the Montreal River.

Groundwater impacts north of the Site were evaluated through the installation of soil borings and temporary monitoring wells. Observations and field screening results in all borings except boring B05 did not indicate evidence of contamination such as MGP waste, free product, or staining. Soil boring B05 contained evidence of contamination between 7 and 9 ft bgs, including blackish-gray staining, hydrocarbon odor, and sheen. Boring B05 was installed approximately 20 ft east of the Montreal River and likely indicates buried, historical river bank waste. Signs of contamination were not observed along the bank of the river near boring B05.

Directly north of the Site in borings B01 through B04, VOC and SVOC contaminants were not detected in groundwater samples. In addition, no evidence of soil contamination was observed or detected in the soil borings. Similarly, additional soil borings B06 and B07 installed closer to the Montreal River (west of borings B01 and B02) did not contain evidence of soil contamination. Therefore, temporary monitoring wells were not installed in the additional borings.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Boring B05 was unique to the data set, both because soil VOC and SVOC contamination was observed in the boring and because VOC and SVOC COC concentrations exceed applicable Part 201 Criteria. In general, it may be presumed that a contaminated groundwater plume is migrating north from the Site along the Montreal River. Theoretically, this hypothesis also is supported by the observed petroleum odors and sheen documented during the construction of the Norrie Street Bridge in 2010. However, based on the groundwater sample results and observations for borings B01, B02, B03, B04, B06, and B07, this hypothesis is unlikely. The borings all were installed to a similar depth at a similar distance from the river, but SVOC and VOC COCs were not detected. It is more likely that the banks of the Montreal River have shifted over time. The river generally flows south to north, but due to geologic and man-made processes, the banks also shift from east west. During MGP operation, it is likely that the river was used for disposal practices. Therefore, MGP waste material and residuals likely were deposited with sediment. Changes in the banks of the river may have resulted in the burial of the historical river bank and with it, a zone of contaminated sediment.

The GSI study completed by the MDEQ and documented in the SA Report (WESTON 2011) confirms that groundwater at the Site is discharging to the Montreal River. Groundwater samples contained contaminants including VOCs, SVOCs, and metals consistent with the wastes observed at the Site. Further, the concentrations of contaminants in groundwater exceed relevant MDEQ Part 201 Criteria and are negatively impacting the Montreal River, as is evidenced by sediment samples collected from the Montreal River next to the Site that identified a significant reduction of survival and growth in the tested organisms in the sediment.

Surface water and sediment samples collected from the Montreal River show that contaminants from the Site may be migrating downriver. In addition, gross contamination, including process waste, has been observed along the river downgradient of the Site and also likely is present within the historical river bank, which now may be buried at some locations as evidenced by the observations for soil boring B05. Hazardous discharges from the Site's subsurface will continue to impact the Montreal River as long as the source material remains at the Site.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Figure 6-1 shows the findings of the screening and sampling results for environmental media at the Site. The findings suggest that most of the source materials, including coal tar and residual process waste, are confined to the northern portion of the Site bordered on the west by the bank of the Montreal River. As **Figures 4-6** and **4-7** show, it is likely that these waste deposits are confined to a 3- to 6-ft-thick interval in the subsurface. The buried waste deposits at the Site will remain a source of contamination, leaching COCs to groundwater as well as the adjacent surface water body. Observations during construction of the Norrie Street Bridge and documented during sediment sample collection and boring installation indicate that historical sediment (the former river bank) impacted by the Site may have been buried in some locations as the river channel moved or was filled in.

Contaminants at the Site pose immediate threats to the public health or welfare of the United States or the environment based on factors that should be considered when evaluating potential future actions at the Site. Human and biological receptors are present at the Site based on the observation of foot traffic, ATV traffic, and animals at the Site during the Supplemental SA. Further, surface water and sediment downstream of the Site have been impacted by historical MGP operations. Toxicological testing indicates that sediment collected from next to the Site may pose a threat to aquatic organisms. Removal of the source material at the Site potentially would mitigate these threats and eliminate source contributions to the ecosystem. Additional assessment is required downstream of the Site to fully understand the impact to sediment along the Montreal River.

Based on observations, soil screening results, and laboratory analytical data, WESTON START has developed a preliminary volume estimate that includes the removal of grossly contaminated soil and process residual waste from the Site. The removal would include the selective excavation, transportation, and disposal of the grossly contaminated media while reusing uncontaminated overburden as backfill. The estimated area of contamination at the Site covers approximately 55,200 square feet (ft^2). The average estimated thickness of the grossly contaminated interval is approximately 4 ft and is composed of coal tar, contaminated soil, process residuals, concrete, and debris. A removal action to address the impacted interval would result in the excavation of approximately 7,100 cubic yards of contaminated soil and debris, or

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

approximately 12,000 tons. In addition, preliminary estimates for groundwater beneath the Site indicate that groundwater likely is confined to perched zones that would be encountered during removal activities. Based on observations during test pit excavation, the volume of groundwater generated during the removal action is not anticipated to exceed 150,000 gallons. These estimates are approximate and do not include surface vegetation, tree stumps, and debris piles that would require removal prior to a removal action at the Site.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

7. REFERENCES

Michigan Department of Environmental Quality (MDEQ). 2010a. Various Communications and Documentation for the Ironwood Manufactured Gas Plant Site. Remediation Division.

MDEQ. 2010b. "Site Inspection Work Plan for the Ironwood Manufactured Gas Plant Site." Remediation Division.

New York State Department of Environmental Conservation (NYSDEC). 2010. "The MGP Program at the NYSDEC." On-line Address: http://www.dec.ny.gov/chemical/24904.html

United States Environmental Protection Agency (U.S. EPA). 1999. "A Resource for MGP Site Characterization and Remediation, Expedited Site Characterization and Source Remediation at Former Manufactured Gas Plant Sites." May.

Weston Solutions, Inc. (WESTON). 2011. "Draft Site Assessment Report for the Ironwood Manufactured Gas Plant Site, Ironwood, Gogebic County, Michigan." April 26.

WESTON. 2012. "Field Sampling Plan for the Ironwood Manufactured Gas Plant Site, Ironwood, Gogebic County, Michigan." April 6.

Wisconsin Department of Natural Resources. (WDNR). 2011. "Areas in Wisconsin Associated with the Ironwood MGP Site." Bureau of Remediation and Redevelopment. January.

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

TABLES

Table 4-1a
Waste Characterization Soil Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP17**	**U.S. EPA Hazardous Waste Toxicity Value***
	Field Sample ID	**IWMGP-TP17-S01-041212**	
	Sampling Date	**4/12/2012**	
Chemical Name	**Unit**	**Result**	
Inorganics			
Arsenic	mg/kg	45	--
Barium	mg/kg	58.2	--
Cadmium	mg/kg	3.4	--
Chromium	mg/kg	31.7	--
Copper	mg/kg	61.5	--
Lead	mg/kg	58.6	--
Mercury	mg/kg	0.022 U	--
Selenium	mg/kg	0.84 U	--
Silver	mg/kg	0.56 U	--
Zinc	mg/kg	62.7	--
Inorganics, TCLP			
Arsenic, TCLP	mg/L	0.050 U	5.0
Barium, TCLP	mg/L	0.5	100
Cadmium, TCLP	mg/L	0.0050 U	1.0
Chromium, TCLP	mg/L	0.050 U	5.0
Copper, TCLP	mg/L	0.05 U	--
Lead, TCLP	mg/L	0.018	5.0
Mercury, TCLP	mg/L	0.0008 U	0.2
Selenium, TCLP	mg/L	0.075 U	1.0
Silver, TCLP	mg/L	0.050 U	5.0
Zinc, TCLP	mg/L	0.261	--
PCBs			
Aroclor-1016	µg/kg	199 U	--
Aroclor-1221	µg/kg	199 U	--
Aroclor-1232	µg/kg	199 U	--
Aroclor-1242	µg/kg	199 U	--
Aroclor-1248	µg/kg	199 U	--
Aroclor-1254	µg/kg	199 U	--
Aroclor-1260	µg/kg	199 U	--
Aroclor-1262	µg/kg	199 U	--
Aroclor-1268	µg/kg	199 U	--
Other			
Percent Moisture	%	17.1	--
Cyanide, Amenable	mg/kg	6.1 U	--
Cyanide, Reactive	mg/kg	0.025 U	--
Flashpoint, Closed Cup	°F	>210	<140
pH	SU	6.0	2 < pH < 12.5
Sulfide, Reactive	mg/kg	100 U	--
VOCs			
Acetone	µg/kg	7,670 U	--
Allyl chloride	µg/kg	1,230 U	--
Benzene	µg/kg	388	--
Bromobenzene	µg/kg	307 U	--
Bromochloromethane	µg/kg	307 U	--
Bromodichloromethane	µg/kg	307 U	--

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1a
Waste Characterization Soil Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP17**	**U.S. EPA Hazardous Waste Toxicity Value***
	Field Sample ID	**IWMGP-TP17-S01-041212**	
	Sampling Date	**4/12/2012**	
Chemical Name	**Unit**	**Result**	
Bromoform	µg/kg	1,230 U	--
Bromomethane	µg/kg	3,070 U	--
2-Butanone (MEK)	µg/kg	3,070 U	--
n-Butylbenzene	µg/kg	307 U	--
sec-Butylbenzene	µg/kg	307 U	--
tert-Butylbenzene	µg/kg	307 U	--
Carbon tetrachloride	µg/kg	307 U	--
Chlorobenzene	µg/kg	307 U	--
Chloroethane	µg/kg	3,070 U	--
Chloroform	µg/kg	307 U	--
Chloromethane	µg/kg	1,230 U	--
2-Chlorotoluene	µg/kg	307 U	--
4-Chlorotoluene	µg/kg	307 U	--
1,2-Dibromo-3-chloropropane	µg/kg	1,230 U	--
Dibromochloromethane	µg/kg	307 U	--
1,2-Dibromoethane (EDB)	µg/kg	307 U	--
Dibromomethane	µg/kg	307 U	--
1,2-Dichlorobenzene	µg/kg	307 U	--
1,3-Dichlorobenzene	µg/kg	307 U	--
1,4-Dichlorobenzene	µg/kg	307 U	--
Dichlorodifluoromethane	µg/kg	307 U	--
1,1-Dichloroethane	µg/kg	307 U	--
1,2-Dichloroethane	µg/kg	307 U	--
1,1-Dichloroethylene	µg/kg	307 U	--
cis-1,2-Dichloroethylene	µg/kg	307 U	--
trans-1,2-Dichloroethylene	µg/kg	307 U	--
Dichlorofluoromethane	µg/kg	3,070 U	--
1,2-Dichloropropane	µg/kg	307 U	--
1,3-Dichloropropane	µg/kg	307 U	--
2,2-Dichloropropane	µg/kg	1,230 U	--
1.1-Dichloropropylene	µg/kg	307 U	--
cis-1,3-Dichloropropylene	µg/kg	307 U	--
trans-1,3-Dichloropropylene	µg/kg	307 U	--
Diethyl ether	µg/kg	1,230 U	--
Ethylbenzene	µg/kg	5,160	--
Hexachloro-1,2-butadiene	µg/kg	1,530 U	--
Isopropyl benzene (Cumene)	µg/kg	400	--
p-Isopropyltoluene	µg/kg	307 U	--
Methylene chloride	µg/kg	1,230 U	--
4-Methyl-2-pentanone (MIBK)	µg/kg	3,070 U	--
Methyl-tert-butyl ether (MTBE)	µg/kg	307 U	--
Naphthalene	µg/kg	37,600	--
n-Propylbenzene	µg/kg	307 U	--
Styrene	µg/kg	307 U	--
1,1,1,2-Tetrachloroethane	µg/kg	307 U	--
1,1,2,2-Tetrachloroethane	µg/kg	307 U	--

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1a
Waste Characterization Soil Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP17**	**U.S. EPA Hazardous Waste Toxicity Value***
	Field Sample ID	**IWMGP-TP17-S01-041212**	
	Sampling Date	**4/12/2012**	
Chemical Name	**Unit**	**Result**	
Tetrachloroethylene	µg/kg	307 U	--
Tetrahydrofuran	µg/kg	12,300 U	--
Toluene	µg/kg	1,100	--
1,2,3-Trichlorobenzene	µg/kg	307 U	--
1,2,4-Trichlorobenzene	µg/kg	307 U	--
1,1,1-Trichloroethane	µg/kg	307 U	--
1,1,2-Trichloroethane	µg/kg	307 U	--
Trichloroethylene	µg/kg	307 U	--
Trichlorofluoromethane	µg/kg	1,230 U	--
1,2,3-Trichloropropane	µg/kg	1,230 U	--
1,1,2-Trichlorotrifluoroethane	µg/kg	307 U	--
1,2,4-Trimethylbenzene	µg/kg	2,260	--
1,3,5-Trimethylbenzene	µg/kg	1,070	--
Vinyl chloride	µg/kg	123 U	--
Xylene (Total)	µg/kg	4,080	--
SVOCs			
Acenaphthene	µg/kg	10,700	--
Acenaphthylene	µg/kg	8,450	--
Anthracene	µg/kg	23,500	--
Benzo(a)anthracene	µg/kg	19,700	--
Benzo(a)pyrene	µg/kg	24,300	--
Benzo(b)fluoranthene	µg/kg	15,000	--
Benzo(g,h,i)perylene	µg/kg	9,200	--
Benzo(k)fluoranthene	µg/kg	8,100 U	--
4-Bromophenylphenyl ether	µg/kg	8,100 U	--
Butyl benzyl phthalate	µg/kg	8,100 U	--
Carbazole	µg/kg	8,100 U	--
4-Chloro-3-methylphenol	µg/kg	8,100 U	--
4-Chloroaniline	µg/kg	8,100 U	--
bis(2-Chloroethoxy)methane	µg/kg	8,100 U	--
bis(2-Chloroethyl)ether	µg/kg	8,100 U	--
bis (2-Chloroisopropyl) ether	µg/kg	8,100 U	--
Chrysene	µg/kg	25,300	--
Dibenzo(a,h)anthracene	µg/kg	8,100 U	--
Dibenzofuran	µg/kg	8,100 U	--
1,2-Dichlorobenzene	µg/kg	8,100 U	--
1,3-Dichlorobenzene	µg/kg	8,100 U	--
1,4-Dichlorobenzene	µg/kg	8,100 U	--
3,3'-Dichlorobenzidine	µg/kg	16,500 U	--
2,4-Dichlorophenol	µg/kg	8,100 U	--
Diethyl phthalate	µg/kg	8,100 U	--
2,4-Dimethylphenol	µg/kg	8,100 U	--
Dimethyl phthalate	µg/kg	8,100 U	--
Di-n-butyl phthalate	µg/kg	8,100 U	--
4,6-Dinitro-2-methylphenol	µg/kg	41,700 U	--
2,4-Dinitrophenol	µg/kg	41,700 U	--

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1a
Waste Characterization Soil Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP17**	**U.S. EPA Hazardous Waste Toxicity Value***
	Field Sample ID	**IWMGP-TP17-S01-041212**	
	Sampling Date	**4/12/2012**	
Chemical Name	**Unit**	**Result**	
2,4-Dinitrotoluene	µg/kg	8,100 U	--
2,6-Dinitrotoluene	µg/kg	8,100 U	--
Di-n-octyl phthalate	µg/kg	8,100 U	--
1,2-Diphenylhydrazine	µg/kg	41,700 U	--
bis(2-Ethylhexyl)phthalate	µg/kg	8,100 U	--
Fluoranthene	µg/kg	38,200	--
Fluorene	µg/kg	8,100 U	--
Hexachloro-1,3-butadiene	µg/kg	8,100 U	--
Hexachlorobenzene	µg/kg	8,100 U	--
Hexachloroethane	µg/kg	8,100 U	--
Indeno(1,2,3-cd)pyrene	µg/kg	11,400	--
Isophorone	µg/kg	8,100 U	--
1-Methylnaphthalene	µg/kg	11,200	--
2-Methylnaphthalene	µg/kg	11,600	--
2-Methylphenol (o-Cresol)	µg/kg	8,100 U	--
3&4-Methylphenol	µg/kg	16,200 U	--
Naphthalene	µg/kg	16,600	--
2-Nitroaniline	µg/kg	41,700 U	--
3-Nitroaniline	µg/kg	41,700 U	--
4-Nitroaniline	µg/kg	41,700 U	--
Nitrobenzene	µg/kg	8,100 U	--
2-Nitrophenol	µg/kg	8,100 U	--
4-Nitrophenol	µg/kg	41,700 U	--
N-Nitrosodimethylamine	µg/kg	8,100 U	--
n-Nitroso-di-n-propylamine	µg/kg	8,100 U	--
N-Nitrosodiphenylamine	µg/kg	8,100 U	--
Pentachlorophenol	µg/kg	16,500 U	--
Phenanthrene	µg/kg	33,200	--
Phenol	µg/kg	8,100 U	--
Pyrene	µg/kg	63,600	--
1,2,4-Trichlorobenzene	µg/kg	8,100 U	--
2,4,5-Trichlorophenol	µg/kg	41,700 U	--
2,4,6-Trichlorophenol	µg/kg	8,100 U	--

Notes:
Screening values from Title 40 of the *Code of Federal Regulations* , Chapter 1, Section 261.20-24

-- = No value listed
°F = Degree Fahrenheit
µg/kg = Microgram per kilogram
ID = Identification
mg/kg = Milligram per kilogram
mg/L = Milligram per liter
PCB = Polychlorinated biphenyl
SU = Standard unit
SVOC = Semivolatile organic compound
TCLP = Toxicity Charateristic Leaching Procedure
U = Analyte analyzed for but not detected above reported sample quantitation limit
U.S. EPA = United States Environmental Protection Agency
VOC = Volatile organic compound

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1b
Waste Characterization Groundwater Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP16**
	Field Sample ID	**IWMGP-TP16-W01-041212**
	Sampling Date	**4/12/2012**
Chemical Name	**Unit**	**Result**
Inorganics		
Arsenic	µg/L	10.0 U
Barium	µg/L	28.9
Cadmium	µg/L	2.0 U
Chromium	µg/L	10.0 U
Copper	µg/L	68
Lead	µg/L	29.8
Mercury	µg/L	0.20 U
Selenium	µg/L	20.0 U
Silver	µg/L	10.0 U
Zinc	µg/L	108
Other		
Carbonaceous BOD_5	mg/L	2.7
Cyanide, Amenable	mg/L	1.0
Flashpoint, Closed Cup	°F	>210
Nitrogen, Ammonia	mg/L	0.36
Oil and Grease	mg/L	5.1 U
pH	SU	6.0
Phosphorus, Total	mg/L	0.11
Sulfide, Idometric	mg/L	5.0 U
VOCs		
Acetone	µg/L	25.0 U
Allyl chloride	µg/L	4.0 U
Benzene	µg/L	1.0 U
Bromobenzene	µg/L	1.0 U
Bromochloromethane	µg/L	1.0 U
Bromodichloromethane	µg/L	1.0 U
Bromoform	µg/L	4.0 U
Bromomethane	µg/L	4.0 U
2-Butanone (MEK)	µg/L	4.0 U
n-Butylbenzene	µg/L	1.0 U
sec-Butylbenzene	µg/L	1.0 U
tert-Butylbenzene	µg/L	1.0 U
Carbon tetrachloride	µg/L	1.0 U
Chlorobenzene	µg/L	1.0 U
Chloroethane	µg/L	1.0 U
Chloroform	µg/L	1.0 U
Chloromethane	µg/L	4.0 U
2-Chlorotoluene	µg/L	1.0 U
4-Chlorotoluene	µg/L	1.0 U
1,2-Dibromo-3-chloropropane	µg/L	4.0 U
Dibromochloromethane	µg/L	1.0 U
1,2-Dibromoethane (EDB)	µg/L	1.0 U
Dibromomethane	µg/L	4.0 U
1,2-Dichlorobenzene	µg/L	1.0 U
1,3-Dichlorobenzene	µg/L	1.0 U
1,4-Dichlorobenzene	µg/L	1.0 U

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1b
Waste Characterization Groundwater Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP16**
	Field Sample ID	**IWMGP-TP16-W01-041212**
	Sampling Date	**4/12/2012**
Chemical Name	**Unit**	**Result**
Dichlorodifluoromethane	µg/L	1.0 U
1,1-Dichloroethane	µg/L	1.0 U
1,2-Dichloroethane	µg/L	1.0 U
1,1-Dichloroethylene	µg/L	1.0 U
cis-1,2-Dichloroethylene	µg/L	1.0 U
trans-1,2-Dichloroethylene	µg/L	1.0 U
Dichlorofluoromethane	µg/L	1.0 U
1,2-Dichloropropane	µg/L	4.0 U
1,3-Dichloropropane	µg/L	1.0 U
2,2-Dichloropropane	µg/L	4.0 U
1.1-Dichloropropylene	µg/L	1.0 U
cis-1,3-Dichloropropylene	µg/L	4.0 U
trans-1,3-Dichloropropylene	µg/L	4.0 U
Diethyl ether	µg/L	4.0 U
Ethylbenzene	µg/L	1.0 U
Hexachloro-1,2-butadiene	µg/L	5.0 U
Isopropyl benzene (Cumene)	µg/L	1.0 U
p-Isopropyltoluene	µg/L	1.0 U
Methylene chloride	µg/L	4.0 U
4-Methyl-2-pentanone (MIBK)	µg/L	4.0 U
Methyl-tert-butyl ether (MTBE)	µg/L	1.0 U
Naphthalene	µg/L	4.0 U
n-Propylbenzene	µg/L	1.0 U
Styrene	µg/L	1.0 U
1,1,1,2-Tetrachloroethane	µg/L	1.0 U
1,1,2,2-Tetrachloroethane	µg/L	1.0 U
Tetrachloroethylene	µg/L	1.0 U
Tetrahydrofuran	µg/L	10.0 U
Toluene	µg/L	1.0 U
1,2,3-Trichlorobenzene	µg/L	1.0 U
1,2,4-Trichlorobenzene	µg/L	1.0 U
1,1,1-Trichloroethane	µg/L	1.0 U
1,1,2-Trichloroethane	µg/L	1.0 U
Trichloroethylene	µg/L	1.0 U
Trichlorofluoromethane	µg/L	1.0 U
1,2,3-Trichloropropane	µg/L	4.0 U
1,1,2-Trichlorotrifluoroethane	µg/L	1.0 U
1,2,4-Trimethylbenzene	µg/L	1.0 U
1,3,5-Trimethylbenzene	µg/L	1.0 U
Vinyl chloride	µg/L	0.40 U
Xylene (Total)	µg/L	3.0 U
SVOCs		
Acenaphthene	µg/L	10.1 U
Acenaphthylene	µg/L	10.1 U
Anthracene	µg/L	10.1 U
Benzo(a)anthracene	µg/L	10.1 U
Benzo(a)pyrene	µg/L	10.1 U

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1b
Waste Characterization Groundwater Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP16**
	Field Sample ID	**IWMGP-TP16-W01-041212**
	Sampling Date	**4/12/2012**
Chemical Name	**Unit**	**Result**
Benzo(b)fluoranthene	µg/L	12
Benzo(g,h,i)perylene	µg/L	11.1
Benzo(k)fluoranthene	µg/L	10.1 U
4-Bromophenylphenyl ether	µg/L	10.1 U
Butyl benzyl phthalate	µg/L	10.1 U
Carbazole	µg/L	10.1 U
4-Chloro-3-methylphenol	µg/L	10.1 U
4-Chloroaniline	µg/L	50.5 U
bis(2-Chloroethoxy)methane	µg/L	10.1 U
bis(2-Chloroethyl)ether	µg/L	10.1 U
bis (2-Chloroisopropyl) ether	µg/L	10.1 U
Chrysene	µg/L	10.1 U
Dibenzo(a,h)anthracene	µg/L	20.2 U
Dibenzofuran	µg/L	10.1 U
1,2-Dichlorobenzene	µg/L	10.1 U
1,3-Dichlorobenzene	µg/L	10.1 U
1,4-Dichlorobenzene	µg/L	10.1 U
3,3'-Dichlorobenzidine	µg/L	20.2 U
2,4-Dichlorophenol	µg/L	10.1 U
Diethyl phthalate	µg/L	10.1 U
2,4-Dimethylphenol	µg/L	10.1 U
Dimethyl phthalate	µg/L	10.1 U
Di-n-butyl phthalate	µg/L	10.1 U
4,6-Dinitro-2-methylphenol	µg/L	50.5 U
2,4-Dinitrophenol	µg/L	50.5 U
2,4-Dinitrotoluene	µg/L	10.1 U
2,6-Dinitrotoluene	µg/L	10.1 U
Di-n-octyl phthalate	µg/L	10.1 U
1,2-Diphenylhydrazine	µg/L	10.1 U
bis(2-Ethylhexyl)phthalate	µg/L	10.1 U
Fluoranthene	µg/L	10.1 U
Fluorene	µg/L	10.1 U
Hexachloro-1,3-butadiene	µg/L	10.1 U
Hexachlorobenzene	µg/L	10.1 U
Hexachloroethane	µg/L	10.1 U
Indeno(1,2,3-cd)pyrene	µg/L	10.1 U
Isophorone	µg/L	10.1 U
1-Methylnaphthalene	µg/L	10.1 U
2-Methylnaphthalene	µg/L	10.1 U
2-Methylphenol (o-Cresol)	µg/L	10.1 U
3&4-Methylphenol	µg/L	20.2 U
Naphthalene	µg/L	10.1 U
2-Nitroaniline	µg/L	50.5 U
3-Nitroaniline	µg/L	50.5 U
4-Nitroaniline	µg/L	10.1 U
Nitrobenzene	µg/L	10.1 U
2-Nitrophenol	µg/L	10.1 U

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-1b
Waste Characterization Groundwater Sample Analytical Results
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**TP16**
	Field Sample ID	**IWMGP-TP16-W01-041212**
	Sampling Date	**4/12/2012**
Chemical Name	**Unit**	**Result**
4-Nitrophenol	µg/L	50.5 U
N-Nitrosodimethylamine	µg/L	10.1 U
n-Nitroso-di-n-propylamine	µg/L	10.1 U
N-Nitrosodiphenylamine	µg/L	10.1 U
Pentachlorophenol	µg/L	23.2 U
Phenanthrene	µg/L	10.1 U
Phenol	µg/L	10.1 U
Pyrene	µg/L	20.8
1,2,4-Trichlorobenzene	µg/L	10.1 U
2,4,5-Trichlorophenol	µg/L	50.5 U
2,4,6-Trichlorophenol	µg/L	10.1 U

Notes:
°F = Degree Fahrenheit
µg/L = Microgram per liter
BOD = Biochemical oxygen demand
ID = Identification
mg/L = Milligram per liter
SU = Standard unit
SVOC = Semivolatile organic compound
TCLP = Toxicity Charateristic Leaching Procedure
U = Analyte analyzed for but not detected above reported sample quantitation limit
VOC = Volatile organic compound

This document shall not be disclosed without the express written permission of U.S. EPA

Table 4-2
Groundwater Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**B01**	**B02**	**B03**	**B04**	**B05**	**1**	**2**	**3**
	Field Sample ID	**IWMGP-B01-W01-041312**	**IWMGP-B02-W01-041312**	**IWMGP-B03-W01-041312**	**IWMGP-B04-W01-041312**	**IWMGP-B05-W01-041212**	**Residential Drinking Water Criteria**	**Groundwater Surface Water Interface Criteria**	**Groundwater Contact Criteria**
	Sampling Date	**4/13/2012**	**4/13/2012**	**4/13/2012**	**4/13/2012**	**4/12/2012**			
Chemical Name	**Unit**	**Result**							
Inorganics									
Calcium	mg/L	31	120 D	NT	84	100 D	--	--	--
Iron	µg/L	**36,000 D [1]**	**2,200 [1]**	NT	**67,000 D [1]**	**11,000 [1]**	300	--	58,000,000
Magnesium	mg/L	18	12	NT	37	12	400	--	1,000,000
Potassium	mg/L	3.8	1.6	NT	5.9	1.6	--	--	--
Sodium	mg/L	21	32	NT	9.2	6	--	--	--
Aluminum	µg/L	**26,000 D [1]**	**1,700 D [1]**	NT	**250,000 D [1]**	**2,400 D [1]**	50	--	64,000,000
Antimony	µg/L	1 U	1 U	NT	1	1 U	6	130	68,000
Arsenic	µg/L	**14 [1,2]**	1.3	NT	**26 [1,2]**	2	10	10	4,300
Barium	µg/L	**260 [2]**	59	NT	**510 [2]**	71	2,000	230	14,000,000
Beryllium	µg/L	1 U	1 U	NT	**2.2 [2]**	1 U	4	0.5	290,000
Cadmium	µg/L	0.44	0.2 U	NT	0.46	0.2 U	5	1.4	190,000
Chromium	µg/L	39	2.8	NT	83	5.9	--	--	--
Cobalt	µg/L	20	15 U	NT	**50 [1]**	15 U	40	100	2,400,000
Copper	µg/L	**130 [2]**	3.2	NT	**310 [2]**	**6.4 [2]**	1,000	5.3	7,400,000
Lead	µg/L	**64 [1,2]**	3.1	NT	**67 [1,2]**	**6 [1,2]**	4	5.2	--
Manganese	µg/L	**820 [1]**	**240 [1]**	NT	**2100 D [1,2]**	**950 [1]**	50	1,100	9,100,000
Molybdenum - Sediment	µg/L	25 U	25 U	NT	25 U	25 U	--	--	--
Nickel	µg/L	**54 [2]**	4.2	NT	**200 [1,2]**	5.7	100	31	74,000,000
Selenium	µg/L	1	1 U	NT	2.2	1 U	50	5	970,000
Silver	µg/L	**0.21 [2]**	0.2 U	NT	**0.84 [2]**	0.2 U	34	.2	1,500,000
Thallium	µg/L	2 U	2 U	NT	2 U	2 U	2	3.7	13,000
Vanadium	µg/L	**62 [1,2]**	**6 [1]**	NT	**240 [1,2]**	**14 [1,2]**	4.5	12	970,000
Zinc	µg/L	**130 [2]**	10 U	NT	**510 [2]**	13	2,400	70	110,000,000
Mercury	µg/L	0.2 U	0.2 U	NT	0.2 U	0.2 U	2	0.0013	56
VOCs									
1,1,1,2-Tetrachloroethane	µg/L	1 U	1 U	1 U	1 U	1 U	77	--	30,000
1,1,1-Trichloroethane	µg/L	1 U	1 U	1 U	1 U	1 U	200	89	1,300,000
1,1,2,2-Tetrachloroethane	µg/L	1 U	1 U	1 U	1 U	1 U	8.5	78	4,700
1,1,2-Trichloroethane	µg/L	1 U	1 U	1 U	1 U	1 U	5	330	21,000
1,1-Dichloroethane	µg/L	1 U	1 U	1 U	1 U	1 U	880	740	2,400,000
1,1-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	7	130	11,000
1,2,3-Trichlorobenzene	µg/L	5 U	5 U	5 U	5 U	5 U	--	--	--
1,2,3-Trichloropropane	µg/L	1 U	1 U	1 U	1 U	1 U	42	--	84,000
1,2,3-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	6.6	--	--	--
1,2,4-Trichlorobenzene, VOCS	µg/L	5 U	5 U	5 U	5 U	5 U	70	99	19,000
1,2,4-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	17	63	17	56,000
1,2-Dibromo-3-chloropropane	µg/L	5 U	5 U	5 U	5 U	5 U	0.2	--	390
1,2-Dibromoethane	µg/L	1 U	1 U	1 U	1 U	1 U	0.05	5.7	25
1,2-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1 U	600	13	160,000
1,2-Dichloroethane	µg/L	1 U	1 U	1 U	1 U	1 U	5	360	19,000
1,2-Dichloropropane	µg/L	1 U	1 U	1 U	1 U	1 U	5	230	16,000
1,3,5-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	6.7	72	45	61,000
1,3-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1 U	6.6	28	2,000
1,4-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	1 U	75	17	6,400
2-Butanone	µg/L	5 5U	5 U	5 U	5 U	5 U	13,000	2,200	240,000,000

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-2
Groundwater Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**B01**	**B02**	**B03**	**B04**	**B05**	**1**	**2**	**3**
	Field Sample ID	**IWMGP-B01-W01-041312**	**IWMGP-B02-W01-041312**	**IWMGP-B03-W01-041312**	**IWMGP-B04-W01-041312**	**IWMGP-B05-W01-041212**	**Residential Drinking Water Criteria**	**Groundwater Surface Water Interface Criteria**	**Groundwater Contact Criteria**
	Sampling Date	**4/13/2012**	**4/13/2012**	**4/13/2012**	**4/13/2012**	**4/12/2012**			
Chemical Name	**Unit**	**Result**							
2-Hexanone	µg/L	5 U	5 U	5 U	5 U	5 U	1,000	--	5,200,000
2-Methylnaphthalene, VOC [a]	µg/L	5 GU	5 U	5 U	5 U	**160 [2]**	260	19	25,000
4-Methyl-2-pentanone	µg/L	5 U	5 U	5 U	5 U	5 U	1,800	--	13,000,000
Acetone	µg/L	20 5U	20 U	20 U	20 U	20 U	730	1,700	31,000,000
Acrylonitrile	µg/L	5 ZGU	5 ZU	5 ZU	5 ZU	5 ZU	2.6	2	14,000
Benzene	µg/L	1 U	1 U	1 U	1 U	1 U	5	200	11,000
Bromobenzene	µg/L	1 U	1 U	1 U	1 U	1 U	18	--	12,000
Bromochloromethane	µg/L	1 U	1 U	1 U	1 U	1 U	--	--	--
Bromodichloromethane	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	14,000
Bromoform	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	140,000
Bromomethane	µg/L	5 U	5 U	5 U	5 U	5 U	10	35	70,000
Carbon disulfide	µg/L	1 U	1 U	1 U	1 U	1 U	800	--	1,200,000
Carbon tetrachloride	µg/L	1 U	1 U	1 U	1 U	1 U	5	45	4,600
Chlorobenzene	µg/L	1 U	1 U	1 U	1 U	1 U	100	25	86,000
Chloroethane	µg/L	5 U	5 U	5 U	5 U	5 U	430	1,100	440,000
Chloroform	µg/L	1 U	1 U	1 U	1 U	1 U	80	350	150,000
Chloromethane	µg/L	5 U	5 U	5 U	5 U	5 U	260	--	490,000
cis-1,2-Dichloroethene	µg/L	1.1	1 U	1 U	1 U	1 U	70	620	200,000
cis-1,3-Dichloropropene	µg/L	1 U	1 U	1 U	1 U	1 U	--	--	--
Cyclohexane	µg/L	5 U	5 U	5 U	5 U	5 U	--	--	--
Dibromochloromethane	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	18,000
Dibromomethane	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	530,000
Dichlorodifluoromethane	µg/L	5 U	5 U	5 U	5 U	5 U	1,700	--	300,000
Diethyl ether	µg/L	5 U	5 U	5 U	5 U	5 U	10	--	35,000,000
Diisopropyl Ether	µg/L	5 U	5 U	5 U	5 U	5 U	30	--	8,000
Ethylbenzene	µg/L	1 U	1 U	1 U	1 U	12	74	18	170,000
Hexachloroethane, VOC	µg/L	5 U	5 U	5 U	5 U	5 U	7.3	6.7	1,900
Isopropylbenzene	µg/L	1 U	1 U	1 U	1 U	2.9	800	28	56,000
m & p - Xylene	µg/L	2 U	2 U	2 U	2 U	12	--	--	--
Methyl iodide	µg/L	1 U	1 U	1 U	1 U	1 U	--	--	--
Methylene chloride	µg/L	5 U	5 U	5 U	5 U	5 U	5	1,500	220,000
Methyl tert-butyl ether	µg/L	1 U	1 U	1 U	1 U	1 U	40	7,100	610,000
Naphthalene, VOC [a]	µg/L	5 U	5 U	5 U	5 U	**290 [2]**	520	11	31,000
n-Butylbenzene	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	5,900
n-Propylbenzene	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	15,000
o-Xylene	µg/L	1 U	1 U	1 U	1 U	6.2	--	--	--
p-Isopropyl toluene	µg/L	1 U	1 U	1 U	1 U	1.8	--	--	--
sec-Butylbenzene	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	4,400
Styrene	µg/L	1 U	1 U	1 U	1 U	1 U	100	80	9,700
tert-Butyl ethyl ether	µg/L	5 U	5 U	5 U	5 U	5 U	49	--	--
tert-Butylbenzene	µg/L	1 U	1 U	1 U	1 U	1 U	80	--	8,900
tert-Butyl Alcohol	µg/L	50 U	50 U	50 U	50 U	50 U	3,900	--	79,000,000
tertiaryAmylmethylether	µg/L	5 U	5 U	5 U	5 U	5 U	190	--	2,600,000
Tetrachloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	5	60	12,000
Tetrahydrofuran	µg/L	5 U	5 U	5 U	5 U	5 U	95	11,000	1,600,000
Toluene	µg/L	1 U	1 U	1 U	1 U	1 U	790	270	530,000

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-2
Groundwater Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

Location ID		B01	B02	B03	B04	B05	1	2	3
Field Sample ID		IWMGP-B01-W01-041312	IWMGP-B02-W01-041312	IWMGP-B03-W01-041312	IWMGP-B04-W01-041312	IWMGP-B05-W01-041212	Residential Drinking Water Criteria	Groundwater Surface Water Interface Criteria	Groundwater Contact Criteria
Sampling Date		4/13/2012	4/13/2012	4/13/2012	4/13/2012	4/12/2012			
Chemical Name	**Unit**	**Result**							
trans-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	100	1,500	220,000
trans-1,3-Dichloropropene	µg/L	1 U	1 U	1 U	1 U	1 U	--	--	--
trans-1,4-Dichloro-2	µg/L	5 ZU	5 ZU	5 ZU	5 ZU	5 ZU	--	--	--
Trichloroethene	µg/L	1 U	1 U	1 U	1 U	1 U	5	200	22,000
Trichlorofluoromethane	µg/L	1 U	1 U	1 U	1 U	1 U	2,600	--	1,100,000
Vinyl chloride	µg/L	1 U	1 U	1 U	1 U	1 U	2	13	1,000
SVOCs									
1,2,4-Trichlorobenzene, SVOC	µg/L	2 U	2 U	2 U	2 U	21 U	70	99	19,000
2,2'-Oxybis(1-chloropropane)	µg/L	1 U	1 U	1 U	1 U	10 U	--	--	--
2,4,5-Trichlorophenol	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	730	--	170,000
2,4,6-Trichlorophenol	µg/L	4 U	4.1 U	4 U	4 U	41 U	120	5	10,000
2,4-Dichlorophenol	µg/L	10 U	10 U	10 U	10 U	100 U	73	11	48,000
2,4-Dimethylphenol	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	370	380	520,000
2,4-Dinitrophenol	µg/L	25 U	26 U	25 U	25 U	260 U	--	--	--
2,4-Dinitrotoluene	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	7.7	--	8,600
2,6-Dinitrotoluene	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	--	--	--
2-Chloroaniline	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	--	--	--
2-Chloronaphthalene	µg/L	2 U	2 U	2 U	2 U	21 U	1,800	--	6,700
2-Chlorophenol	µg/L	10 U	10 U	10 U	10 U	100 U	45	18	94,000
2-Methylnaphthalene, SVOC	µg/L	5.1 U	5.1 U	5.1 U	5 U	**130 [2]**	260	19	25,000
2-Methylphenol	µg/L	10 U	10 U	10 U	10 U	100 U	--	--	--
2-Nitroaniline	µg/L	20 U	20 U	20 U	20 U	210 U	--	--	--
2-Nitrophenol	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	20	--	79,000
3 & 4-Methylphenol	µg/L	20 U	20 U	20 U	20 U	210 U	--	--	--
3-Nitroaniline	µg/L	20 U	20 U	20 U	20 U	210 U	--	--	--
4,6-Dinitro-2-methylphenol	µg/L	20 U	20 U	20 U	20 U	210 U	20	--	9,500
4-Bromophenyl-phenylether	µg/L	2 U	2 U	2 U	2 U	21 U	--	--	--
4-Chloro-3-methylphenol	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	150	7.4	79,000
4-Chloroaniline	µg/L	10 U	10 U	10 U	10 U	100 U	--	--	--
4-Chlorophenyl-phenylether	µg/L	1 U	1 U	1 U	1 U	10 U	--	--	--
4-Nitroaniline	µg/L	20 U	20 U	20 U	20 U	210 U	--	--	--
4-Nitrophenol	µg/L	25 5U	26 5U	25 5U	25 5U	260 5U	--	--	--
Acenaphthene	µg/L	1 U	1 U	1 U	1 U	**110 [2]**	1,300	38	4,200
Acenaphthylene	µg/L	1 U	1 U	1 U	1 U	13	52	--	3,900
Aniline	µg/L	4 U	4.1 U	4 U	4 U	41 U	53	4	140,000
Anthracene	µg/L	1 U	1 U	1 U	1 U	**78 [1,3]**	43	--	43
Azobenzene	µg/L	2 U	2 U	2 U	2 U	21 U	23	--	1,600
Benzo(a)anthracene	µg/L	1 U	1 U	1 U	1 U	**52 [1,3]**	2.1	--	9.4
Benzo(a)pyrene	µg/L	1 U	1 U	1 U	1 U	**54 [1,3]**	5	--	1
Benzo(b)fluoranthene	µg/L	1 U	1 U	1 U	1 U	**39 [1,3]**	1.5	--	1.5
Benzo(g,h,i)perylene	µg/L	1 U	1 U	1 U	1 U	**23 [1,3]**	1	--	1
Benzo(k)fluoranthene	µg/L	1 U	1 U	1 U	1 U	**16 [1,3]**	1	--	1
Benzyl Alcohol	µg/L	51 U	51 U	51 U	50 U	510 U	10,000	--	44,000,000
Bis(2-chloroethoxy)methane	µg/L	2 U	2 U	2 U	2 U	21 U	--	--	--
Bis(2-chloroethyl)ether	µg/L	1 U	1 U	1 U	1 U	10 U	2	1	5,700
Bis(2-ethylhexyl)phthalate	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	6	25	320

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-2
Groundwater Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**B01**	**B02**	**B03**	**B04**	**B05**	**1**	**2**	**3**
	Field Sample ID	**IWMGP-B01-W01-041312**	**IWMGP-B02-W01-041312**	**IWMGP-B03-W01-041312**	**IWMGP-B04-W01-041312**	**IWMGP-B05-W01-041212**	**Residential Drinking Water Criteria**	**Groundwater Surface Water Interface Criteria**	**Groundwater Contact Criteria**
	Sampling Date	**4/13/2012**	**4/13/2012**	**4/13/2012**	**4/13/2012**	**4/12/2012**			
Chemical Name	**Unit**	**Result**							
Butylbenzylphthalate	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	1,200	67	2,700
Carbazole	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	85	10	7,400
Chrysene	µg/L	1 U	1 U	1 U	1 U	**49 [1,3]**	1.6	--	1.6
Dibenzo(a,h)anthracene	µg/L	2 U	2 U	2 U	2 U	21 U	2	--	2
Dibenzofuran	µg/L	4 U	4.1 U	4 U	4 U	41 U	--	4	--
Diethylphthalate	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	5,500	110	1,100,000
Dimethylphthalate	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	73,000	--	4,200,000
Di-n-butylphthalate	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	880	9.7	11,000
Di-n-octylphthalate	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	130	--	400
Fluoranthene	µg/L	1 U	1 U	1 U	1 U	**80 [2]**	210	1.6	210
Fluorene	µg/L	1 U	1 U	1 U	1 U	**61 [2]**	880	12	2,000
Hexachlorobenzene	µg/L	1 U	1 U	1 U	1 U	10 U	1	0.2	4.6
Hexachlorobutadiene	µg/L	1 U	1 U	1 U	1 U	10 U	15	0.053	400
Hexachlorocyclopentadiene	µg/L	10 ZU	10 ZU	10 ZU	10 ZU	100 ZU	50	--	1,600
Hexachloroethane, SVOC	µg/L	1 U	1 U	1 U	1 U	10 U	7.3	6.7	1,900
Indeno(1,2,3-cd)pyrene	µg/L	2 U	2 U	2 U	2 U	**22 [1,3]**	2	--	2
Isophorone	µg/L	1 U	1 U	1 U	1 U	10 U	770	1,300	990,000
N,N-dimethylaniline	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	16	--	20,000
Naphthalene, SVOC	µg/L	1 U	1 U	1 U	1 U	**160 [2]**	520	11	31,000
Nitrobenzene	µg/L	2 U	2 U	2 U	2 U	21 U	3.4	180	11,000
N-methylaniline	µg/L	1 U	1 U	1 U	1 U	10 U	--	--	--
N-Nitrosodimethylamine	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	--	--	--
N-Nitroso-di-n-propylamine	µg/L	2 U	2 U	2 U	2 U	21 U	5	--	360
N-Nitrosodiphenylamine	µg/L	2 U	2 U	2 U	2 U	21 U	270	--	35,000
Pentachlorophenol	µg/L	20 U	20 U	20 U	20 U	210 U	1	--	200
Phenanthrene	µg/L	1 U	1 U	1 U	1 U	**180 [1,2]**	52	2	1,000
Phenol	µg/L	5.1 U	5.1 U	5.1 U	5 U	51 U	4,400	450	29,000,000
Pyrene	µg/L	1 U	1 U	1 U	1	**180 [1,3]**	140	--	140
Pyridine	µg/L	20 U	20 U	20 U	20 U	210 U	20	--	94,000
Tetramethylurea	µg/L	1 U	1 U	1 U	1 U	10 U	--	--	--
Cyanide									
Cyanide - Available	mg/L	0.002 U	0.002 U	NT	0.002 U	0.002 U	--	--	--
Cyanide	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	--	--	--

Notes:
Analytical results in bold exceed screening criteria 1, 2, or 3 (shown in brackets).
Screening criteria from Part 201 Generic Cleanup Criteria and Screening Levels calculated by the Michigan Department of Environmental Quality (updated 03/25/2011).
-- = No criterion available
µg/L = Microgram per liter
D = Analyte value quantified from dilution(s); RL raised
G = Result and RL considered estimated due to initial calibration standard criteria failure
ID = Identification
mg/L = Milligram per liter
NT = Not tested
RL = Reporting limit
SVOC = Semivolatile organic compound
VOC = Volatile organic compound
U = Analyte analyzed for but not detected above reported sample quantitation limit
Z = Result reported below RL to meet the TDL in RRD Op Memo 2 (10/22/04) multiplied by applicable dilution factor
a Methods 8260 and 624 used to analyze VOCs with boiling points below 200 °C; 2-methylnaphthalene and naphthalene have boiling points above 200 °C and are better suited to analysis using Methods 8270 or

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-3
Surface Water Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	W01	W02	W03	W04	1	2
	Field Sample ID	IWMGP-S01-W01-041112	IWMGP-S02-W02-041112	IWMGP-S03-W03-041112	IWMGP-S04-W04-041112	Human Cancer Value for Surface Water Used as a Drinking Water Source	Human Non-Cancer Value for Surface Water Used as a Drinking Water Source
	Sampling Date	4/11/2012	4/11/2012	4/11/2012	4/11/2012		
Chemical Name	**Unit**	**Result**					
Inorganics							
Calcium	mg/L	13	13	14	14	--	--
Iron	µg/L	610	650	630	630	--	--
Magnesium	mg/L	3.6	3.6	3.9	3.8	--	--
Potassium	mg/L	0.72	0.7	0.81	0.76	--	--
Sodium	mg/L	3.7	3.8	5.9	4.2	--	--
Aluminum	µg/L	120	120	120	110	--	--
Antimony	µg/L	1 U	1 U	1 U	1 U	--	1.7
Arsenic	µg/L	1 U	1 U	1 U	1 U	10	10
Barium	µg/L	13	13	14	14	--	1,900
Beryllium	µg/L	1 U	1 U	1 U	1 U	--	160
Cadmium	µg/L	0.2 U	0.2 U	0.2 U	0.2 U	--	2.5
Chromium	µg/L	1 U	1 U	1 U	1 U	--	120
Cobalt	µg/L	15 U	15 U	15 U	15 U	--	--
Copper	µg/L	1.1	1.2	1.3	1.3	--	470
Lead	µg/L	1 U	1 U	1 U	1 U	--	14
Manganese	µg/L	41	43	37	35	--	1,300
Molybdenum - Sediment	µg/L	25 U	25 U	25 U	25 U	--	--
Nickel	µg/L	2 U	2 U	2 U	2 U	--	2,600
Selenium	µg/L	1 U	1 U	1 U	1 U	--	120
Silver	µg/L	0.2 U	0.2 U	0.2 U	0.2 U	--	130
Thallium	µg/L	2 U	2 U	2 U	2 U	--	1.2
Vanadium	µg/L	2 U	2 U	2 U	2 U	--	53
Zinc	µg/L	10 U	10 U	10 U	10 U	--	3300
Mercury	µg/L	0.2 U	0.2 U	0.2 U	0.2 U	--	0.0018
VOCs							
1,1,1,2-Tetrachloroethane	µg/L	1 U	1 U	1 U	1 U	19	680
1,1,1-Trichloroethane	µg/L	1 U	1 U	1 U	1 U	--	1,900
1,1,2,2-Tetrachloroethane	µg/L	1 U	1 U	1 U	1 U	3.2	180
1,1,2-Trichloroethane	µg/L	1 U	1 U	1 U	1 U	12	110
1,1-Dichloroethane	µg/L	1 U	1 U	1 U	1 U	--	1,500
1,1-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	--	1,200
1,2,3-Trichlorobenzene	µg/L	5 U	5 U	5 U	5 U	--	55
1,2,3-Trichloropropane	µg/L	1 U	1 U	1 U	1 U	--	--
1,2,3-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	--	290
1,2,4-Trichlorobenzene, VOCS	µg/L	5 U	5 U	5 U	5 U	--	80
1,2,4-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	--	190
1,2-Dibromo-3-chloropropane	µg/L	5 U	5 U	5 U	5 U	0.24	--

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-3
Surface Water Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

Location ID		W01	W02	W03	W04	1	2
Field Sample ID		IWMGP-S01-W01-041112	IWMGP-S02-W02-041112	IWMGP-S03-W03-041112	IWMGP-S04-W04-041112	Human Cancer Value for Surface Water Used as a Drinking Water Source	Human Non-Cancer Value for Surface Water Used as a Drinking Water Source
Sampling Date		4/11/2012	4/11/2012	4/11/2012	4/11/2012		
Chemical Name	**Unit**	**Result**					
1,2-Dibromoethane	µg/L	1 U	1 U	1 U	1 U	0.17	250
1,2-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	--	2,000
1,2-Dichloroethane	µg/L	1 U	1 U	1 U	1 U	6	6,900
1,2-Dichloropropane	µg/L	1 U	1 U	1 U	1 U	9.1	12,000
1,3,5-Trimethylbenzene	µg/L	1 U	1 U	1 U	1 U	--	2,000
1,3-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	--	37
1,4-Dichlorobenzene	µg/L	1 U	1 U	1 U	1 U	24	1,100
2-Butanone	µg/L	5 5U	5 5U	5 5U	5 5U	--	17,000
2-Hexanone	µg/L	5 U	5 U	5 U	5 U	--	9,700
2-Methylnaphthalene, VOC [a]	µg/L	5 GU	5 GU	5 GU	5 GU	--	600
4-Methyl-2-pentanone	µg/L	5 U	5 U	5 U	5 U	--	--
Acetone	µg/L	20 5U	20 5U	20 5U	20 5U	--	5,600
Acrylonitrile	µg/L	5 ZGU	5 ZGU	5 ZGU	5 ZGU	0.21	58
Benzene	µg/L	1 U	1 U	1 U	1 U	12	19
Bromobenzene	µg/L	1 U	1 U	1 U	1 U	--	--
Bromochloromethane	µg/L	1 U	1 U	1 U	1 U	--	1,000
Bromodichloromethane	µg/L	1 U	1 U	1 U	1 U	6.8	170
Bromoform	µg/L	1 U	1 U	1 U	1 U	52	470
Bromomethane	µg/L	5 U	5 U	5 U	5 U	--	39
Carbon disulfide	µg/L	1 U	1 U	1 U	1 U	--	1,000
Carbon tetrachloride	µg/L	1 U	1 U	1 U	1 U	5.6	18
Chlorobenzene	µg/L	1 U	1 U	1 U	1 U	--	470
Chloroethane	µg/L	5 U	5 U	5 U	5 U	170	500,000
Chloroform	µg/L	1 U	1 U	1 U	1 U	--	350
Chloromethane	µg/L	5 U	5 U	5 U	5 U	110	3,500
cis-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	--	880
cis-1,3-Dichloropropene	µg/L	1 U	1 U	1 U	1 U	3.3	930
Cyclohexane	µg/L	5 U	5 U	5 U	5 U	--	--
Dibromochloromethane	µg/L	1 U	1 U	1 U	1 U	6.8	570
Dibromomethane	µg/L	1 U	1 U	1 U	1 U	--	--
Dichlorodifluoromethane	µg/L	5 U	5 U	5 U	5 U	--	2,900
Diethyl ether	µg/L	5 U	5 U	5 U	5 U	--	14,000
Diisopropyl Ether	µg/L	5 U	5 U	5 U	5 U	--	22,000
Ethylbenzene	µg/L	1 U	1 U	1 U	1 U	25	2,100
Hexachloroethane, VOC	µg/L	5 U	5 U	5 U	5 U	5.3	6
Isopropylbenzene	µg/L	1 U	1 U	1 U	1 U	--	1,700
m & p - Xylene	µg/L	2 U	2 U	2 U	2 U	--	--
Methyl iodide	µg/L	1 U	1 U	1 U	1 U	--	--

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-3
Surface Water Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	W01	W02	W03	W04	1	2
	Field Sample ID	IWMGP-S01-W01-041112	IWMGP-S02-W02-041112	IWMGP-S03-W03-041112	IWMGP-S04-W04-041112	Human Cancer Value for Surface Water Used as a Drinking Water Source	Human Non-Cancer Value for Surface Water Used as a Drinking Water Source
	Sampling Date	4/11/2012	4/11/2012	4/11/2012	4/11/2012		
Chemical Name	**Unit**	**Result**					
Methylene chloride	µg/L	5 U	5 U	5 U	5 U	47	1,600
Methyl tert-butyl ether	µg/L	1 U	1 U	1 U	1 U	100	920
Naphthalene, VOC [a]	µg/L	5 U	5 U	5 U	5 U	--	1,100
n-Butylbenzene	µg/L	1 U	1 U	1 U	1 U	--	3,500
n-Propylbenzene	µg/L	1 U	1 U	1 U	1 U	--	--
o-Xylene	µg/L	1 U	1 U	1 U	1 U	--	--
p-Isopropyl toluene	µg/L	1 U	1 U	1 U	1 U	--	--
sec-Butylbenzene	µg/L	1 U	1 U	1 U	1 U	--	--
Styrene	µg/L	1 U	1 U	1 U	1 U	20	4,200
tert-Butyl ethyl ether	µg/L	5 U	5 U	5 U	5 U	--	2,500
tert-Butylbenzene	µg/L	1 U	1 U	1 U	1 U	--	--
tert-Butyl Alcohol	µg/L	50 U	50 U	50 U	50 U	--	--
tertiaryAmylmethylether	µg/L	5 U	5 U	5 U	5 U	--	--
Tetrachloroethene	µg/L	1 U	1 U	1 U	1 U	11	320
Tetrahydrofuran	µg/L	5 U	5 U	5 U	5 U	--	350
Toluene	µg/L	1 U	1 U	1 U	1 U	--	5,600
trans-1,2-Dichloroethene	µg/L	1 U	1 U	1 U	1 U	--	470
trans-1,3-Dichloropropene	µg/L	1 U	1 U	1 U	1 U	3.3	930
trans-1,4-Dichloro-2-butene	µg/L	5 ZU	5 ZU	5 ZU	5 ZU	--	--
Trichloroethene	µg/L	1 U	1 U	1 U	1 U	29	44
Trichlorofluoromethane	µg/L	1 U	1 U	1 U	1 U	--	--
Vinyl chloride	µg/L	1 U	1 U	1 U	1 U	.25	83
SVOCs							
1,2,4-Trichlorobenzene, SVOC	µg/L	2 U	2 U	2 U	2 U	--	80
2,2'-Oxybis(1-chloropropane)	µg/L	1 U	1 U	1 U	1 U	6	990
2,4,5-Trichlorophenol	µg/L	5 U	5.1 U	5 U	5 U	--	--
2,4,6-Trichlorophenol	µg/L	4 U	4.1 U	4 U	4 U	41	1,900
2,4-Dichlorophenol	µg/L	10 U	10 U	10 U	10 U	--	220
2,4-Dimethylphenol	µg/L	5 U	5.1 U	5 U	5 U	--	450
2,4-Dinitrophenol	µg/L	25 U	26 U	25 U	25 U	--	55
2,4-Dinitrotoluene	µg/L	5 U	5.1 U	5 U	5 U	--	--
2,6-Dinitrotoluene	µg/L	5 U	5.1 U	5 U	5 U	--	--
2-Chloroaniline	µg/L	5 U	5.1 U	5 U	5 U	--	91
2-Chloronaphthalene	µg/L	2 U	2 U	2 U	2 U	--	--
2-Chlorophenol	µg/L	10 U	10 U	10 U	10 U	--	190
2-Methylnaphthalene, SVOC	µg/L	5 U	5.1 U	5 U	5 U	--	600
2-Methylphenol	µg/L	10 U	10 U	10 U	10 U	--	1,400
2-Nitroaniline	µg/L	20 U	20 U	20 U	20 U	--	--

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-3
Surface Water Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

Location ID		W01	W02	W03	W04	1	2
Field Sample ID		IWMGP-S01-W01-041112	IWMGP-S02-W02-041112	IWMGP-S03-W03-041112	IWMGP-S04-W04-041112	Human Cancer Value for Surface Water Used as a Drinking Water Source	Human Non-Cancer Value for Surface Water Used as a Drinking Water Source
Sampling Date		4/11/2012	4/11/2012	4/11/2012	4/11/2012		
Chemical Name	Unit	Result					
2-Nitrophenol	µg/L	5 U	5.1 U	5 U	5 U	--	--
3 & 4-Methylphenol	µg/L	20 U	20 U	20 U	20 U	--	--
3-Nitroaniline	µg/L	20 U	20 U	20 U	20 U	--	--
4,6-Dinitro-2-methylphenol	µg/L	20 U	20 U	20 U	20 U	--	--
4-Bromophenyl-phenylether	µg/L	2 U	2 U	2 U	2 U	--	--
4-Chloro-3-methylphenol	µg/L	5 U	5.1 U	5 U	5 U	--	6,900
4-Chloroaniline	µg/L	10 U	10 U	10 U	10 U	2	39
4-Chlorophenyl-phenylether	µg/L	1 U	1 U	1 U	1 U	--	--
4-Nitroaniline	µg/L	20 U	20 U	20 U	20 U	--	--
4-Nitrophenol	µg/L	25 U	26 U	25 U	25 U	--	680
Acenaphthene	µg/L	1 U	1 U	1 U	1 U	--	580
Acenaphthylene	µg/L	1 U	1 U	1 U	1 U	--	--
Aniline	µg/L	4 U	4.1 U	4 U	4 U	21	190
Anthracene	µg/L	1 U	1 U	1 U	1 U	--	1,900
Azobenzene	µg/L	2 U	2 U	2 U	2 U	3.7	--
Benzo(a)anthracene	µg/L	1 U	1 U	1 U	1 U	--	--
Benzo(a)pyrene	µg/L	1 U	1 U	1 U	1 U	--	--
Benzo(b)fluoranthene	µg/L	1 U	1 U	1 U	1 U	--	--
Benzo(g,h,i)perylene	µg/L	1 U	1 U	1 U	1 U	--	--
Benzo(k)fluoranthene	µg/L	1 U	1 U	1 U	1 U	--	--
Benzyl Alcohol	µg/L	50 U	51 U	50 U	50 U	--	--
Bis(2-chloroethoxy)methane	µg/L	2 U	2 U	2 U	2 U	--	--
Bis(2-chloroethyl)ether	µg/L	1 U	1 U	1 U	1 U	0.79	--
Bis(2-ethylhexyl)phthalate	µg/L	5 U	5.1 U	5 U	5 U	25	120
Butylbenzylphthalate	µg/L	5 U	5.1 U	5 U	5 U	--	6.9
Carbazole	µg/L	5 U	5.1 U	5 U	5 U	19	--
Chrysene	µg/L	1 U	1 U	1 U	1 U	--	--
Dibenzo(a,h)anthracene	µg/L	2 U	2 U	2 U	2 U	--	--
Dibenzofuran	µg/L	4 U	4.1 U	4 U	4 U	--	--
Diethylphthalate	µg/L	5 U	5.1 U	5 U	5 U	--	14,000
Dimethylphthalate	µg/L	5 U	5.1 U	5 U	5 U	--	--
Di-n-butylphthalate	µg/L	5 U	5.1 U	5 U	5 U	--	640
Di-n-octylphthalate	µg/L	5 U	5.1 U	5 U	5 U	--	240
Fluoranthene	µg/L	1 U	1 U	1 U	1 U	--	18
Fluorene	µg/L	1 U	1 U	1 U	1 U	--	140
Hexachlorobenzene	µg/L	1 U	1 U	1 U	1 U	0.00045	0.046
Hexachlorobutadiene	µg/L	1 U	1 U	1 U	1 U	0.33	0.093
Hexachlorocyclopentadiene	µg/L	10 ZU	10 ZU	10 ZU	10 ZU	--	140

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-3
Surface Water Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**W01**	**W02**	**W03**	**W04**	**1**	**2**
	Field Sample ID	**IWMGP-S01-W01-041112**	**IWMGP-S02-W02-041112**	**IWMGP-S03-W03-041112**	**IWMGP-S04-W04-041112**	**Human Cancer Value for Surface Water Used as a Drinking Water Source**	**Human Non-Cancer Value for Surface Water Used as a Drinking Water Source**
	Sampling Date	**4/11/2012**	**4/11/2012**	**4/11/2012**	**4/11/2012**		
Chemical Name	**Unit**	**Result**					
Hexachloroethane, SVOC	µg/L	1 U	1 U	1 U	1 U	5.3	6
Indeno(1,2,3-cd)pyrene	µg/L	2 U	2 U	2 U	2 U	--	--
Isophorone	µg/L	1 U	1 U	1 U	1 U	310	4,100
N,N-dimethylaniline	µg/L	5 U	5.1 U	5 U	5 U	--	--
Naphthalene, SVOC	µg/L	1 U	1 U	1 U	1 U	--	1,100
Nitrobenzene	µg/L	2 U	2 U	2 U	2 U	4.7	26
N-methylaniline	µg/L	1 U	1 U	1 U	1 U	--	--
N-Nitrosodimethyla	µg/L	5 U	5.1 U	5 U	5 U	--	--
N-Nitroso-di-n-propylamine	µg/L	2 U	2 U	2 U	2 U	--	--
N-Nitrosodiphenylamine	µg/L	2 U	2 U	2 U	2 U	--	--
Pentachlorophenol	µg/L	20 U	20 U	20 U	20 U	1.8	300
Phenanthrene	µg/L	1 U	1 U	1 U	1 U	--	--
Phenol	µg/L	5 U	5.1 U	5 U	5 U	--	1,100
Pyrene	µg/L	1 U	1 U	1 U	1 U	--	15
Pyridine	µg/L	20 U	20 U	20 U	20 U	--	--
Tetramethylurea	µg/L	1 U	1 U	1 U	1 U	--	--
Cyanide							
Cyanide - Available	mg/L	0.002 U	0.002 U	0.002 U	0.002 U	--	--
Cyanide	mg/L	0.005 U	0.005 U	0.005 U	0.005 U	--	--

Notes:

Analytical results in bold exceed screening criteria 1 or 2 (shown in brackets).

Screening criteria from the Rule 57 Water Quality Values calculated by the Michigan Department of Environmental Quality (updated 12/5/2011).

-- = No criterion available
µg/L = Microgram per liter
D = Analyte value quantified from dilution(s); RL raised
G = Result and RL considered estimated due to initial calibration standard criteria failure
ID = Identification
mg/L = Milligram per liter
RL = Reporting limit
SVOC = Semivolatile organic compound
VOC = Volatile organic compound
U = Analyte analyzed for but not detected above reported sample quantitation limit
Z = Result reported below RL to meet the TDL in RRD Op Memo 2 (10/22/04) multiplied by applicable dilution

a Methods 8260 and 624 used to analyze VOCs with boiling points below 200 °C; 2-methylnaphthalene and naphthalene have boiling points above 200 °C and are better suited to analysis using Methods 8270 or 625 as SVOCs

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-4
Sediment Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	SED01	SED-02	SED-03	SED-04	1	2	3
	Field Sample ID	IWMGP-S01-SED01-041112	IWMGP-S02-SED02-041112	IWMGP-S03-SED03-041112	IWMGP-S04-SED04-041112	U.S. EPA Ecological Screening Levels	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria
	Sampling Date	4/11/2012	4/11/2012	4/11/2012	4/11/2012			
Chemical Name	**Unit**	**Result**						
Inorganics								
Calcium	mg/kg	3,000	3,600	5,600 D	5,500	--	--	--
Iron	mg/kg	**26,000 D [2]**	**48,000 D [2]**	**18,000 D [2]**	**23,000 D [2]**	--	6.0	--
Magnesium	mg/kg	5,400 D	**9,400 D [2]**	5,900 D	8,000 D	--	8,000	--
Potassium	mg/kg	240	550	280	260	--	--	--
Sodium	mg/kg	85	130	160	160	--	--	--
Aluminum	mg/kg	**5,400 [2]**	**8,100 [2]**	**7,600 [2]**	**9,500 [2]**	--	1.0	--
Antimony	mg/kg	0.3 U	0.99	0.3 U	0.3 U	--	4.3	94
Arsenic	mg/kg	3.7	3.1	0.91	1.3	9.79	4.6	4.6
Barium	mg/kg	24	38	19	25	--	1,300	--
Beryllium	mg/kg	0.26	0.31	0.3	0.33	--	51	--
Cadmium	mg/kg	0.2 U	0.28	0.2 U	0.2 U	0.99	6.0	--
Chromium	mg/kg	12	28	20	16	43.4	--	--
Cobalt	mg/kg	**5.6 [2,3]**	**9.4 [2,3]**	**8.4 [2,3]**	**11 [2,3]**	50	0.8	2.0
Copper	mg/kg	11	26	29	21	31.6	5,800	--
Lead	mg/kg	6	34	13	15	35.8	700	--
Manganese	mg/kg	**180 [2]**	**250 [2]**	**230 [2]**	**490 [2]**	--	1.0	--
Molybdenum - Sediment	mg/kg	1 U	1 U	1 U	1 U	--	--	--
Nickel	mg/kg	11	25	22	21	--	100	--
Selenium	mg/kg	0.2 U	0.3	0.2 U	0.2 U	--	4.0	0.4
Silver	mg/kg	0.1 U	0.1 U	0.1 U	0.1 U	0.5	4.5	0.1
Thallium	mg/kg	0.5 U	0.5 U	0.5 U	0.5 U	--	2.3	4.2
Vanadium	mg/kg	27	37	37	37	--	72	190
Zinc	mg/kg	37	110	52	71	121	2,400	--
Mercury	mg/kg	0.05 NU	0.05 NU	0.05 NU	**0.3 N4 [1]**	0.174	--	--
VOCs								
1,1,1,2-Tetrachloroethane	µg/kg	84 U	1,600 U	74 U	81 U	--	1,500	--
1,1,1-Trichloroethane	µg/kg	84 U	1,600 U	74 U	81 U	213	4,000	1,800
1,1,2,2-Tetrachloroethane	µg/kg	84 U	1,600 U	74 U	81 U	850	170	1,600
1,1,2-Trichloroethane	µg/kg	84 U	1,600 U	74 U	81 U	--	100	6,600
1,1-Dichloroethane	µg/kg	84 U	1,600 U	74 U	81 U	.575	18,000	15,000
1,1-Dichloroethene	µg/kg	84 U	1,600 U	74 U	81 U	19.4	140	2,600
1,2,3-Trichlorobenzene	µg/kg	420 U	8,200 U	370 U	410 U	--	--	--
1,2,3-Trichloropropane	µg/kg	84 U	1,600 U	74 U	81 U	--	840	--
1,2,3-Trimethylbenzene	µg/kg	84 U	5,700	74 U	81 U	--	--	--
1,2,4-Trichlorobenzene, VOC	µg/kg	420 U	8,200 U	370 U	410 U	--	4,200	5,900
1,2,4-Trimethylbenzene	µg/kg	84 U	**17,000 [2,3]**	74 U	81 U	--	2,100	570
1,2-Dibromo-3-chloropropane	µg/kg	420 U	8,200 U	370 U	410 U	--	10	--

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-4
Sediment Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	SED01	SED-02	SED-03	SED-04	1	2	3
	Field Sample ID	IWMGP-S01-SED01-041112	IWMGP-S02-SED02-041112	IWMGP-S03-SED03-041112	IWMGP-S04-SED04-041112	U.S. EPA Ecological Screening Levels	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria
	Sampling Date	4/11/2012	4/11/2012	4/11/2012	4/11/2012			
Chemical Name	**Unit**	**Result**						
1,2-Dibromoethane	µg/kg	84 ZU	1,600 ZU	74 ZU	81 ZU	--	20	110
1,2-Dichlorobenzene	µg/kg	84 U	1,600 U	74 U	81 U	294	14,000	280
1,2-Dichloroethane	µg/kg	84 U	1,600 U	74 U	81 U	--	100	7,200
1,2-Dichloropropane	µg/kg	84 U	1,600 U	74 U	81 U	333	100	4,600
1,3,5-Trimethylbenzene	µg/kg	84 U	**6,200 [2,3]**	74 U	81 U	--	1,800	1,100
1,3-Dichlorobenzene	µg/kg	84 U	1,600 U	74 U	81 U	1,310	170	680
1,4-Dichlorobenzene	µg/kg	84 U	1,600 U	74 U	81 U	318	1,700	360
2-Butanone	µg/kg	420 U	8,200 U	370 U	410 U	42.4	260,000	44,000
2-Hexanone	µg/kg	420 U	8,200 U	370 U	410 U	58.2	20,000	--
2-Methylnaphthalene, VOC [a]	µg/kg	420 U	**300,000 6 [2,3]**	370 U	410 U	--	57,000	4,200
4-Methyl-2-pentanone	µg/kg	420 U	8,200 U	370 U	410 U	25.1	36,000	--
Acetone	µg/kg	1,700 GU	33,000 GU	1,500 GU	1,600 GU	9.9	15,000	34,000
Acrylonitrile	µg/kg	420 ZU	8,200 ZU	370 ZU	410 ZU	1.2	100	100
Benzene	µg/kg	84 U	1,600 U	74 U	81 U	142	100	4,000
Bromobenzene	µg/kg	84 U	1,600 U	74 U	81 U	--	550	--
Bromochloromethane	µg/kg	84 U	1,600 U	74 U	81 U	--	--	--
Bromodichloromethane	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
Bromoform	µg/kg	84 U	1,600 U	74 U	81 U	492	1,600	--
Bromomethane	µg/kg	340 U	6,600 U	290 U	330 U	1.37	200	700
Carbon disulfide	µg/kg	84 U	1,600 U	74 U	81 U	23.9	16,000	--
Carbon tetrachloride	µg/kg	84 U	1,600 U	74 U	81 U	1,450	100	900
Chlorobenzene	µg/kg	84 U	1,600 U	74 U	81 U	291	2,000	500
Chloroethane	µg/kg	420 U	8,200 U	370 U	410 U	--	8,600	22,000
Chloroform	µg/kg	84 U	1,600 U	74 U	81 U	121	1,600	7,000
Chloromethane	µg/kg	420 U	8,200 U	370 U	410 U	--	5,200	--
cis-1,2-Dichloroethene	µg/kg	84 U	1,600 U	74 U	81 U	--	1,400	12,000
cis-1,3-Dichloropropene	µg/kg	84 U	1,600 U	74 U	81 U	--	--	--
Cyclohexane	µg/kg	420 U	8,200 U	370 U	410 U	--	--	--
Dibromochloromethane	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
Dibromomethane	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
Dichlorodifluoromethane	µg/kg	420 U	8,200 U	370 U	410 U	--	95,000	--
Diethyl ether	µg/kg	340 U	6,600 U	290 U	330 U	--	200	--
Diisopropyl Ether	µg/kg	420 U	8,200 U	370 U	410 U	--	600	--
Ethylbenzene	µg/kg	84 U	**5,600 [2,3]**	74 U	81 U	--	1,500	360
Hexachloroethane, VOC	µg/kg	420 U	8,200 U	370 U	410 U	--	430	1,800
Isopropylbenzene	µg/kg	84 U	1,800	74 U	81 U	--	91,000	3,200
m & p - Xylene	µg/kg	170 U	3,700	150 U	160 U	--	--	--

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-4
Sediment Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	SED01	SED-02	SED-03	SED-04	1	2	3
	Field Sample ID	IWMGP-S01-SED01-041112	IWMGP-S02-SED02-041112	IWMGP-S03-SED03-041112	IWMGP-S04-SED04-041112	U.S. EPA Ecological Screening Levels	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria
	Sampling Date	4/11/2012	4/11/2012	4/11/2012	4/11/2012			
Chemical Name	**Unit**	**Result**						
Methyl iodide	µg/kg	84 U	1,600 U	74 U	81 U	--	--	--
Methylene chloride	µg/kg	170 U	3,300 U	150 U	160 U	--	100	30,000
Methyl tert-butyl ether	µg/kg	84 U	1,600 U	74 U	81 U	--	800	140,000
Naphthalene, VOC [a]	µg/kg	420 U	**410,000 [2,3]**	370 U	410 U	--	35,000	730
n-Butylbenzene	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
n-Propylbenzene	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
o-Xylene	µg/kg	84 U	2,400	74 U	81 U	--	--	--
p-Isopropyl toluene	µg/kg	84 U	2,200	74 U	81 U	--	--	--
sec-Butylbenzene	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
Styrene	µg/kg	84 U	1,600 U	74 U	81 U	254	2,700	2,100
tert-Butyl ethyl ether	µg/kg	420 U	8,200 U	370 U	410 U	--	980	--
tert-Butylbenzene	µg/kg	84 U	1,600 U	74 U	81 U	--	1,600	--
tert-Butyl Alcohol	µg/kg	4,200 U	82,000 U	3,700 U	4,100 U	--	78,000	--
tertiaryAmylmethylether	µg/kg	420 U	8,200 U	370 U	410 U	--	3,900	--
Tetrachloroethene	µg/kg	84 U	1,600 U	74 U	81 U	990	100	1,200
Tetrahydrofuran	µg/kg	420 U	8,200 U	370 U	410 U	--	1,900	220,000
Toluene	µg/kg	84 U	1,600 U	74 U	81 U	1,220	16,000	5,400
trans-1,2-Dichloroethene	µg/kg	84 U	1,600 U	74 U	81 U	654	2,000	30,000
trans-1,3-Dichloropropene	µg/kg	84 U	1,600 U	74 U	81 U	--	--	--
trans-1,4-Dichloro-2-butene	µg/kg	420 ZU	8,200 ZU	370 ZU	410 ZU	--	--	--
Trichloroethene	µg/kg	84 U	1,600 U	74 U	81 U	--	100	4,000
Trichlorofluoromethane	µg/kg	84 U	1,600 U	74 U	81 U	--	52,000	--
Vinyl chloride	µg/kg	84 ZU	1,600 ZU	74 ZU	81 ZU	--	40	260
SVOCs								
1,2,4-Trichlorobenzene, SVOC	µg/kg	510 U	13,000 U	490 U	2,500 U	--	4,200	5,900
2,2'-Oxybis(1-chloropropane)	µg/kg	250 U	6,500 U	240 U	1,300 U	--	--	--
2,4,5-Trichlorophenol	µg/kg	840 U	22,000 U	810 U	4,100 U	--	39,000	--
2,4,6-Trichlorophenol	µg/kg	840 U	22,000 U	810 U	4,100 U	--	2,400	330
2,4-Dichlorophenol	µg/kg	840 U	22,000 U	810 U	4,100 U	81.7	1,500	330
2,4-Dimethylphenol	µg/kg	840 U	22,000 U	810 U	4,100 U	304	7,400	7,600
2,4-Dinitrophenol	µg/kg	4,300 ZU	110,000 ZU	4,200 ZU	21,000 ZU	6.21	--	--
2,4-Dinitrotoluene	µg/kg	640 U	16,000 U	610 U	3,100 U	14.4	430	--
2,6-Dinitrotoluene	µg/kg	640 U	16,000 U	610 U	3,100 U	39.8	--	--
2-Chloronaphthalene	µg/kg	510 U	13,000 U	490 U	2,500 U	417	620,000	--
2-Chlorophenol	µg/kg	840 U	22,000 U	810 U	4,100 U	31.9	900	360
2-Methylnaphthalene, SVOC	µg/kg	640 U	**140,000 [2,3]**	610 U	3,100 U	--	57,000	4,200
2-Methylphenol	µg/kg	840 U	22,000 U	810 U	4,100 U	55.4	--	--

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-4
Sediment Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	SED01	SED-02	SED-03	SED-04	1	2	3
	Field Sample ID	IWMGP-S01-SED01-041112	IWMGP-S02-SED02-041112	IWMGP-S03-SED03-041112	IWMGP-S04-SED04-041112	U.S. EPA Ecological Screening Levels	Drinking Water Protection Criteria	Groundwater Surface Water Interface Protection Criteria
	Sampling Date	4/11/2012	4/11/2012	4/11/2012	4/11/2012			
Chemical Name	**Unit**	**Result**						
2-Nitroaniline	µg/kg	1,300 U	33,000 U	1,200 U	6,300 U	--	--	--
2-Nitrophenol	µg/kg	840 U	22,000 U	810 U	4,100 U	--	400	--
3 & 4-Methylphenol	µg/kg	1,700 U	43,000 U	1,600 U	8,300 U	--	--	--
3-Nitroaniline	µg/kg	1,300 U	33,000 U	1,200 U	6,300 U	--	--	--
4,6-Dinitro-2-methylphenol	µg/kg	4,300 ZU	110,000 ZU	4,200 ZU	21,000 ZU	104	830	--
4-Bromophenyl-phenylether	µg/kg	510 U	13,000 U	490 U	2,500 U	1,550	--	--
4-Chloro-3-methylphenol	µg/kg	510 U	13,000 U	490 U	2,500 U	388	5,800	280
4-Chlorophenyl-phenylether	µg/kg	250 U	6,500 U	240 U	1,300 U	--	--	--
4-Nitroaniline	µg/kg	1,300 U	33,000 U	1,200 U	6,300 U	--	--	--
4-Nitrophenol	µg/kg	43,00 ZU	110,000 ZU	4,200 ZU	21,000 ZU	--	--	--
Acenaphthene	µg/kg	250 U	**240,000 [1,3]**	240 U	1,300 U	6.71	300,000	8,700
Acenaphthylene	µg/kg	250 U	**28,000 [1,2]**	240 U	1,300 U	5.87	5,900	--
Anthracene	µg/kg	250 U	**400,000 [1,2]**	240 U	**1,300 * [1]**	57.2	41,000	--
Azobenzene	µg/kg	510 U	13,000 U	490 U	2,500 U	--	4,200	--
Benzo(a)anthracene	µg/kg	250 U	**88,000 [1]**	240 U	**2,500 [1]**	108	--	--
Benzo(a)pyrene	µg/kg	510 U	**79,000 [1]**	490 U	**2,400 T [1]**	150	--	--
Benzo(b)fluoranthene	µg/kg	510 U	**62,000 [1]**	490 U	2,200 T	10,400	--	--
Benzo(g,h,i)perylene	µg/kg	510 U	**31,000 [1]**	490 U	2,500 U	170	--	--
Benzo(k)fluoranthene	µg/kg	510 U	21,000	490 U	2,500 U	--	--	--
Benzyl Alcohol	µg/kg	6,400 U	160,000 U	6,100 U	31,000 U	1.04	200,000	--
Bis(2-chloroethoxy)methane	µg/kg	510 U	13,000 U	490 U	2,500 U	--	--	--
Bis(2-chloroethyl)ether	µg/kg	250 U	6,500 U	240 U	1,300 U	3,520	100	100
Bis(2-ethylhexyl)phthalate	µg/kg	640 U	16,000 U	610 U	3,100 U	182	--	--
Butylbenzylphthalate	µg/kg	640 U	16,000 U	610 U	3,100 U	1970	310,000	120,000
Carbazole	µg/kg	640 U	16,000 U	610 U	3,100 U	--	9,400	1,100
Chrysene	µg/kg	250 U	81,000	240 U	2,400	--	--	--
Dibenzo(a,h)anthracene	µg/kg	510 U	13,000 U	490 U	**3,100 [1]**	33	--	--
Dibenzofuran	µg/kg	640 U	**20,000 [1,3]**	610 U	3,100 U	449	--	1,700
Diethylphthalate	µg/kg	640 U	16,000 U	610 U	3,100 U	295	110,000	2,200
Dimethylphthalate	µg/kg	640 U	16,000 U	610 U	3,100 U	--	790,000	--
Di-n-butylphthalate	µg/kg	640 U	16,000 U	610 U	3,100 U	1,110	760,000	11,000
Di-n-octylphthalate	µg/kg	640 U	16,000 U	610 U	3,100 U	40,600	100,000,000	--
Fluoranthene	µg/kg	250 U	**200,000 [1,3]**	240 U	**3,600 * [1]**	423	730,000	5,500
Fluorene	µg/kg	250 U	**140,000 [1,3]**	240 U	1,300 U	77.4	390,000	5,300
Hexachlorobenzene	µg/kg	510 U	13,000 U	490 U	2,500 U	20	1,800	350
Hexachlorobutadiene	µg/kg	250 ZU	6,500 ZU	240 ZU	1,300 ZU	26.5	26,000	91
Hexachlorocyclopentadiene	µg/kg	2,500 ZU	65,000 ZU	2,400 ZU	13,000 ZU	901	320,000	--
Hexachloroethane, SVOC	µg/kg	250 U	6,500 U	240 U	1,300 U	--	430	1,800

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-4
Sediment Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

	Location ID	**SED01**	**SED-02**	**SED-03**	**SED-04**	**1**	**2**	**3**
	Field Sample ID	**IWMGP-S01-SED01-041112**	**IWMGP-S02-SED02-041112**	**IWMGP-S03-SED03-041112**	**IWMGP-S04-SED04-041112**	**U.S. EPA Ecological Screening Levels**	**Drinking Water Protection Criteria**	**Groundwater Surface Water Interface Protection Criteria**
	Sampling Date	**4/11/2012**	**4/11/2012**	**4/11/2012**	**4/11/2012**			
Chemical Name	**Unit**	**Result**						
Indeno(1,2,3-cd)pyrene	µg/kg	510 U	**25,000 [1]**	490 U	**3,300 [1]**	200	--	--
Isophorone	µg/kg	250 U	6,500 U	240 U	1,300 U	432	15,000	26,000
Naphthalene, SVOC	µg/kg	250 U	**190,000 [2,3]**	240 U	1,300 U	--	35,000	730
Nitrobenzene	µg/kg	510 U	13,000 U	490 U	2,500 U	145	330	3,600
N-Nitrosodimethylamine	µg/kg	640 U	16,000 U	610 U	3,100 U	--	--	--
N-Nitroso-di-n-propylamine	µg/kg	510 U	13,000 U	490 U	2,500 U	--	330	--
N-Nitrosodiphenylamine	µg/kg	510 U	13,000 U	490 U	2,500 U	--	5,400	--
Pentachlorophenol	µg/kg	4,300 U	110,000 U	4,200 U	21,000 U	23,000	22	--
Phenanthrene	µg/kg	250 U	**540,000 [2,3]**	240 U	**4,700 * [3]**	--	56,000	2,100
Phenol	µg/kg	840 U	22,000 U	810 U	4,100 U	--	88,000	9,000
Pyrene	µg/kg	250 U	300,000	300	7,700	--	480,000	--
Cyanide								
Cyanide	mg/kg	**0.3 [1,3]**	**5.2 [1,2,3]**	**0.1 [1,3]**	**0.2 [1,3]**	0.0001	4	0.1
Cyanide - Available	mg/kg	0.2	0.6	0.1 U	0.1 U	--	--	--

Notes:

Analytical results in bold exceed screening criteria 1, 2, or 3 (shown in brackets).

Screening criteria from U.S. EPA Region 5 RCRA Ecological Screening Levels (8/22/2003) and Part 201 Generic Cleanup Criteria and Screening Levels calculated by the Michigan Department of Environmental Quality (updated 03/25/2011)

* = Result considered estimated due to high internal standard response
-- = No criterion available
µg/kg = Microgram per kilogram
D = Analyte value quantified from dilution(s); RL raised
G = Result and RL considered estimated due to initial calibration standard criteria failure
ID = Identification
mg/kg = Milligram per kilogram
N = Non-homogeneous sample made analysis of sample questionable.
RL = Reporting limit
SVOC = Semivolatile organic compound
VOC = Volatile organic compound
U = Analyte analyzed for but not detected above reported sample quantitation limit
U.S. EPA = United States Environmental Protection Agency
Z = Result reported below RL to meet the TDL in RRD Op Memo 2 (10/22/04) multiplied by applicable dilution factor

a Methods 8260 and 624 used to analyze VOCs with boiling points below 200 °C; 2-methylnaphthalene and naphthalene have boiling points above 200 °C and are better suited to analysis using Methods 8270 or 625 as SVOCs

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-5
Residential Well Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

		N10339 Vanderhagen Road	N10307 Vanderhagen Road	N10290 Junet Road	Residential Drinking Water Criteria
Location ID					
Sample ID		**LE23754**	**LE23753**	**LE23755**	
Sampling Date		**4/12/2012**	**4/12/2012**	**4/13/2012**	
Chemical Name	**Unit**	**Result**			
VOCs					
1,1 Dichloroethane	µg/L	0.5 U	0.5 U	0.5 U	880
1,1 Dichloroethylene	µg/L	0.5 U	0.5 U	0.5 U	7.0 (A)
1,1 Dichloropropene	µg/L	0.5 U	0.5 U	0.5 U	NA
1,1,1 Trichloroethane	µg/L	0.5 U	0.5 U	0.5 U	200 (A)
1,1,1,2 Tetrachloroethane	µg/L	0.5 U	0.5 U	0.5 U	77
1,1,2 Trichloroethane	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
1,1,2,2 Tetrachloroethane	µg/L	0.5 U	0.5 U	0.5 U	8.5
1,2 Dichlorobenzene	µg/L	0.5 U	0.5 U	0.5 U	600 (A)
1,2 Dichloroethane	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
1,2 Dichloropropane	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
1,2,3 Trichlorobenzene	µg/L	0.5 U	0.5 U	0.5 U	NA
1,2,3 Trichloropropane	µg/L	0.5 U	0.5 U	0.5 U	42
1,2,4 Trichlorobenzene	µg/L	0.5 U	0.5 U	0.5 U	70 (A)
1,2,4 Trimethylbenzene	µg/L	0.5 U	0.5 U	0.5 U	63 (E)
1,3 Dichlorobenzene	µg/L	0.5 U	0.5 U	0.5 U	6.6
1,3 Dichloropropane	µg/L	0.5 U	0.5 U	0.5 U	8.5
1,3,5 Trimethylbenzene	µg/L	0.5 U	0.5 U	0.5 U	72 (E)
1,4 Dichlorobenzene	µg/L	0.5 U	0.5 U	0.5 U	75 (A)
2,2, Dichloropropane	µg/L	0.5 U	0.5 U	0.5 U	NA
Benzene	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
Bromobenzene	µg/L	0.5 U	0.5 U	0.5 U	18
Bromochloromethane	µg/L	0.5 U	0.5 U	0.5 U	NA
Bromodichloromethane	µg/L	0.5 U	0.5 U	0.5 U	80 (A,W)
Bromoform	µg/L	0.5 U	0.5 U	0.5 U	80 (A,W)
Bromomethane	µg/L	1.0 U	1.0 U	1.0 U	10
Carbon tetrachloride	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
Chlorobenzene	µg/L	0.5 U	0.5 U	0.5 U	100 (A)
Chlorodibromomethane	µg/L	0.5 U	0.5 U	0.5 U	NA
Chloroethane	µg/L	0.5 U	0.5 U	0.5 U	430
Chloroform	µg/L	0.5 U	0.5 U	0.5 U	80 (A,W)
Chloromethane	µg/L	0.5 U	0.5 U	0.5 U	260
cis-1,2 Dichloroethylene	µg/L	0.5 U	0.5 U	0.5 U	70 (A)
cis-1,3 Dichloropropene	µg/L	0.5 U	0.5 U	0.5 U	NA
Dibromomethane	µg/L	0.5 U	0.5 U	0.5 U	80
Dichlorodifluoromethane	µg/L	1.0 U	1.0 U	1.0 U	1,700
Dichloromethane	µg/L	0.6 U	0.6 U	0.6 U	NA
Ethylbenzene	µg/L	0.5 U	0.5 U	0.5 U	74 (E)
Fluorotrichloromethane	µg/L	1.0 U	1.0 U	1.0 U	NA

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-5
Residential Well Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

		N10339 Vanderhagen Road	N10307 Vanderhagen Road	N10290 Junet Road	Residential Drinking Water Criteria
Location ID					
Sample ID		**LE23754**	**LE23753**	**LE23755**	
Sampling Date		**4/12/2012**	**4/12/2012**	**4/13/2012**	
Chemical Name	**Unit**	**Result**			
Hexachlorobutadiene	µg/L	0.5 U	0.5 U	0.5 U	15
Isopropylbenzene	µg/L	0.5 U	0.5 U	0.5 U	800
m&p-Xylene	µg/L	0.5 U	0.5 U	0.5 U	NA
Methyl ethyl ketone	µg/L	5.0 U	5.0 U	5.0 U	NA
Methyl isobutyl ketone	µg/L	5.0 U	5.0 U	5.0 U	NA
Methyl-tert-butyl ether (MTBE)	µg/L	1.0 U	1.0 U	1.0 U	40 (E)
Naphthalene	µg/L	0.5 U	0.5 U	0.5 U	520
n-Butylbenzene	µg/L	0.5 U	0.5 U	0.5 U	80
Nitrobenzene	µg/L	0.01 U	0.01 U	0.01 U	3.4
n-Propylbenzene	µg/L	0.5 U	0.5 U	0.5 U	80
o-Chlorotoluene	µg/L	0.5 U	0.5 U	0.5 U	150
o-Xylene	µg/L	0.5 U	0.5 U	0.5 U	NA
p-Chlorotoluene	µg/L	0.5 U	0.5 U	0.5 U	NA
p-Isopropyltoluene	µg/L	0.5 U	0.5 U	0.5 U	NA
sec-Butylbenzene	µg/L	0.5 U	0.5 U	0.5 U	80
Styrene	µg/L	0.5 U	0.5 U	0.5 U	100 (A)
tert-Butylbenzene	µg/L	0.5 U	0.5 U	0.5 U	NA
Tetrachloroethylene	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
Tetrahydrofuran	µg/L	5.0 U	5.0 U	5.0 U	95
Toluene	µg/L	0.5 U	0.5 U	0.5 U	790 (E)
Total Trihalomethanes	µg/L	0.5 U	0.5 U	0.5 U	80 (W)
Total Xylenes	µg/L	1.0 U	1.0 U	1.0 U	280 (E)
trans-1,2 Dichloroethylene	µg/L	0.5 U	0.5 U	0.5 U	100 (A)
trans-1,3 Dichloropropene	µg/L	0.5 U	0.5 U	0.5 U	NA
Trichloroethylene	µg/L	0.5 U	0.5 U	0.5 U	5.0 (A)
Vinyl chloride	µg/L	0.4 U	0.4 U	0.4 U	2.0 (A)
SVOCs					
1-Methylnaphthalene	µg/L	1.0 U	1.0 U	1.0 U	260
2-Chloronaphthalene	µg/L	1.0 U	1.0 U	1.0 U	NA
2-Methylnaphthalene	µg/L	1.0 U	1.0 U	1.0 U	260
2,4-Dinitrotoluene	µg/L	1.0 U	1.0 U	1.0 U	7.7
2,6-Dinitrotoluene	µg/L	1.0 U	1.0 U	1.0 U	NA
Acenaphthene	µg/L	1.0 U	1.0 U	1.0 U	52
Acenaphthylene	µg/L	1.0 U	1.0 U	1.0 U	43 (S)
Anthracene	µg/L	1.0 U	1.0 U	1.0 U	43 (S)
Benzo(a)anthracene	µg/L	1.0 U	1.0 U	1.0 U	2.1
Benzo(a)pyrene	µg/L	0.06 U	0.06 U	0.06 U	5 (A)
Benzo(b)fluoranthene	µg/L	1.0 U	1.0 U	1.0 U	1.5 (S,AA)
Benzo(g,h,i)perylene	µg/L	1.0 U	1.0 U	1.0 U	1.0 (M); 0.26 (S)
Benzo(k)fluoranthene	µg/L	1.0 U	1.0 U	1.0 U	1.0 (M); 0.8 (S)

This document shall not be disclosed without the express written permission of U.S. EPA.

Table 4-5
Residential Well Sample Analytical Results – April 2012
Ironwood Manufactured Gas Plant Site
Ironwood, Gogebic County, Michigan

		N10339 Vanderhagen Road	N10307 Vanderhagen Road	N10290 Junet Road	Residential Drinking Water Criteria
Location ID					
Sample ID		**LE23754**	**LE23753**	**LE23755**	
Sampling Date		**4/12/2012**	**4/12/2012**	**4/13/2012**	
Chemical Name	**Unit**	**Result**			
Chrysene	µg/L	1.0 U	1.0 U	1.0 U	1.6 (S)
Di(2-ethylhexyl)adipate	µg/L	0.6 U	0.6 U	0.6 U	400 (A)
Di(2-ethylhexyl)phthalate	µg/L	1.8 U	1.8 U	1.8 U	130
Dibenzo(a,h)anthracene	µg/L	1.0 U	1.0 U	1.0 U	2.0 (M); 0.21
Fluoranthene	µg/L	1.0 U	1.0 U	1.0 U	210 (S)
Fluorene	µg/L	1.0 U	1.0 U	1.0 U	880
Indeno(1,2,3-cd)pyrene	µg/L	1.0 U	1.0 U	1.0 U	2.0 (M); 0.022 (S)
Phenanthrene	µg/L	1.0 U	1.0 U	1.0 U	52
Pyrene	µg/L	1.0 U	1.0 U	1.0 U	140 (S)

Notes:

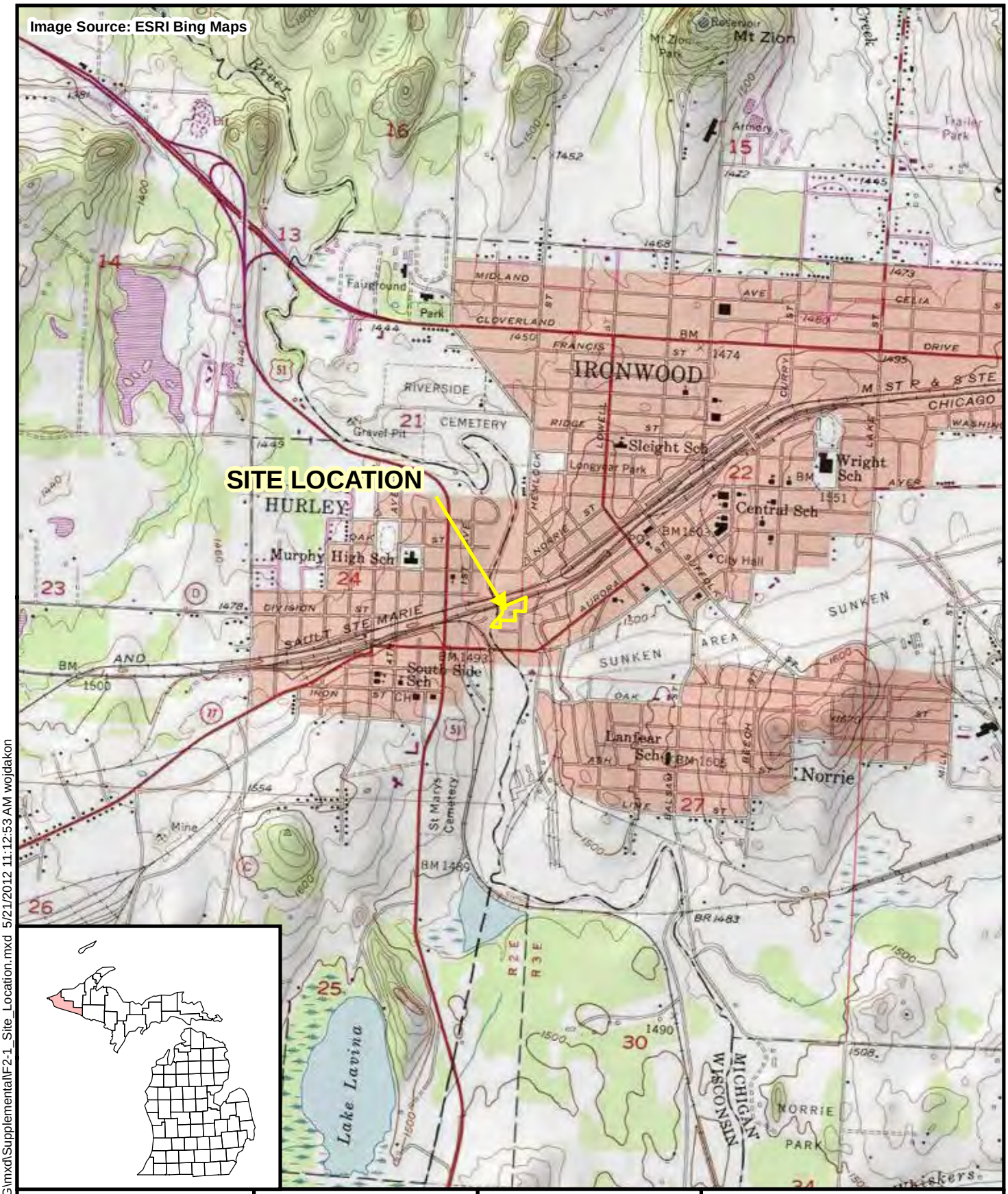
Analytical results in bold exceed screening criteria.

Screening criteria originally promulgated on December 21, 2002, in the Administrative Rules for Part 201, Environmental Remediation, of the NREPA, 1994, Public Act 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.

µg/L = Microgram per liter
ID = Identification
NA = Criterion not available
NREPA = Natural Resources and Environmental Protection Act
SVOC = Semivolatile organic compound
U = Analyte analyzed for but not detected above reported sample quantitation limit
VOC = Volatile organic compound
(A) Criterion is the State of Michigan drinking water standard established pursuant to Section 5 of 1976 PA 399, MCL 325.1005.
(AA) Comparison to these criteria may take into account an evaluation of if the hazardous substances are adsorbed to particulates rather than dissolved in water and if filtered groundwater samples were used to evaluate groundwater.
(E) Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of the NREPA, 1994 PA 451, as amended; notice of aesthetic impact may be used as an institutional control mechanism if groundwater concentrations exceed the aesthetic drinking water criterion but not the applicable health-based drinking water value
(M) Calculated criterion is below the analytical target detection limit; therefore, criterion defaults to target detection limit
(S) Criterion defaults to hazardous substance-specific water solubility limit
(W) Concentrations of trihalomethanes in groundwater shall be added together to determine compliance with the Michigan drinking water standard of 80 µg/L

This document shall not be disclosed without the express written permission of U.S. EPA.

FIGURES



Legend

Site Boundary

0 2,000 Feet

N

Prepared for:
U.S. EPA REGION V

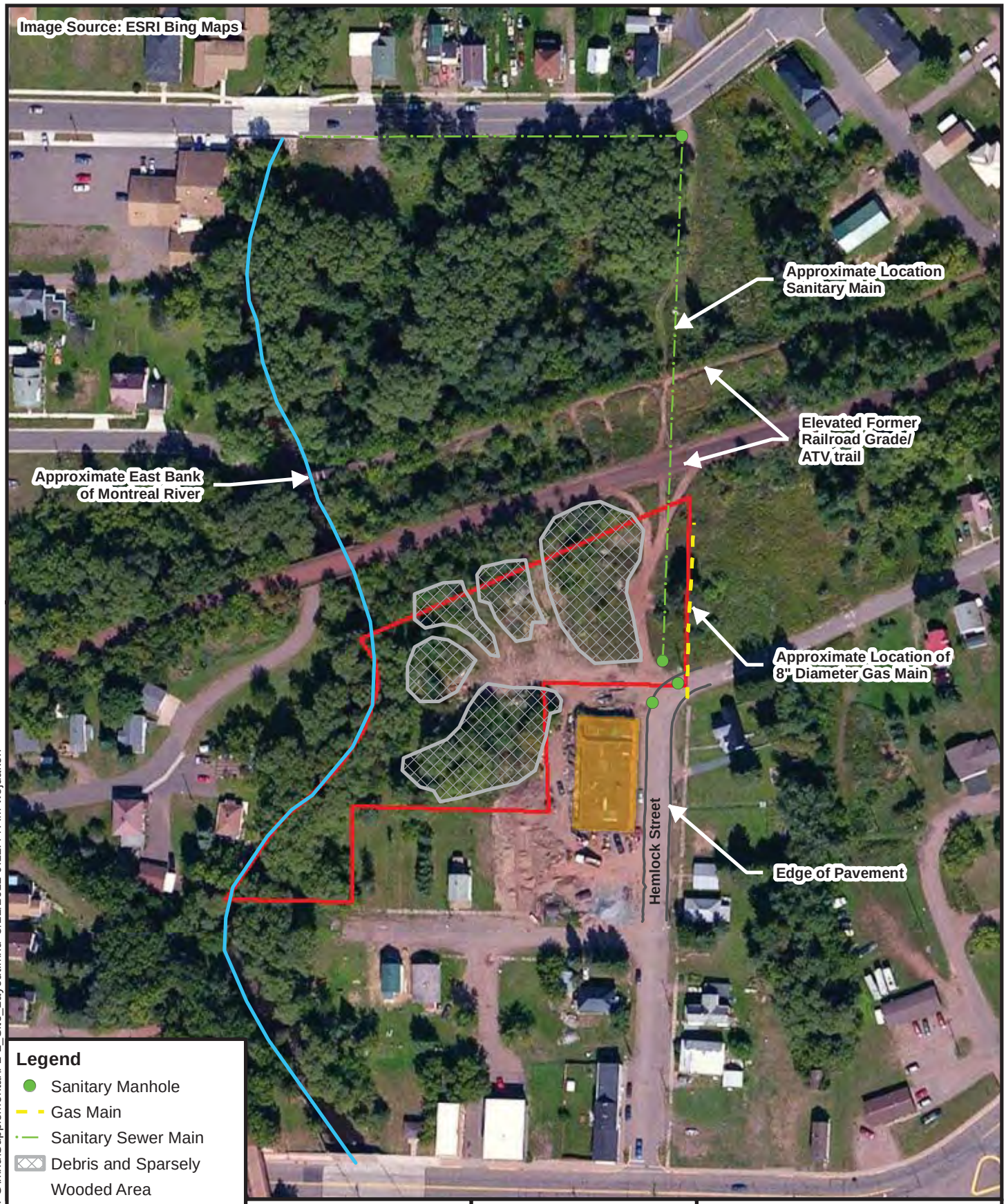
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 2-1
Site Location Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\IF2-1_Site_Location.mxd 5/21/2012 11:12:53 AM wojdakon



Prepared for:
U.S. EPA REGION V

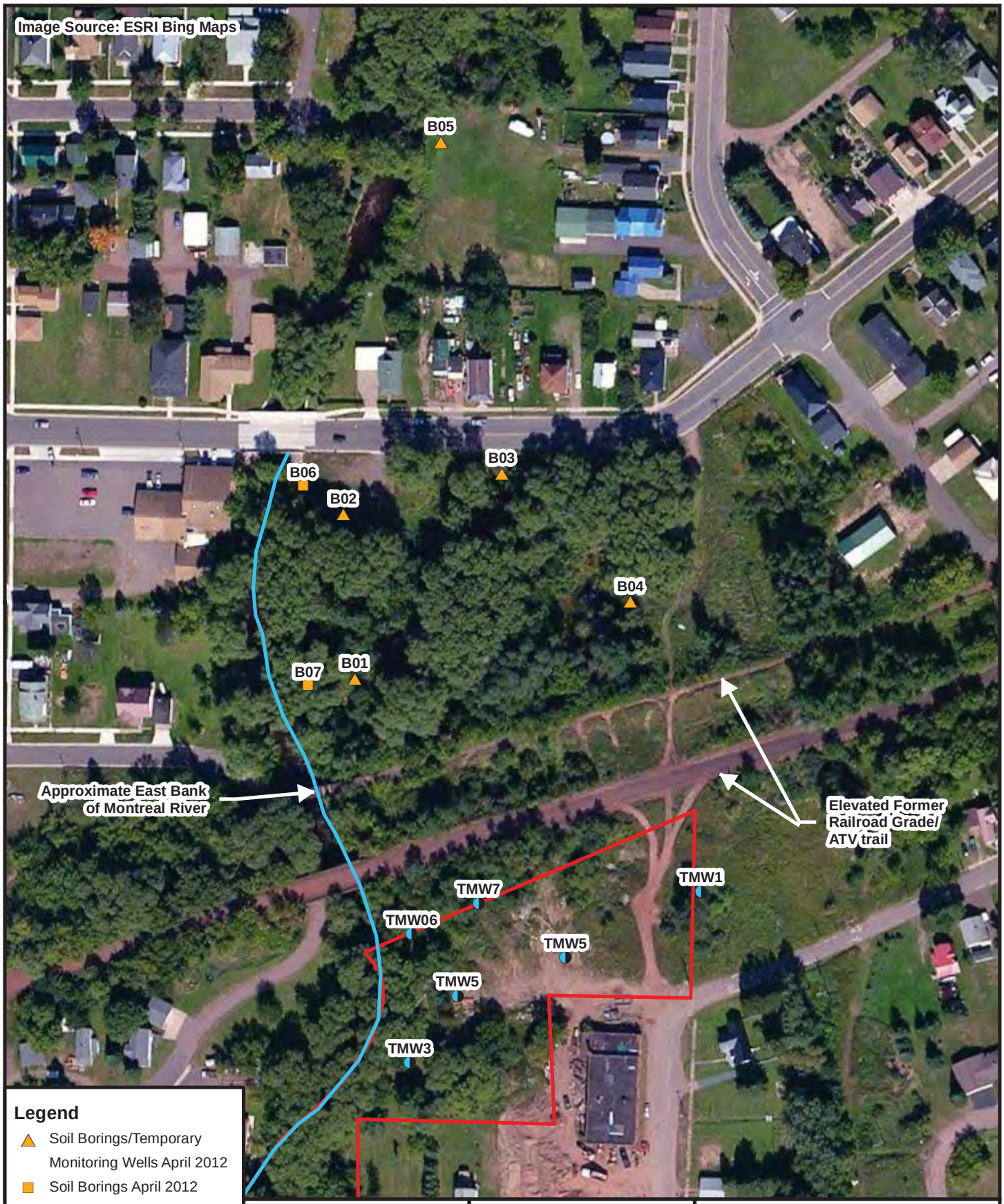
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 2-2
Site Layout Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\F2-2_Site_Layout.mxd 5/22/2012 9:12:44 AM wojdakon



Prepared for:
U.S. EPA REGION V

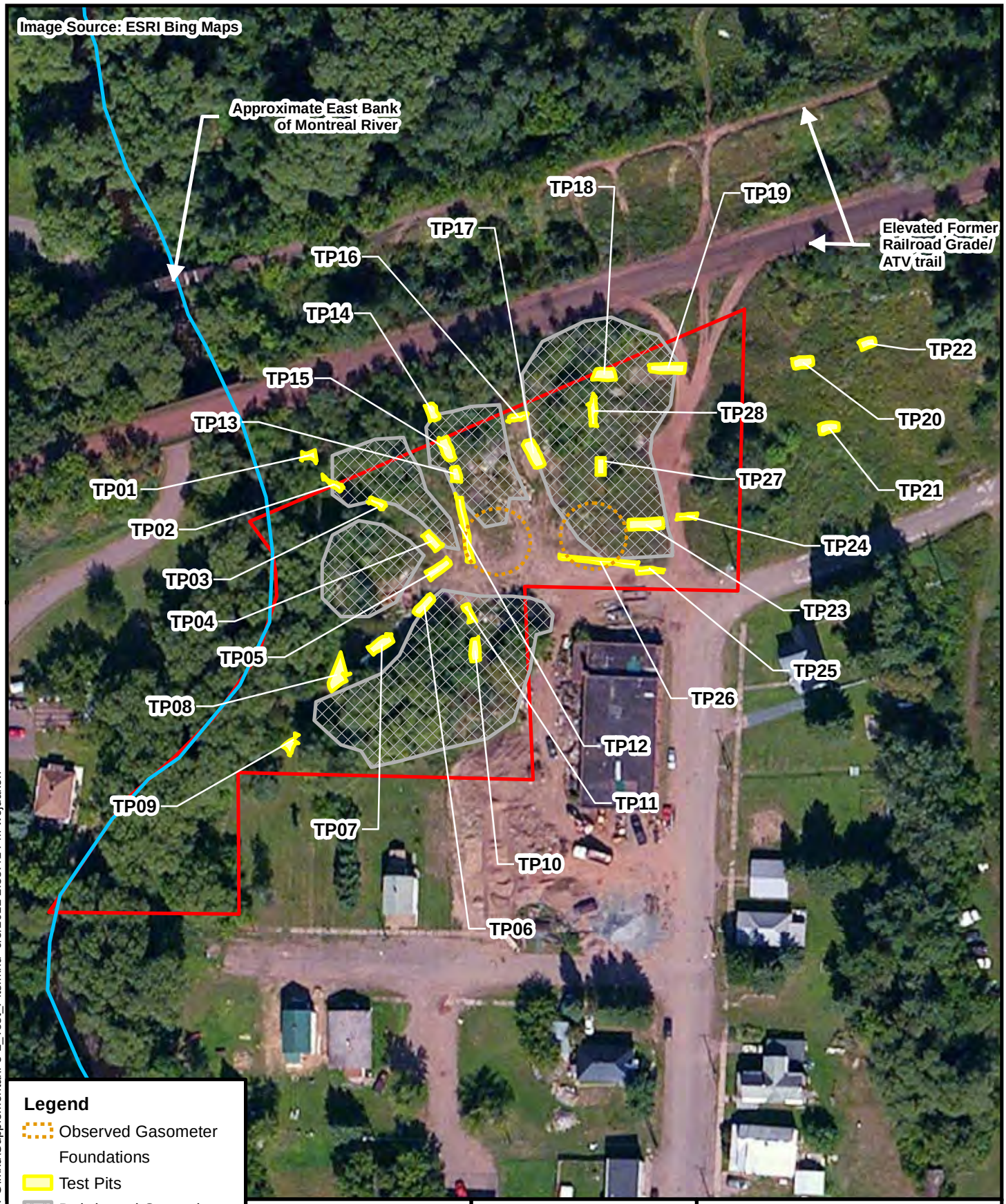
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 3-1
Soil Boring and Temporary Monitoring Well Location Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\F3-1_Boring_TMW.mxd 5/23/2012 9:47:53 AM wojdakon



Legend

- Observed Gasometer Foundations
- Test Pits
- Debris and Sparsely Wooded Area
- Site Boundary

0 100 Feet

N

Prepared for:
U.S. EPA REGION V

Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 3-2
Test Pit Location Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\F3-2_Test_Pits.mxd 6/5/2012 2:38:41 PM wojdakon

Prepared for:
U.S. EPA REGION V

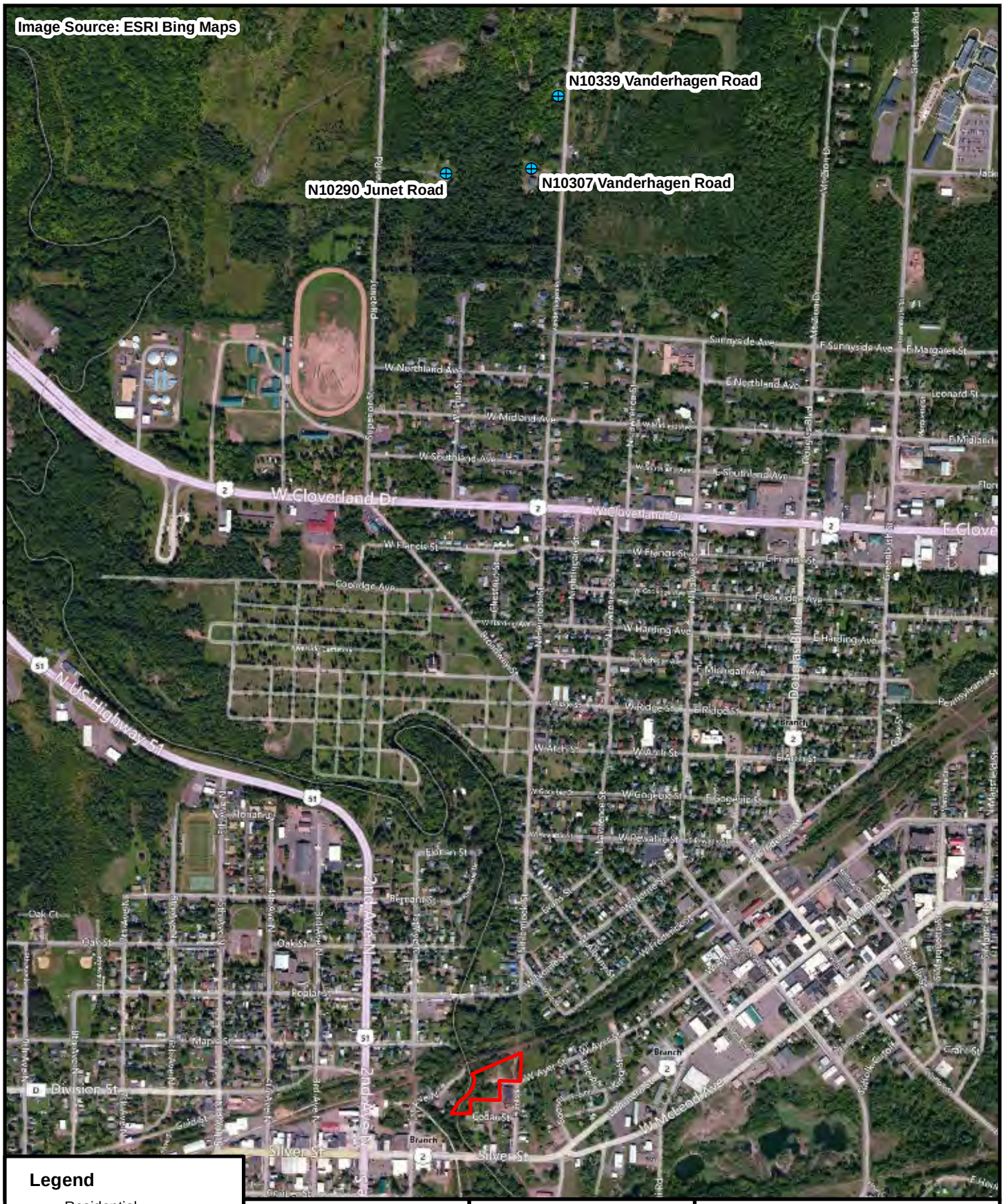
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 3-3
Sediment and Surface Water Sampling Location Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\F3-3_Sed_SW.mxd 5/21/2012 11:35:02 AM wojdakon



Prepared for:
U.S. EPA REGION V

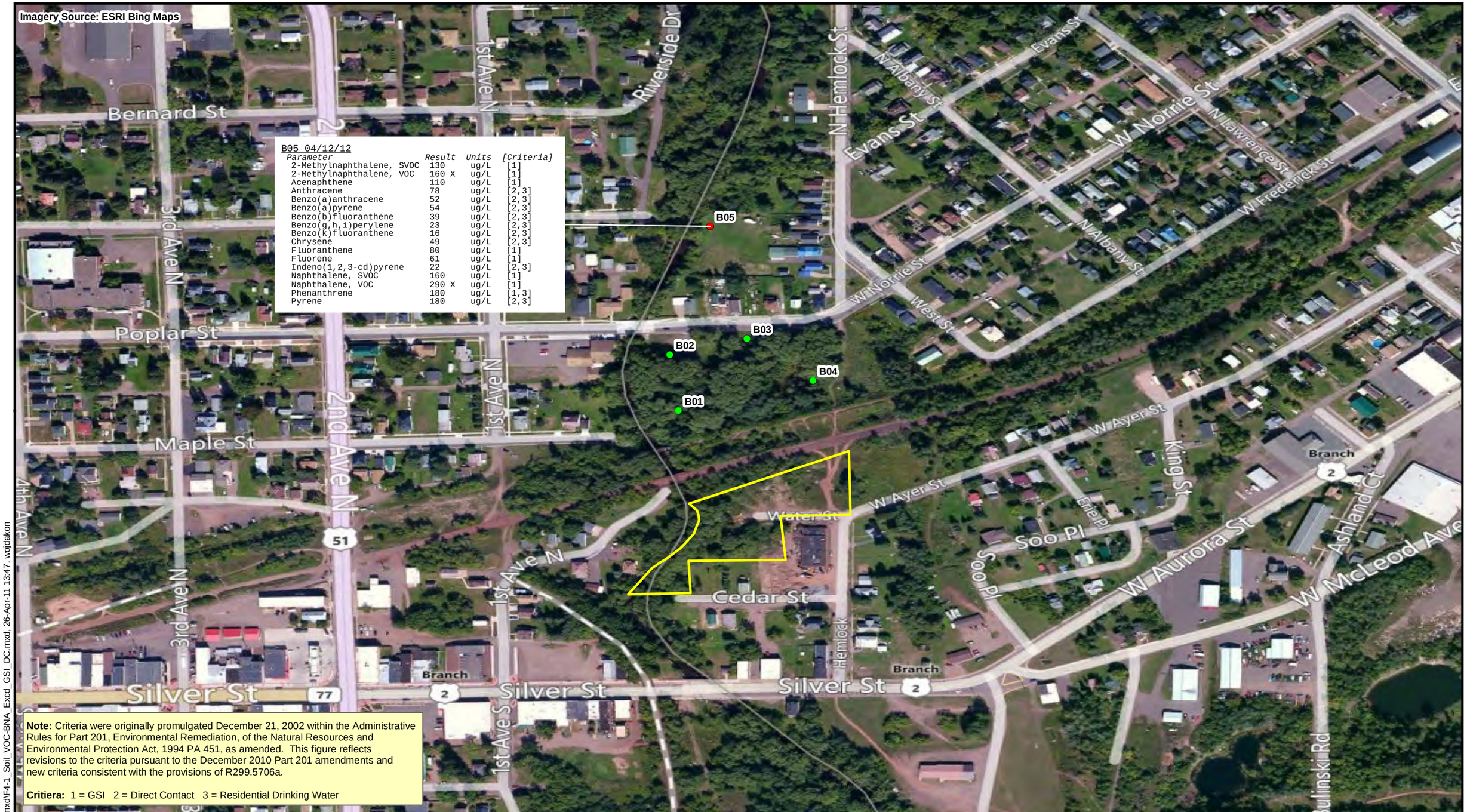
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 3-4
Residential Well Sampling Location Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\F3-4_Res_Wells.mxd 5/21/2012 11:41:17 AM wojdakon



B05 04/12/12

Parameter	Result	Units	[Criteria]
2-Methylnaphthalene, SVOC	130	ug/L	[1]
2-Methylnaphthalene, VOC	160 X	ug/L	[1]
Acenaphthene	110	ug/L	[1]
Anthracene	78	ug/L	[2,3]
Benzo(a)anthracene	52	ug/L	[2,3]
Benzo(a)pyrene	54	ug/L	[2,3]
Benzo(b)fluoranthene	39	ug/L	[2,3]
Benzo(g,h,i)perylene	23	ug/L	[2,3]
Benzo(k)fluoranthene	16	ug/L	[2,3]
Chrysene	49	ug/L	[2,3]
Fluoranthene	80	ug/L	[1]
Fluorene	61	ug/L	[1]
Indeno(1,2,3-cd)pyrene	22	ug/L	[2,3]
Naphthalene, SVOC	160	ug/L	[1]
Naphthalene, VOC	290 X	ug/L	[1]
Phenanthrene	180	ug/L	[1,3]
Pyrene	180	ug/L	[2,3]

Note: 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 figure reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a.

Critiera: 1 = GSI 2 = Direct Contact 3 = Residential Drinking Water

Legend

- Locations with no exceedances
- Locations with at least one exceedance
- Site Boundary

ug/l = microgram per liter

0 300 Feet

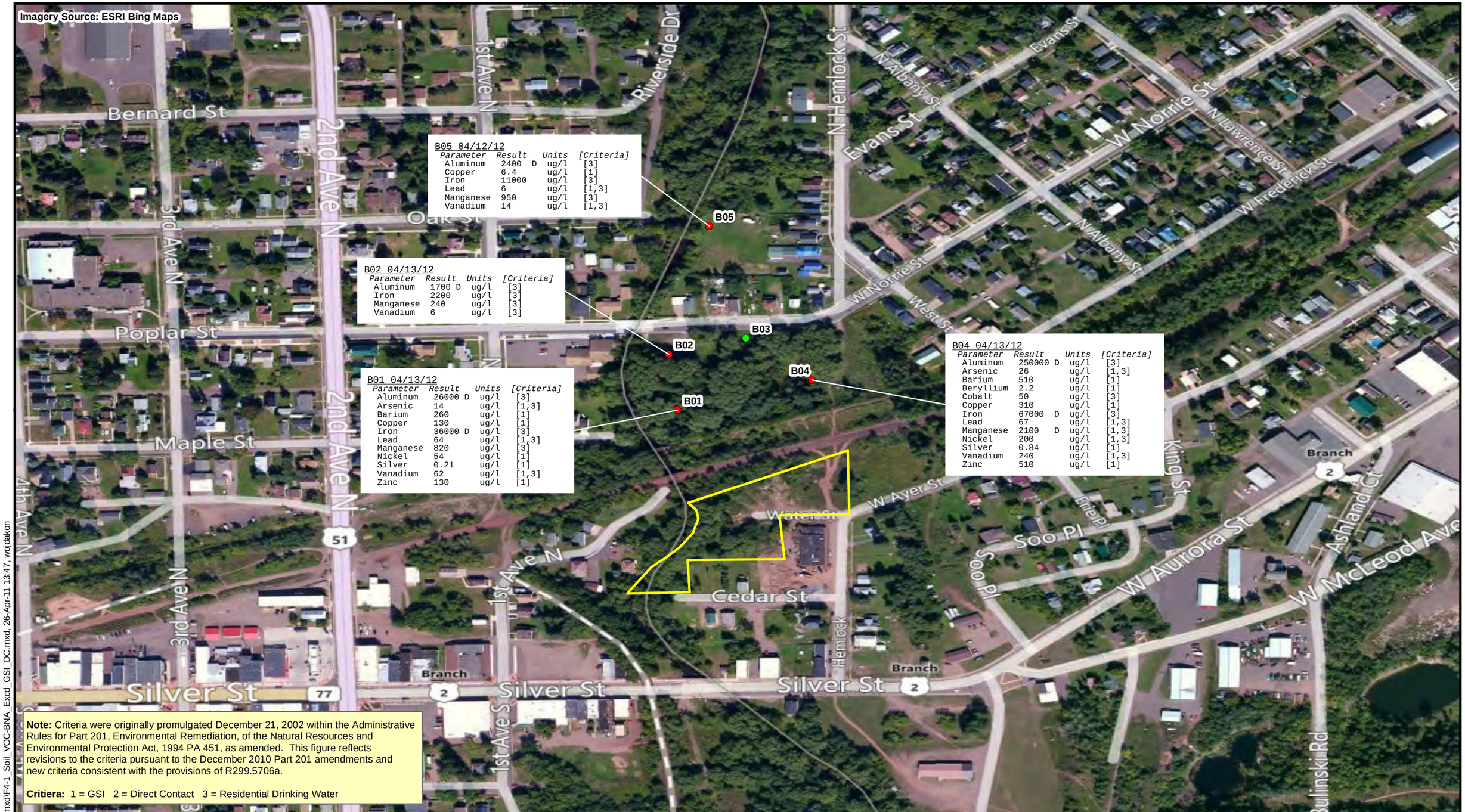
N

Prepared For:
US EPA Region V
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AMCP

Prepared By:
WESTON SOLUTIONS, INC.
600 East Lakeshore Dr, Suite 200
Houghton, Michigan 49931

Figure 4-1
VOC/SVOC Groundwater Analytical Results
Exceed GSI and Direct Contact Criteria
Ironwood MGP SA
Ironwood, Gogebic County, Michigan

File: D:\Ironwood_MPG\mxd\F4-1_Soil_VOC-BNA_Excd_GSI_DC.mxd, 26-Apr-11 13:47, wojdakon



Note: 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 figure reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a.

Critiera: 1 = GSI 2 = Direct Contact 3 = Residential Drinking Water

Legend

- Locations with at least one exceedance
- Locations with no exceedances
- Site Boundary

ug/l = microgram per liter

0 300 Feet

N

Prepared For:
US EPA Region V
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AMCP

Prepared By:
WESTON SOLUTIONS, INC.
600 East Lakeshore Dr, Suite 200
Houghton, Michigan 49931

Figure 4-2
Inorganic Groundwater Analytical Results
Exceed GSI and Direct Contact Criteria
Ironwood MGP SA
Ironwood, Gogebic County, Michigan

File: D:\Ironwood_MPG\mxd\F4-1_Soil_VOC-BNA_Excd_GSI_DC.mxd, 26-Apr-11 13:47, wojdakon

S04 04/11/12

Parameter	Result	Units	[Criteria]
Anthracene	1300 *	ug/Kg	[4]
Benzo(a)anthracene	2500	ug/Kg	[4]
Benzo(a)pyrene	2400 T	ug/Kg	[3,4]
Dibenzo(a,h)anthracene	3100	ug/Kg	[3,4]
Fluoranthene	3600 *	ug/Kg	[4]
Indeno(1,2,3-cd)pyrene	3300	ug/Kg	[4]
Phenanthrene	4700 *	ug/Kg	[2]

S02 04/11/12

Parameter	Result	Units	[Criteria]
1,2,4-Trimethylbenzene	17000	ug/Kg	[1,2]
1,3,5-Trimethylbenz	6200	ug/Kg	[1,2]
2-Methylnaphthalene, SVOC	140000	ug/Kg	[1,2]
2-Methylnaphthalene, VOC	300000 X6	ug/Kg	[1,2]
Acenaphthene	240000	ug/Kg	[2,4]
Acenaphthylene	28000	ug/Kg	[1,4]
Anthracene	400000	ug/Kg	[,4]
Benzo(a)anthracene	88000	ug/Kg	[3,4]
Benzo(a)pyrene	79000	ug/Kg	[3,4]
Benzo(b)fluoranthene	62000	ug/Kg	[3,4]
Benzo(g,h,i)perylene	31000	ug/Kg	[4]
Dibenzofuran	20000	ug/Kg	[2,4]
Ethylbenzene	5600	ug/Kg	[1,2]
Fluoranthene	200000	ug/Kg	[2,4]
Fluorene	140000	ug/Kg	[2,4]
Indeno(1,2,3-cd)pyrene	25000	ug/Kg	[3,4]
Naphthalene, SVOC	190000	ug/Kg	[1,2]
Naphthalene, VOC	410000 X	ug/Kg	[1,2]
Phenanthrene	540000	ug/Kg	[1,2]

Note: 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 figure reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a.

Critiera: 1 = Drinking Water 2 = GSI 3 = Direct Contact 4 = USEPA ESL

Legend

- Locations with no exceedances
- Locations with at least one exceedance
- Site Boundary

ug/kg = microgram per kilogram

0 600 Feet

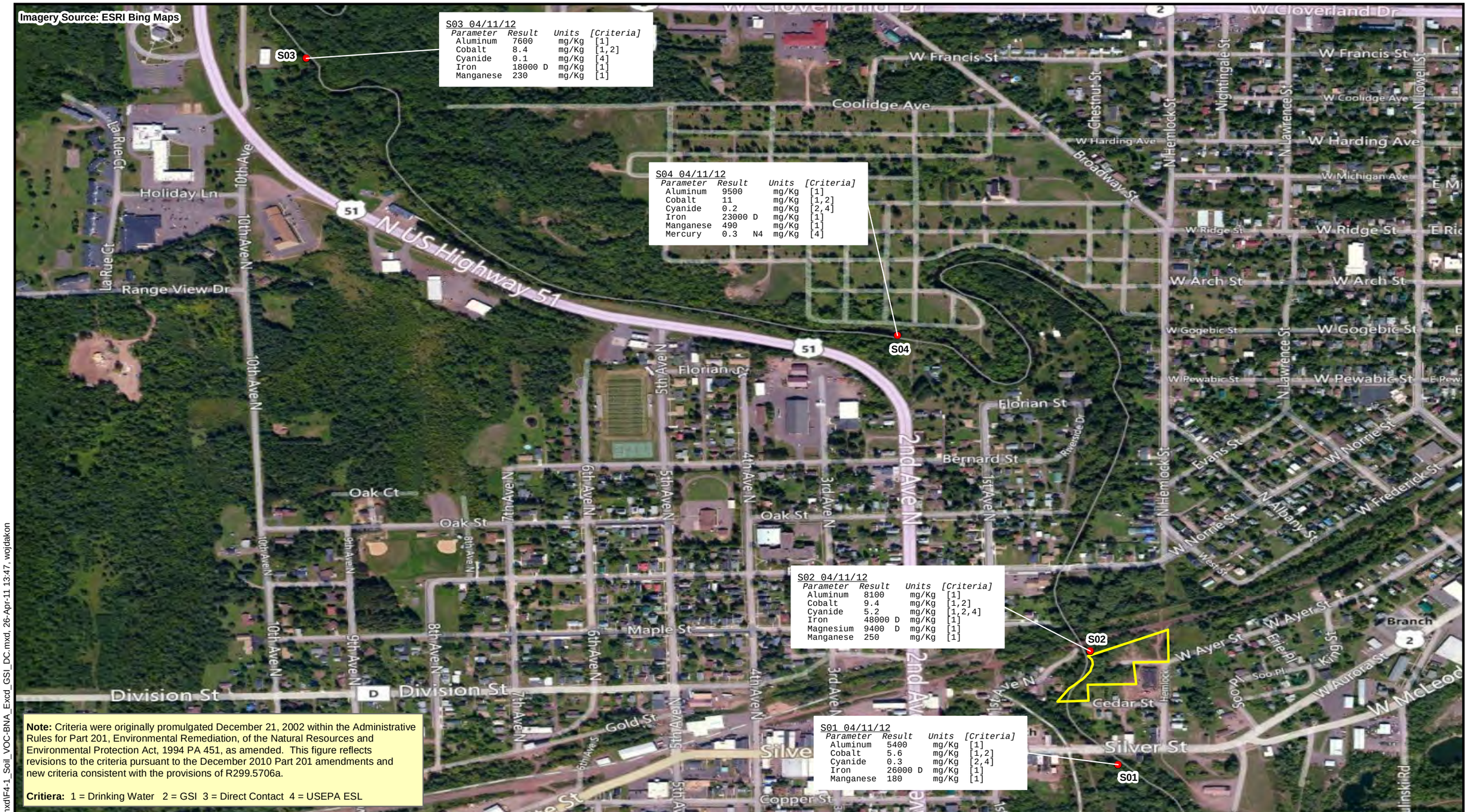
N

Prepared For:
US EPA Region V
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AMCP

Prepared By:
WESTON SOLUTIONS, INC.
600 East Lakeshore Dr, Suite 200
Houghton, Michigan 49931

Figure 4-3
VOC/SVOC Surface Water and Sediment Analytical Results
Exceeding GSI and Direct Contact Criteria
Ironwood MGP SA
Ironwood, Gogebic County, Michigan

File: D:\Ironwood_MPG\mxd\F4-1_Soil_VOC-BNA_Excd_GSI_DC.mxd, 26-Apr-11 13:47, wojdakon



Note: 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 figure reflects revisions to the criteria pursuant to the December 2010 Part 201 amendments and new criteria consistent with the provisions of R299.5706a.

Critiera: 1 = Drinking Water 2 = GSI 3 = Direct Contact 4 = USEPA ESL

Legend

- Locations with no exceedances
- Locations with at least one exceedance
- Site Boundary

mg/kg = milligram per kilogram

0 600 Feet

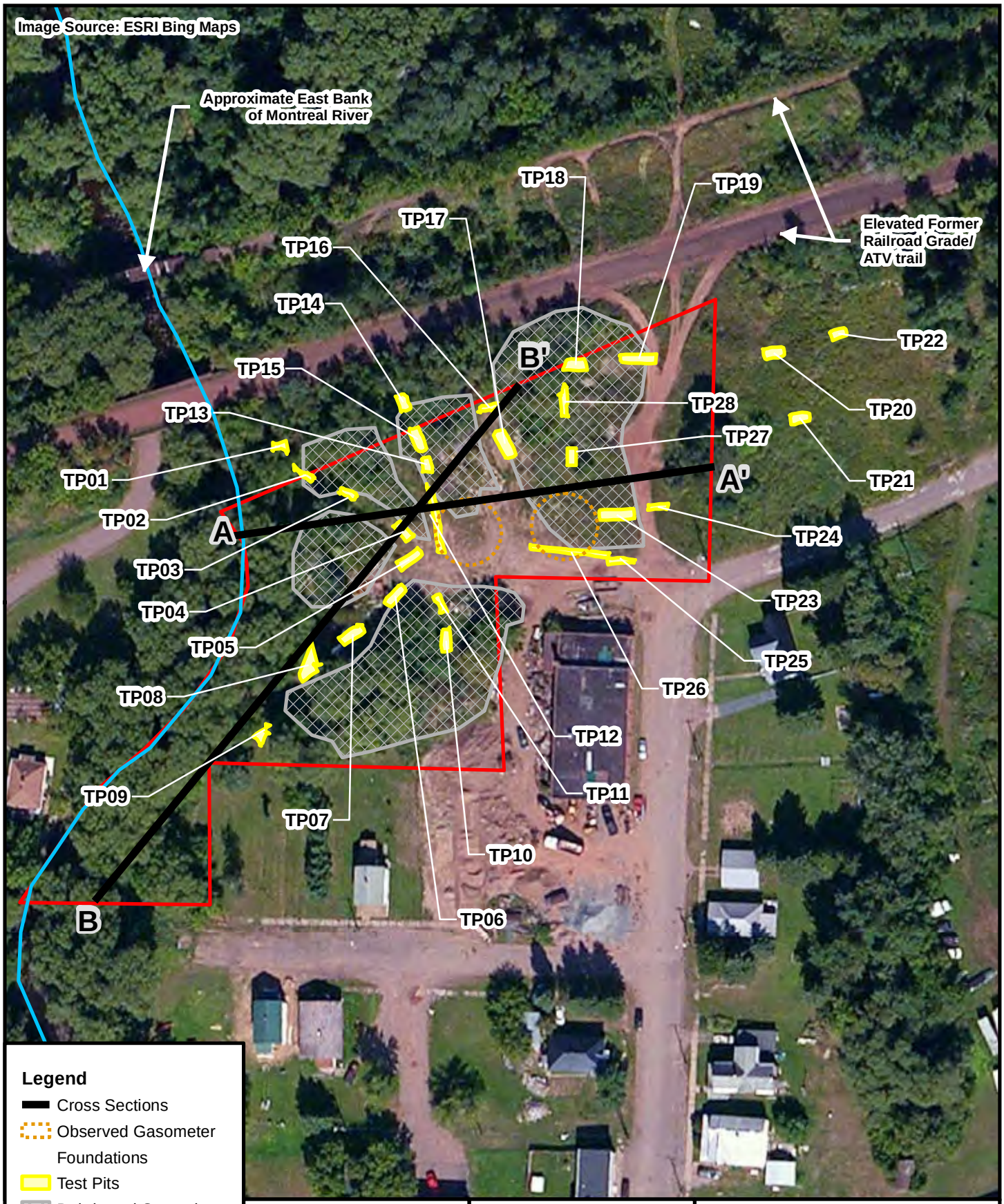
N

Prepared For:
US EPA Region V
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AMCP

Prepared By:
WESTON SOLUTIONS, INC.
600 East Lakeshore Dr, Suite 200
Houghton, Michigan 49931

Figure 4-4
Inorganic Surface Water and Sediment Analytical Results
Exceeding GSI and Direct Contact Criteria
Ironwood MGP SA
Ironwood, Gogebic County, Michigan

File: D:\Ironwood_MPG\mxd\F4-1_Soil_VOC-BNA_Excd_GSI_DC.mxd, 26-Apr-11 13:47, wojdakon



Legend

- Cross Sections
- Observed Gasometer Foundations
- Test Pits
- Debris and Sparsely Wooded Area
- Site Boundary

0 100 Feet

N

Prepared for:
U.S. EPA REGION V

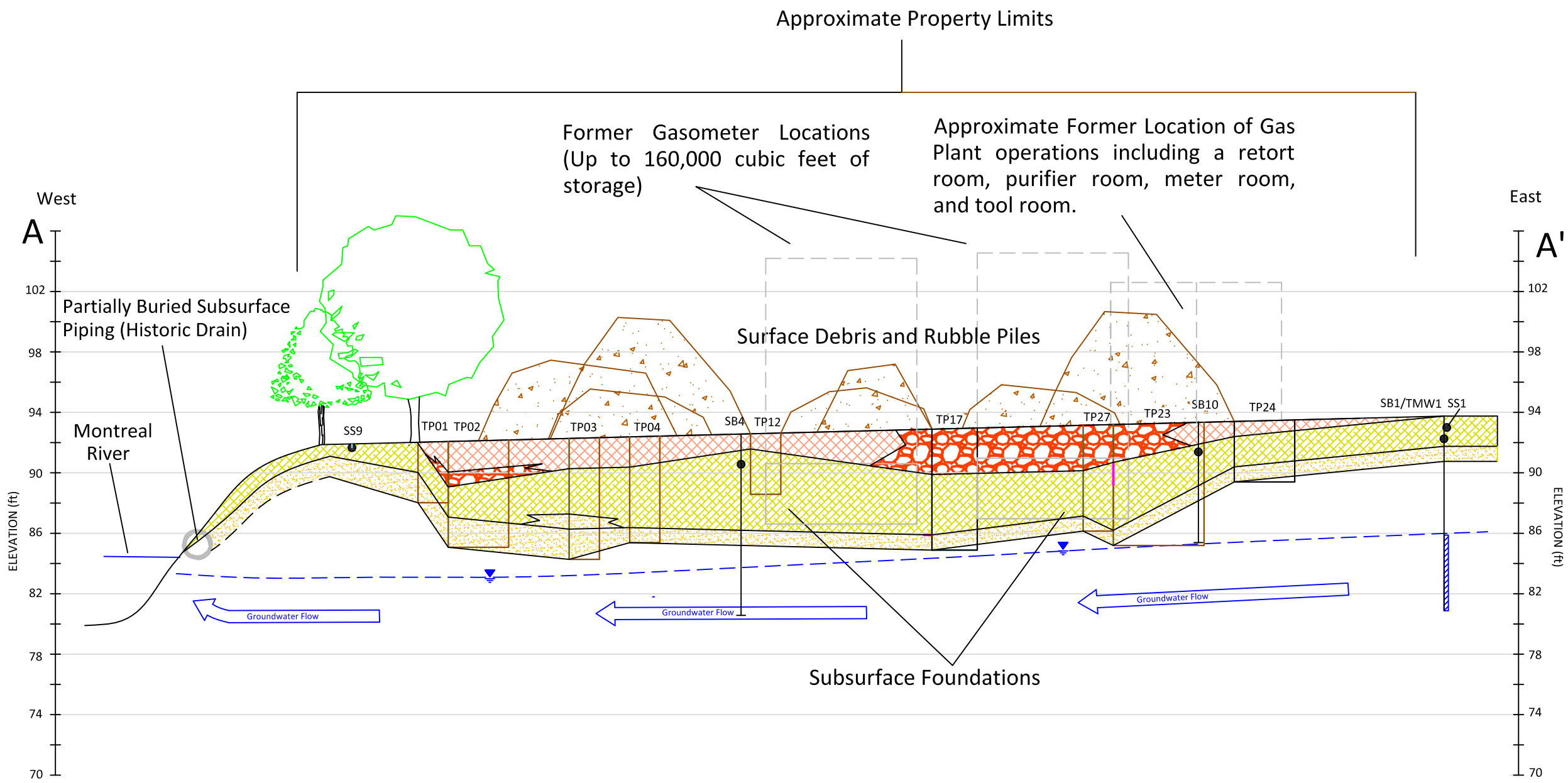
Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

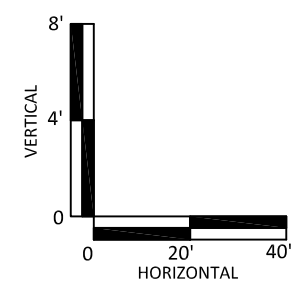
Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive
Suite 200
Houghton, Michigan 49931

Figure 4-5
Conceptual Site Model Cross-Sectional
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

FILE: D:\Ironwood_MPG\mxd\Supplemental\F4-5_Cross_Sections.mxd 6/5/2012 2:37:57 PM wojdakon





LEGEND

- Approximate Extent of Impacted Soil Commingled with Coal Tar, Purifier and other Process Wastes
- FILL, varying composition including bricks, slag, and construction debris
- FILL, generally sand and gravel
- SAND, SILT, and CLAY

TP01 Test Pit Location - April 2012

Sample Location - October 2010

TMW-4 Monitoring Well Location and Screened Interval

Approximate Groundwater Elevation October 2010

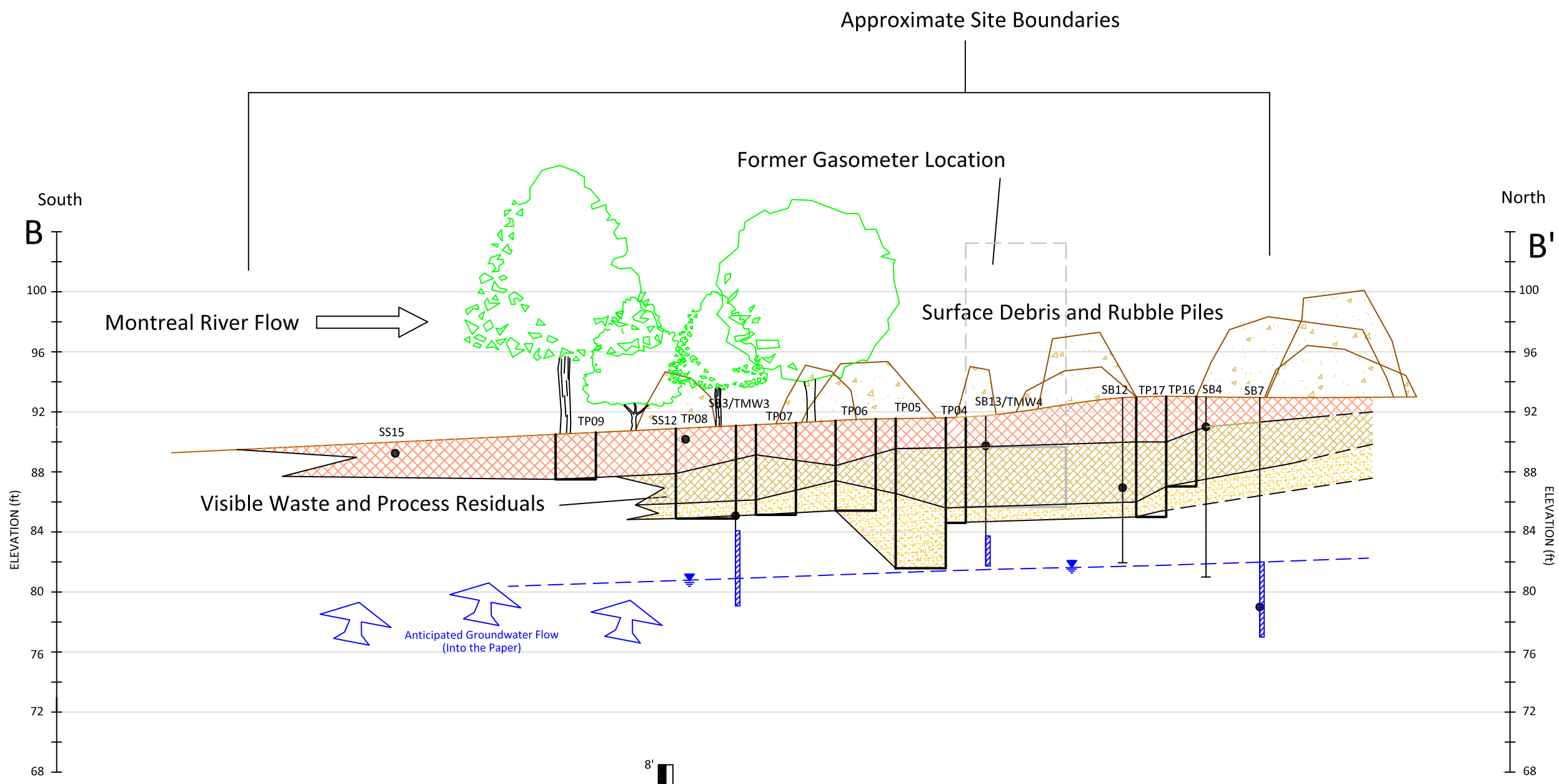
K:\Ironwood MGP\Preliminary Conceptual Site Model

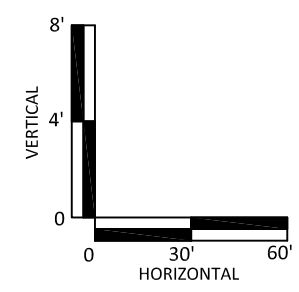
Prepared for:
U.S. EPA REGION V
Contract No.: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

WESTON SOLUTIONS, INC.
600 EAST LAKESHORE DRIVE
SUITE 200
HOUGHTON, MI
49931

FIGURE 4-6
PRELIMINARY CONCEPTUAL SITE MODEL
EAST-WEST PROFILE
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

SCALE:	DRAWN:	DATE:	CHECKED BY:
AS NOTED	DPL	6/2012	DMC





LEGEND

- Approximate Extent of Impacted Soil Commingled with Coal Tar, Purifier and other Process Wastes
- FILL, generally sand and gravel
- SAND, SILT, and CLAY
- TP01 — Test Pit Location - April 2012
- Sample Location - October 2010
- TMW-4 — Temporary Monitoring Well Location and Screened Interval
- Approximate Groundwater Elevation October 2010

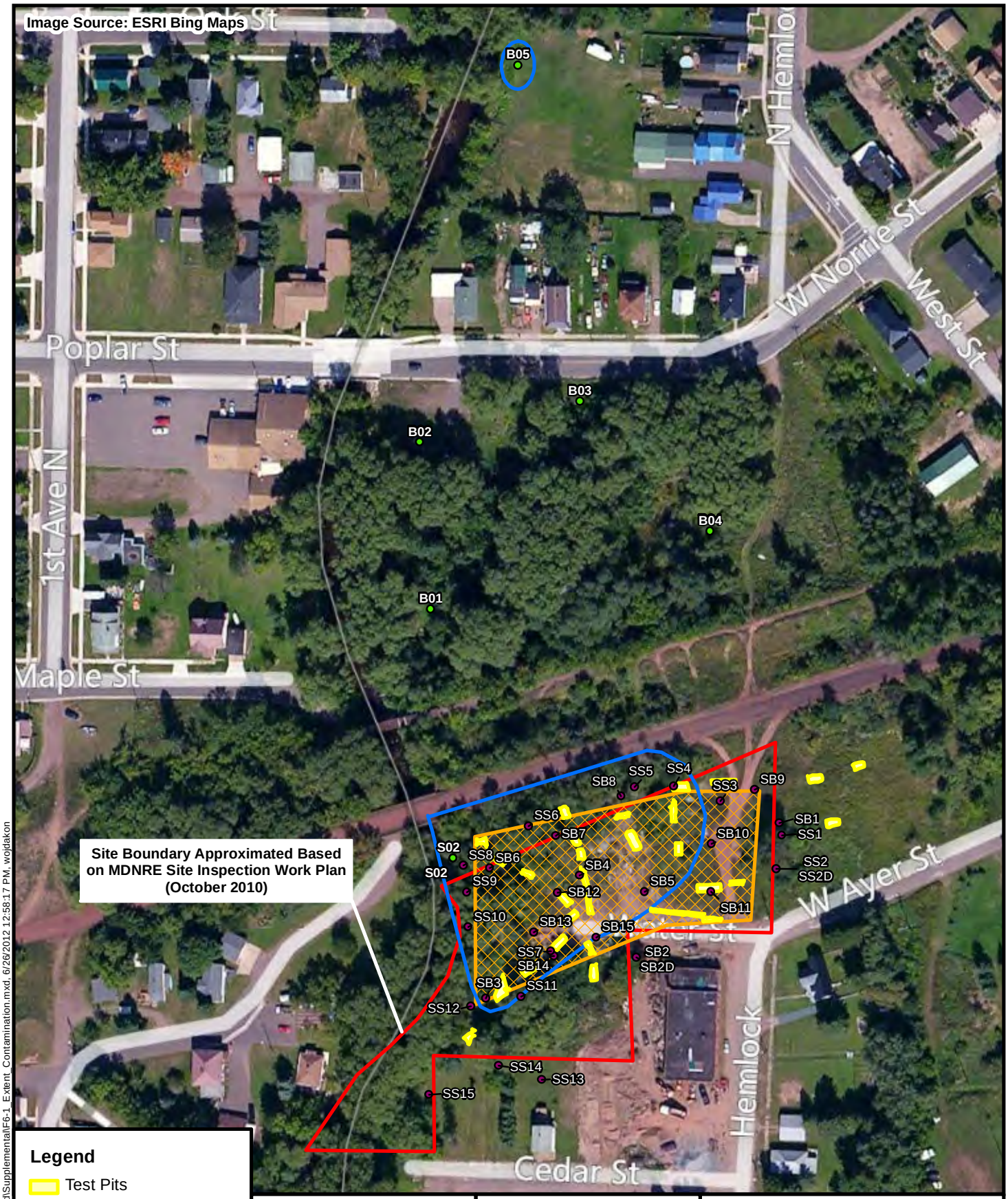
K:\Ironwood MGP\Preliminary Conceptual Site Model

Prepared for:
U.S. EPA REGION V
Contract No.: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AMCP

WESTON SOLUTIONS, INC.
600 EAST LAKESHORE DRIVE
SUITE 200
HOUGHTON, MI
49931

FIGURE 4-7
PRELIMINARY CONCEPTUAL SITE MODEL
NORTH-SOUTH PROFILE
Ironwood MGP SA
Ironwood, Gogebic County, Michigan

SCALE:	DRAWN:	DATE:	CHECKED BY:
AS NOTED	DPL	6/2012	DMC



Prepared for:
U.S. EPA REGION V

Contract No: EP-S5-06-04
TDD: S05-0001-1011-003
DCN: 1273-2A-AWBY

Prepared By:
WESTON SOLUTIONS, INC

600 East Lakeshore Drive,
Suite 200
Houghton, MI 49931

Figure 6-1
Source Area Extent of Contamination Map
Ironwood MGP Supplemental SA
Ironwood, Gogebic County, Michigan

Path: D:\Ironwood_MPG\mxd\Supplemental\F6-1_Extent_Contamination.mxd, 6/26/2012 12:58:17 PM, wojdakon

ATTACHMENT A
PHOTOGRAPHIC DOCUMENTATION

Site: Ironwood MGP Site
Photograph No.: 1 **Date:** 4/9/12
Direction: West **Photographer:** Daniel Liebau
Subject: Installation of soil boring B02 and temporary monitoring well southeast of the Norrie Street Bridge

Site: Ironwood MGP Site
Photograph No.: 2 **Date:** 4/9/12
Direction: Southwest/down **Photographer:** Daniel Liebau
Subject: Typical soil core extracted from Site free of odors or staining; from boring B02

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 3 **Date:** 4/9/12
Direction: Southwest **Photographer:** Daniel Liebau
Subject: Installation of soil boring B05 and temporary monitoring well at a residential property northeast of the Norrie Street Bridge

Site: Ironwood MGP Site
Photograph No.: 4 **Date:** 4/9/12
Direction: West/down **Photographer:** Daniel Liebau
Subject: Odor and sheen observed at approximately 7 to 9 ft bgs in soil core extracted from boring B05

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 5 **Date:** 4/10/12
Direction: West **Photographer:** Daniel Liebau
Subject: Installation of boring B07 west of boring B01 and approximately 20 ft east of the Montreal River

Site: Ironwood MGP Site
Photograph No.: 6 **Date:** 4/10/12
Direction: North/down **Photographer:** Daniel Liebau
Subject: Boring B06 properly plugged and abandoned using bentonite pellets

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 7 **Date:** 4/11/12
Direction: Northeast/down **Photographer:** Daniel Liebau
Subject: Brownish-black coal tar and water seeping into test pit TP03

Site: Ironwood MGP Site
Photograph No.: 8 **Date:** 4/11/12
Direction: North **Photographer:** Daniel Liebau
Subject: North sidewall of test pit TP05 showing typical staining in subsurface

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 9 **Date:** 4/11/12
Direction: North/down **Photographer:** Daniel Liebau
Subject: Brown to orangish-brown clayey silt in test pit TP08 in southwest portion of Site

Site: Ironwood MGP Site
Photograph No.: 10 **Date:** 4/11/12
Direction: Northeast **Photographer:** Daniel Liebau
Subject: Excavation of test pit TP08: test pit excavation progressed southwest away from historical Site operations to delineate subsurface distribution of waste

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 11 **Date:** 4/11/12
Direction: North/northwest **Photographer:** Daniel Liebau
Subject: Excavation of former gasometer foundation at test pit TP12 on west side of Site

Site: Ironwood MGP Site
Photograph No.: 12 **Date:** 4/11/12
Direction: North/northwest **Photographer:** Daniel Liebau
Subject: Viscous coal tar contamination in test pit TP12 just beyond northern limits of gasometer foundation

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 13 **Date:** 4/11/12
Direction: Northwest **Photographer:** Daniel Liebau
Subject: Coal tar-contaminated soil and debris excavated from north end of test pit TP12

Site: Ironwood MGP Site
Photograph No.: 14 **Date:** 4/11/12
Direction: South **Photographer:** Daniel Liebau
Subject: Coal tar-contaminated soil and debris excavated from test pit TP13

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 15 **Date:** 4/11/12
Direction: Southeast **Photographer:** Daniel Liebau
Subject: Excavation of test pit TP15; excavation progressed north from former gasometer foundation

Site: Ironwood MGP Site
Photograph No.: 16 **Date:** 4/11/12
Direction: South/down **Photographer:** Daniel Liebau
Subject: Asphalt-like, coal tar-contaminated soil and debris at approximately 4 ft bgs at test pit TP15

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 17 **Date:** 4/11/12
Direction: South/southwest **Photographer:** Daniel Liebau
Subject: Sheen observed during collection of sediment sample IWMGP-S02-SED02-041112 next to Site

Site: Ironwood MGP Site
Photograph No.: 18 **Date:** 4/12/12
Direction: West **Photographer:** Daniel Liebau
Subject: Collection of representative groundwater waste characterization sample IWMGP-TP16-W01-041212 from floor of test pit T16

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 19 **Date:** 4/12/12
Direction: North **Photographer:** Daniel Liebau
Subject: Coal tar-contaminated soil and debris excavated from test pit TP17

Site: Ironwood MGP Site
Photograph No.: 20 **Date:** 4/12/12
Direction: North **Photographer:** Daniel Liebau
Subject: Before excavation across ATV trail; temporary barricades and warning signs placed along trail and across primary access route

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 21 **Date:** 4/12/12
Direction: East **Photographer:** Daniel Liebau
Subject: Concrete floor and foundation encountered during excavation of test pit TP19

Site: Ironwood MGP Site
Photograph No.: 22 **Date:** 4/12/12
Direction: West **Photographer:** Daniel Liebau
Subject: Test pit TP20 showing soil east of former Site operations; generally sandy and typically featured coal residuals in upper soil intervals

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 23 **Date:** 4/12/12
Direction: North **Photographer:** Daniel Liebau
Subject: Coal tar-contaminated soil and debris excavated from test pit TP23

Site: Ironwood MGP Site
Photograph No.: 24 **Date:** 4/12/12
Direction: West **Photographer:** Daniel Liebau
Subject: Excavation of former gasometer foundation from test pit TP26 on east side of Site

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 25 **Date:** 4/12/12
Direction: East/southeast **Photographer:** Daniel Liebau
Subject: Coal tar-contaminated soil and debris excavated from test pit TP27

Site: Ironwood MGP Site
Photograph No.: 26 **Date:** 4/12/12
Direction: South **Photographer:** Daniel Liebau
Subject: Coal tar-contaminated soil and debris excavated from test pit TP28

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

Site: Ironwood MGP Site
Photograph No.: 27 **Date:** 4/12/12
Direction: South/southeast **Photographer:** Daniel Liebau
Subject: Concrete footing excavated along eastern limits of test pit TP28

Site: Ironwood MGP Site
Photograph No.: 28 **Date:** 4/13/12
Direction: South **Photographer:** Daniel Liebau
Subject: Purging of the potable well located at N 10290 Junet Road

This document was prepared by Weston Solutions, Inc., expressly for U.S. EPA. It shall not be released or disclosed in whole or in part without the express written permission of U.S. EPA.

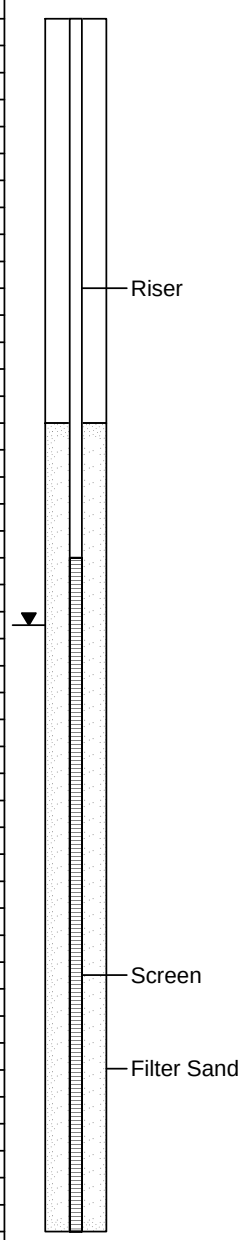
ATTACHMENT B
BORING LOGS

LOG OF BORING B01

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 9 April 2012	Total Depth	: 9 feet
Finish Date	: 9 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4524395711
Boring Method	: Geoprobe 6610DT	Longitude	: -90.178789884
Borehole Diameter	: 2 inches		

Well: TMW-B01
Elev.:



Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	DESCRIPTION	REMARKS
				TOPSOIL, SANDY, brown, fine grained, roots and organics	
	80%	0.0	SM	SAND, fine grained, with SILT, orangish brown, moist	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
		0.0		Wet at 4.5 ft below grade	A groundwater sample labeled IWMGP-B01-W01-0141312 was collected from the temporary monitoring well on 13 April 2012 for laboratory analyses.
	80%	0.0	SM	SAND, medium to fine grained, trace SILT, trace CLAY, orangish brown, some angular GRAVEL, 1/8" to 1/4" diameter	Following collection of the groundwater sample, temporary well materials were removed from the boring and the hole was properly abandoned with bentonite pellets.
		0.0	SP	SAND, reddish brown, greyish green angular rock fragments throughout, 1/4" to 2" diameter	Temporary Monitoring Well Construction Notes: Well Diameter: 1" Riser Construction: PVC Schedule 40 Screen Construction: Slotted PVC 0.10 Screen Length: 5'

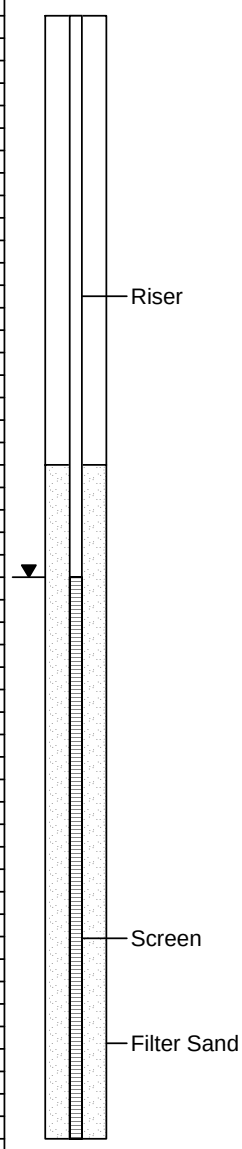
Boring Refusal at 9 ft below grade.

LOG OF BORING B02

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 9 April 2012	Total Depth	: 10 feet
Finish Date	: 9 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4529480265
Boring Method	: Geoprobe 6610DT	Longitude	: -90.1788698406
Borehole Diameter	: 2 inches		

Well: TMW-B02
Elev.:



Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	DESCRIPTION	REMARKS
0	60%	0.0		FILL, SANDY, orangish brown, roots and organics	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
2			AR	FILL, SAND, medium to fine grained, pinkish brown, brick fragments	A groundwater sample labeled IWMGP-B02-W01-0141312 was collected from the temporary monitoring well on 13 April 2012 for laboratory analyses.
4		0.0	SM	SAND, fine grained, with SILT, moist to wet, no odor	Following collection of the groundwater sample, temporary well materials were removed from the boring and the hole was properly abandoned with bentonite pellets.
6	80%	0.0	SM	SAND, fine grained, with SILT, wet, no odor	Temporary Monitoring Well Construction Notes: Well Diameter: 1" Riser Construction: PVC Schedule 40 Screen Construction: Slotted PVC 0.10 Screen Length: 5'
8		0.0			
10			SP	SAND, coarse to fine grained, wet, no odor	
12					

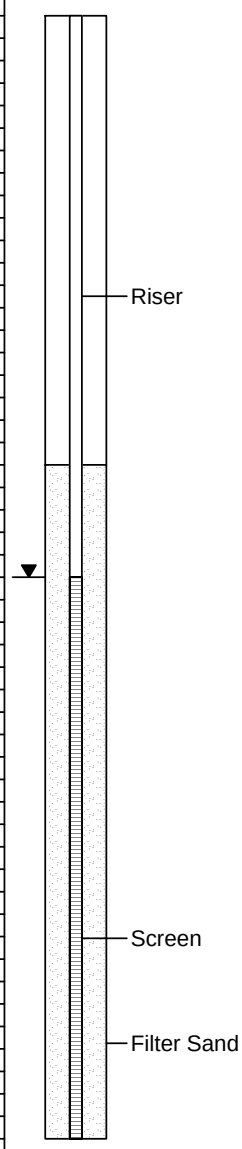
Boring refusal at 10 ft below grade

LOG OF BORING B03

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 9 April 2012	Total Depth	: 10 feet
Finish Date	: 9 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4529480265
Boring Method	: Geoprobe 6610DT	Longitude	: -90.1788698406
Borehole Diameter	: 2 inches		

Well: TMW-B02
Elev.:



Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	DESCRIPTION	REMARKS
0–2.5	80%	0.0	SW	SAND, fine grained, orangish brown, some 1/4 inch diameter greenish gray angular GRAVEL	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
2.5–4.5		0.0	SW	SAND, fine grained, orangish brown, 1.5 inch diameter greenish gray rock fragments, moist, no odor	A groundwater sample labeled IWMGP-B03-W01-0141312 was collected from the temporary monitoring well on 13 April 2012 for laboratory analyses.
4.5–6.5	80%	0.0	SW	SAND, fine grained, trace SILT, orangish brown, some 1 inch diameter rock fragments	A rock in the end of the sample tube prevented recovery, the boring was offset and the 5-10 ft interval was re-sampled.
6.5–8.5		0.0	SM	SAND, medium to fine grained, with SILT, orangish brown	Following collection of the groundwater sample, temporary well materials were removed from the boring and the hole was properly abandoned with bentonite pellets.
8.5–10				BEDROCK, pulverized greenish gray rock fragments	Temporary Monitoring Well Construction Notes: Well Diameter: 1" Riser Construction: PVC Schedule 40 Screen Construction: Slotted PVC 0.10 Screen Length: 5'

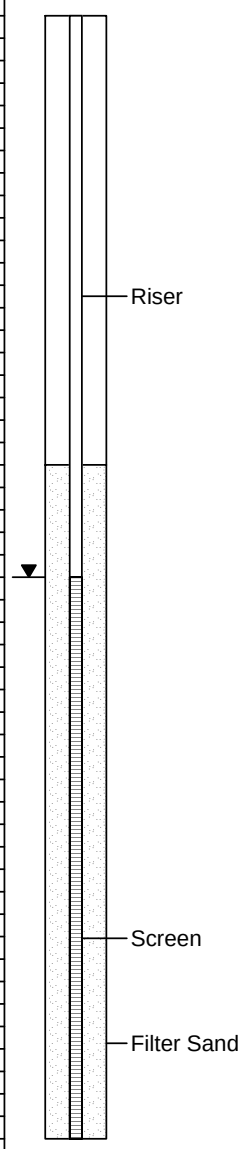
Boring refusal at 10 ft below grade

LOG OF BORING B04

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 9 April 2012	Total Depth	: 10 feet
Finish Date	: 9 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4527127158
Boring Method	: Geoprobe 6610DT	Longitude	: -90.1775679151
Borehole Diameter	: 2 inches		

Well: TMW-B02
Elev.:



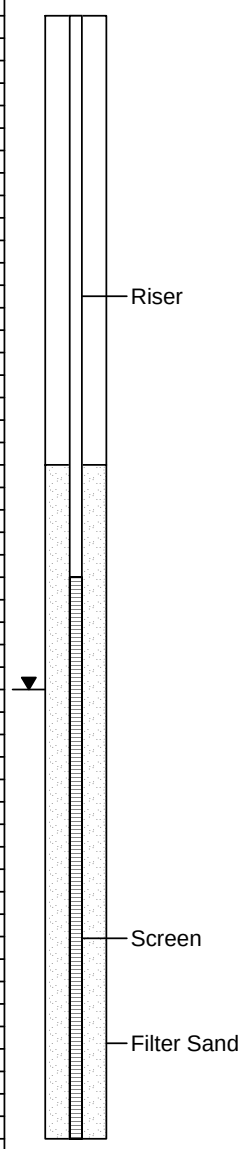
Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	DESCRIPTION	REMARKS
0	60%	0.0	SP	SAND, fine grained, with SILT, orangish brown, trace 1/4 inch diameter angular GRAVEL	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
2					A groundwater sample labeled IWMGP-B04-W01-0141312 was collected from the temporary monitoring well on 13 April 2012 for laboratory analyses.
4		0.0	SC	SAND, fine grained, blackish brown, CLAYEY, organics, no odor	Following collection of the groundwater sample, temporary well materials were removed from the boring and the hole was properly abandoned with bentonite pellets.
6	80%	0.0	SM	SAND, fine grained, with SILT, orangish brown	Temporary Monitoring Well Construction Notes: Well Diameter: 1" Riser Construction: PVC Schedule 40 Screen Construction: Slotted PVC 0.10 Screen Length: 5'
8		0.0		BEDROCK, Pulverized greenish gray rock fragments	
10				Boring refusal at 10 ft below grade	
12					

LOG OF BORING B05

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 9 April 2012	Total Depth	: 10 feet
Finish Date	: 9 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4541133247
Boring Method	: Geoprobe 6610DT	Longitude	: -90.178502052
Borehole Diameter	: 2 inches		

Well: TMW-B02
Elev.:



Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	DESCRIPTION	REMARKS
0	20%	0.0	SP	SAND, fine grained, brown, low recovery	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
2					A groundwater sample labeled IWMGP-B05-W01-0141312 was collected from the temporary monitoring well on 13 April 2012 for laboratory analyses.
4		0.0			Following collection of the groundwater sample, temporary well materials were removed from the boring and the hole was properly abandoned with bentonite pellets.
6	90%	0.0	SM	SAND, fine grained, reddish brown, with SILT, moist to wet	Temporary Monitoring Well Construction Notes: Well Diameter: 1" Riser Construction: PVC Schedule 40 Screen Construction: Slotted PVC 0.10 Screen Length: 5'
			SM	SAND, fine grained, with SILT, brown, blackish gray staining, slight odor	
8		1.2	SM	SAND, fine grained, with SILT, slight sheen	
10				BEDROCK, pulverized greenish gray rock fragments	
12				Boring refusal at 10 feet below grade.	

LOG OF BORING B06

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.1273.001.0010

Start Date	: 10 April 2012	Total Depth	: 10 feet
Finish Date	: 10 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4530307361
Boring Method	: Geoprobe 6610DT	Longitude	: -90.1790558122
Borehole Diameter	: 2 inches		

Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	GRAPHIC	DESCRIPTION	REMARKS
0					TOPSOIL, SANDY, dark brown, roots/organics	
	60%	0.0	SP		SAND, fine grained, some medium grained, orangish brown	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
2						
			GP		GRAVEL, pink, angular 1/8 inch to 1/4 inch diameter	
		0.0	SP		SAND, fine grained, trace GRAVEL, reddish brown, trace organics/roots	Following soil screening activities the boring was properly abandoned with bentonite pellets.
4						
6	80%	0.0	SP		SAND, coarse to fine grained, reddish brown	
			SP		SAND, medium to coarse grained, blackish brown	
8			SM		SAND, fine grained, trace SILT, reddish brown	
		0.0	SP		SAND, woody debris	
					BEDROCK, pulverized greenish gray rock fragments	
10					Boring refusal at 10 ft below grade.	
12						

LOG OF BORING B07

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 10 April 2012	Total Depth	: 9 feet
Finish Date	: 10 April 2012	Drilling Firm	: Coleman Engineering Co.
WESTON Geologist	: D. Liebau	Latitude	: 46.4530307361
Boring Method	: Geoprobe 6610DT	Longitude	: -90.1790558122
Borehole Diameter	: 2 inches		

Depth in ft	Percent (%)	PID Headspace (ppm)	USCS	GRAPHIC	DESCRIPTION	REMARKS
0					TOPSOIL, SANDY, fine to medium grained, brownish black, organics	Soil borings were continuously logged. Soil samples for laboratory analysis were not collected.
	80%	0.0	SP		SAND, fine grained, some SILT, dark brown	
2			ML		SILT, with SAND, fine grained, orangish brown, moist to wet	
		0.0				
4			SP		SAND, fine to medium grained, trace SILT, orangish brown, wet	Following soil screening activities the boring was properly abandoned with bentonite pellets.
			SP		SAND, fine to medium grained, trace SILT, grayish brown, trace organics, wet	
6	60%	0.0	SP		SAND, trace SILT, gray, wet	
8		0.0			BEDROCK, pulverized greenish gray rock fragments, SANDY	
					Boring refusal at 9 ft below grade.	
10						
12						

ATTACHMENT C
TEST PIT LOGS

LOG OF TEST PIT TP01

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 14 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 4 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, CINDERS and SAND, black to blackish brown, asphaltic tar and woody debris, dry SAND, black to blackish brown, organics, dry at 2 ft below grade	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, SAND with SILT, trace CLAY, orangish brown	Breathing Zone Monitoring: 0.0 ppm The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
4			Excavation completed at a depth of approximately 4 ft below grade.	
6				
8				
10				

LOG OF TEST PIT TP02

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 18 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 7 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND and GRAVEL, orange to reddish brown	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, SAND and GRAVEL, orange to reddish brown, bricks and rubble fragments, light brown colored water and tar seeping into test trench, sheen present on pooled groundwater	
4	AR		FILL, SAND, TAR and WASTE MATERIAL, black, strong coal tar odor, wet	Breathing Zone Monitoring: 0.0 ppm
6	SP		SAND with SILT, trace CLAY, orangish brown, moist	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
8			Excavation completed at a depth of approximately 7 ft below grade.	
10				

LOG OF TEST PIT TP03

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 8 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND and GRAVEL, orangish brown, organics	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL,SAND, with SILT, grayish black Brownish black coal tar and water seeping into the test pit at approximately 5 ft below grade	Breathing Zone Monitoring: 1.5 ppm
	SP		SAND, with SILT, orangish gray	
6	SC		SILTY SAND, CLAYEY, orangish red	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
8			Excavation completed at a depth of approximately 8 ft below grade.	
10				

LOG OF TEST PIT TP04

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 7 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SILTY SAND, orangish brown	
2	AR		FILL,SILTY SAND, grayish black, commingled coal tar deposits and black wood chips (process waste)	Breathing Zone Monitoring: 0.1 ppm
4			8 in diameter ceramic pipe oriented north to south at approximately 4 ft below grade	Breathing Zone Monitoring: 1.2 ppm (not sustained)
			Brownish black coal tar and water seeping into the test pit at approximately 6 ft below grade	
6	SC		SILTY SAND, CLAYEY, orangish brown, moist	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
			Excavation completed at a depth of approximately 7ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-4.bor

LOG OF TEST PIT TP05

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 10 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND AND GRAVEL, tan to brown	
2	AR		FILL, SAND, grayish green, commingled coal tar deposits and slag, strong odor	Breathing Zone Monitoring: 0.0 ppm Breathing Zone Monitoring: 0.9 ppm (not sustained)
4	SM		SILTY SAND, brownish gray	
6	SM		SILTY SAND, some CLAY, reddish brown	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
8				
10			Excavation completed at a depth of approximately 10 ft below grade.	
12				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-5.bor

LOG OF TEST PIT TP06

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 10 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6.5 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND AND GRAVEL, orangish brown	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, SAND, greyish brown, commingled coal tar deposits and slag, cobbles	Breathing Zone Monitoring: 0.0 ppm
4	SP		SAND, with SILT, reddish brown, 6 in diameter cobbles Clay pipe oriented northwest to southeast, clear water draining from the pipe	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6.5 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-6.bor

LOG OF TEST PIT TP07

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 15 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, fine grained, brown to orangish brown	
2	AR		FILL, SAND, with SILT, greyish tan, fine grained, commingled black wood chips (process waste), coal tar odor	Breathing Zone Monitoring: 0.0 ppm Breathing Zone Monitoring: 0.0 ppm
	SM		SAND, fine grained, with SILT, grayish tan	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-7.bor

LOG OF TEST PIT TP08

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 15 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		SAND, fine grained, trace SILT, tan to brown, organics and roots at approximately 3 ft below grade	Breathing Zone Monitoring: 0.0 ppm
2	AR		CLAYEY SILT, with SAND, fine grained, orangish brown	Breathing Zone Monitoring: 0.0 ppm
4	SM		SANDY SILT, grayish black, organics, slight coal tar odor	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-8.bor

LOG OF TEST PIT TP09

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 10 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 3 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	SW		SAND, medium to fine grained, brown, organics in upper 1 ft, no evidence of waste or debris.	Breathing Zone Monitoring: 0.0 ppm
2				The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
			Excavation completed at a depth of approximately 3 ft below grade.	
4				
6				
8				
10				

LOG OF TEST PIT TP-10

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 18 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	SW		SAND, brown, organics and roots, metal debris, black organic interval at approximately 3 ft below grade, no odors	Breathing Zone Monitoring: 0.0 ppm
2				
4	SM		SILTY SAND, brown	Breathing Zone Monitoring: 0.0 ppm The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-10.bor

LOG OF TEST PIT TP-11

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 15 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, brown	
	AR		FILL, SAND, black, coal tar deposits, 2 in gravel seam	Breathing Zone Monitoring: 0.0 ppm
	AR		FILL, SAND AND GRAVEL, pinkish tan	
2	AR		FILL, SAND, greenish grey, fine grained, commingled tar deposits	
4	GP		SAND AND GRAVEL, pinkish brown, medium grained	Breathing Zone Monitoring: 0.0 ppm The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-11.bor

LOG OF TEST PIT TP-12

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 48 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 4 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, brown	
	AR		FILL, Concrete, gasometer foundation, approximately 40 ft in diameter	Breathing Zone Monitoring: 0.0 ppm
2				
			The test pit excavation was extended north beyond the edge of the concrete. Coal tar contamination present along the northern limits of the gasometer foundation.	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
4			Excavation completed at a depth of approximately 4 ft below grade.	
6				
8				
10				

LOG OF TEST PIT TP-13

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 10 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 8 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, rocky/cobbles, reddish brown, organics	
	AR		FILL, SAND, black, rubble, brick, commingled tar deposits, strong odor	Breathing Zone Monitoring: 0.0 parts per million (ppm) Breathing Zone Monitoring: 0.0 ppm
2				
4				
6				
	CL		SILTY CLAY, greyish green, moist, strong odor	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
8			Excavation completed at a depth of approximately 8 ft below grade.	
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-13.bor

LOG OF TEST PIT TP-14

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 9 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0				
			FILL, SAND, brown, hummocky, wood and metal debris, cables, concrete, rubble, no odor	
2				Breathing Zone Monitoring: 0.0 ppm
4	AR			
				Breathing Zone Monitoring: 0.0 ppm
6				
8				
	AR		SAND, orangish brown	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
			Excavation completed at a depth of approximately 9 ft below grade.	
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-14.bor

LOG OF TEST PIT TP-15

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 11 April 2012	Test Pit Width	: 4 ft
Finish Date	: 11 April 2012	Test Pit Length	: 18 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 9 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, reddish brown, roots/organics, shingles and construction debris 2 inch diameter metal pipe at approximately 4 ft below the ground surface	Breathing Zone Monitoring: 0.0 ppm
4	AR		FILL, black coal tar and asphaltic material, boulders/cobbles and debris, strong coal tar odor Water at approximately 8 ft below grade	Breathing Zone Monitoring: 0.0 ppm
8	CL		SILTY CLAY, greyish green	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
			Excavation completed at a depth of approximately 9 ft below grade.	
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-15.bor

LOG OF TEST PIT TP-16

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, brown, roots/organics, construction debris, concrete, bricks, and boulders	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, black coal tar and debris	Breathing Zone Monitoring: 0.0 ppm
4			Groundwater discharging from bricks and debris at approximately 5 ft below grade	Collected a groundwater waste characterization sample via a peristaltic pump at 9:30 labeled IWMGP-TP16-W01-041212 The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-16.bor

LOG OF TEST PIT TP-17

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 18 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 8 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND AND GRAVEL, reddish brown, concrete and wood debris, no odor	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, SAND, black coal tar, concrete/cobbles and debris, strong coal tar odor	Breathing Zone Monitoring: 0.0 ppm Collected a representative soil waste characterization sample at 11:00 labeled IWMGP-TP17-S01-041212
4	AR			
6	SM		SAND, SILTY, CLAYEY, tan	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
8			Excavation completed at a depth of approximately 8 ft below grade.	
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-17.bor

LOG OF TEST PIT TP-18

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.1273.001.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 17 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, reddish brown, roots/organics, 1 ft diameter boulders, interbedded black seams - approximately 2 in wide, possibly coal, concrete debris, no odor	Breathing Zone Monitoring: 0.0 ppm
2			Apparent top of footing on north side of test pit at 3 ft below grade, footing oriented from east to west	
	CL		CLAY, orange and grey mottling, two concrete structures oriented from north to south, approximately 3 to 4 ft wide	Breathing Zone Monitoring: 0.0 ppm
4				
				The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-18.bor

LOG OF TEST PIT TP-19

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.1273.001.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 25 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, reddish brown, roots/organics, concrete pad at approximately 2 ft below grade	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, SAND, black, possibly coal residuals, no odor Approximately 6 in diameter clay pipe oriented north to south at 4 ft below grade	Breathing Zone Monitoring: 0.0 ppm
4	SC		CLAYEY SAND, orangish brown, groundwater seeping into the excavation	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-19.bor

LOG OF TEST PIT TP-20

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.1273.001.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 17 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 4 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, black, commingled with coal residuals, no odor	
	AR		SAND, SILTY, orangish brown, fine grained, no odor	Breathing Zone Monitoring: 0.0 ppm
2	SC		SAND, SILTY, CLAYEY, pinkish brown	Breathing Zone Monitoring: 0.0 ppm The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
4			Excavation completed at a depth of approximately 4 ft below grade.	
6				
8				
10				

LOG OF TEST PIT TP-21

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.1273.001.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 15 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 3 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, blackish brown	
	AR		FILL, SAND, SILTY, brown, no odor	Breathing Zone Monitoring: 0.0 parts per million (ppm)
2	CL		SILTY CLAY, with SAND, pinkish brown, fine grained	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
			Excavation completed at a depth of approximately 3 ft below grade.	
4				
6				
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-21.bor

LOG OF TEST PIT TP-22

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 2 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		TOPSOIL, blackish brown, organics/roots	Breathing Zone Monitoring: 0.0 ppm
	SP		SAND, some SILT, brown, fine grained, angular cobbles and boulders, 6 in to 1 ft in diameter	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
2			Excavation completed at a depth of approximately 2 ft below grade.	
4				
6				
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-22.bor

LOG OF TEST PIT TP-23

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 28 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 8 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, reddish brown, fine grained, 2 in to 6 in diameter slag fragments, commingled coal tar deposits	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, SILTY SAND, brown	
	AR		Concrete - Encountered a concrete floor, approximately 1 ft thick, possibly located in the vicinity of the former meter room. The test pit was extended east to where the concrete terminated, and vertical excavation of the test pit resumed.	
4	AR		FILL, black, commingled coal tar and debris, bricks, slag, strong coal tar odor	Breathing Zone Monitoring: 0.0 ppm
6	SM		SAND, SILTY, CLAYEY, pinkish brown	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
8			Excavation completed at a depth of approximately 8 ft below grade.	
10				

LOG OF TEST PIT TP-24

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 15 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 4 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND AND GRAVEL, reddish brown	
	AR		FILL, SAND, blackish brown, commingled coal tar and process waste	Breathing Zone Monitoring: 0.0 ppm
2				Breathing Zone Monitoring: 0.0 ppm
	CL		SILTY CLAY, some SAND, medium to fine grained, pinkish brown with yellowish green staining	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
4			Excavation completed at a depth of approximately 4 ft below grade.	
6				
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-24.bor

LOG OF TEST PIT TP-25

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 20 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 5 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND AND GRAVEL, reddish brown and black	Breathing Zone Monitoring: 0.0 parts per million (ppm)
2	AR		FILL, SILTY SAND, black, commingled coal tar and debris, cobbles and boulders, 6 in to 2 ft in diameter	Breathing Zone Monitoring: 0.0 ppm
4	CL		SILTY CLAY, pinkish brown	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
			Excavation completed at a depth of approximately 5 ft below grade.	
6				
8				
10				

LOG OF TEST PIT TP-26

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 55 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND AND GRAVEL, reddish brown FILL, Concrete, gasometer foundation at 1 ft below grade and approximately 4 ft thick, extend excavation west and resume vertical excavation.	
2	AR		FILL, SAND, blackish grey, coal tar and process waste, strong coal tar odor	Breathing Zone Monitoring: 0.0 ppm Breathing Zone Monitoring: 0.0 ppm
4	CL		SILTY CLAY, pinkish tan, wet, water seeping into the test pit from beneath the foundation	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-26.bor

LOG OF TEST PIT TP-27

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 12 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 7 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, reddish brown, cobbles, brick, and concrete debris	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, black coal tar and process waste, wet, concrete at approximately 5 ft below grade in the north end of the test pit	Breathing Zone Monitoring: 0.0 ppm
4	CL		SILTY CLAY, SANDY, tan, black water seeping into the excavation from the north side at approximately 6 ft below grade	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 7 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-27.bor

LOG OF TEST PIT TP-28

Ironwood Manufactured Gas Plant Site
United States Environmental Protection Agency
Ironwood, Michigan
20405.012.001.1273.0010

Start Date	: 12 April 2012	Test Pit Width	: 4 ft
Finish Date	: 12 April 2012	Test Pit Length	: 20 ft
WESTON Geologist	: D. Liebau	Test Pit Depth	: 6 ft
Excavating Company	: Veolia Environmental Services		
Excavating Equipment	: CAT 307 Excavator		

Depth in ft	USCS	GRAPHIC	DESCRIPTION	REMARKS
0	AR		FILL, SAND, with SILT, orangish brown, roots/organics, concrete foundation along west edge of test pit	Breathing Zone Monitoring: 0.0 ppm
2	AR		FILL, black, commingled coal tar, process waste, rubble and debris, strong coal tar odor	Breathing Zone Monitoring: 0.0 ppm
4	CL		SILTY CLAY, pinkish tan	The excavation was systematically backfilled to ensure that subsurface contaminated materials were not left exposed on the ground surface.
6			Excavation completed at a depth of approximately 6 ft below grade.	
8				
10				

06-04-2012 K:\USEPA Ironwood MGP\Supplemental Site Assessment\Test Pit Logs\TP-28.bor

ATTACHMENT D
LABORATORY ANALYTICAL REPORTS

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

May 10, 2012

Mr. Dan Liebau
Weston Solutions, Inc.
600 E Lakeshore Drive #200
Houghton, MI 49931

RE: Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Dear Mr. Liebau:
Enclosed are the analytical results for sample(s) received by the laboratory on April 17, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout for
Diane J. Anderson
diane.anderson@pacelabs.com
Project Manager

Enclosures

cc: Ms. Lisa Graczyk, Weston Solutions, Inc.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

CERTIFICATIONS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Minnesota Certification IDs
1700 Elm Street SE Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
EPA Region 8 Certification #: Pace
Florida/NELAP Certification #: E87605
Georgia Certification #: 959
Idaho Certification #: MN00064
Illinois Certification #: 200011
Iowa Certification #: 368
Kansas Certification #: E-10167
Louisiana Certification #: 03086
Louisiana Certification #: LA080009
Maine Certification #: 2007029
Maryland Certification #: 322
Michigan DEQ Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT CERT0092
Nebraska Certification #: Pace
Nevada Certification #: MN_00064
New Jersey Certification #: MN-002
New Mexico Certification #: Pace
New York Certification #: 11647
North Carolina Certification #: 530
North Dakota Certification #: R-036
North Dakota Certification #: R-036A
Ohio VAP Certification #: CL101
Oklahoma Certification #: D9921
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Tennessee Certification #: 02818
Texas Certification #: T104704192
Washington Certification #: C754
Wisconsin Certification #: 999407970

Green Bay Certification IDs
1241 Bellevue Street, Green Bay, WI 54302
Florida/NELAP Certification #: E87948
Illinois Certification #: 200050
Kentucky Certification #: 82
Louisiana Certification #: 04168
Minnesota Certification #: 055-999-334
New York Certification #: 11888
North Carolina Certification #: 503
North Dakota Certification #: R-150
South Carolina Certification #: 83006001
US Dept of Agriculture #: S-76505
Wisconsin Certification #: 405132750

Indiana Certification IDs
7726 Moller Road, Indianapolis, IN 46268
Illinois Certification #: 200074
Indiana Certification #: C-49-06
Kansas Certification #: E-10247
Kentucky Certification #: 0042
Louisiana/NELAC Certification #: 04076
Ohio VAP: CL0065
Pennsylvania: 68-04991
West Virginia Certification #: 330

Kansas Certification IDs
9608 Loiret Boulevard, Lenexa, KS 66219
A2LA Certification #: 2456.01
Arkansas Certification #: 05-008-0
Illinois Certification #: 001191
Iowa Certification #: 118
Kansas/NELAP Certification #: E-10116
Louisiana Certification #: 03055
Nevada Certification #: KS000212008A
Oklahoma Certification #: 9205/9935
Texas Certification #: T104704407-08-TX
Utah Certification #: 9135995665

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10189069001	**IWMGP-TP17-SO1-041212**	Solid	04/12/12 11:00	04/17/12 09:11
10189069002	**IWMGP-TP16-WO1-041212**	Water	04/12/12 11:00	04/17/12 09:11

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE ANALYTE COUNT

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10189069001	**IWMGP-TP17-SO1-041212**	% Moisture	LLC	1	PASI-M
		EPA 8270	JLR	72	PASI-M
		EPA 8260	CNC	71	PASI-M
		EPA 1010	DEY	1	PASI-G
		SW-846 7.3.4.2	OL	1	PASI-D
		SW-846 7.3.4.2	OL	1	PASI-K
		SW-846 7.3.3.2	AJM	1	PASI-D
		SW-846 7.3.3.2	AJM	1	PASI-K
		EPA 9012	ILP	1	PASI-I
10189069002	**IWMGP-TP16-WO1-041212**	EPA 6010	IP	9	PASI-M
		EPA 7470	TEM	1	PASI-M
		EPA 8270	JLR	72	PASI-M
		EPA 8260	ECB	73	PASI-M
		EPA 1010	DEY	1	PASI-G
		EPA 1664 OG	AS1	1	PASI-M
		SM 4500-S F (2000)	DEY	1	PASI-G
		EPA 350.1	MWD	1	PASI-M
		SM 4500-P E	MWD	1	PASI-M

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP17-SO1-041212 **Lab ID: 10189069001** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Dry Weight	Analytical Method: % Moisture							
Percent Moisture	**18.6**	%	0.10	1		04/24/12 00:00		
8270 MSSV	Analytical Method: EPA 8270 Preparation Method: EPA 3550							
Acenaphthene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	83-32-9	M6
Acenaphthylene	**10700**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	208-96-8	M6
Anthracene	**8450**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	120-12-7	M6
Benzo(a)anthracene	**23500**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	56-55-3	M6
Benzo(a)pyrene	**19700**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	50-32-8	M6
Benzo(b)fluoranthene	**24300**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	205-99-2	M6
Benzo(g,h,i)perylene	**15000**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	191-24-2	M6
Benzo(k)fluoranthene	**9200**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	207-08-9	M6
4-Bromophenylphenyl ether	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	101-55-3	
Butylbenzylphthalate	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	85-68-7	
Carbazole	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	86-74-8	
4-Chloro-3-methylphenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	59-50-7	
4-Chloroaniline	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	106-47-8	M6
bis(2-Chloroethoxy)methane	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	111-91-1	
bis(2-Chloroethyl) ether	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	111-44-4	
bis(2-Chloroisopropyl) ether	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	108-60-1	
2-Chloronaphthalene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	91-58-7	
2-Chlorophenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	95-57-8	
4-Chlorophenylphenyl ether	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	7005-72-3	
Chrysene	**25300**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	218-01-9	M6
Dibenz(a,h)anthracene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	53-70-3	M6
Dibenzofuran	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	132-64-9	M6
1,2-Dichlorobenzene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	106-46-7	
3,3'-Dichlorobenzidine	ND	ug/kg	16500	20	04/25/12 13:15	04/27/12 17:40	91-94-1	M6
2,4-Dichlorophenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	120-83-2	M6
Diethylphthalate	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	84-66-2	
2,4-Dimethylphenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	105-67-9	
Dimethylphthalate	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	131-11-3	
Di-n-butylphthalate	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	84-74-2	
4,6-Dinitro-2-methylphenol	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	534-52-1	M6
2,4-Dinitrophenol	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	51-28-5	M6
2,4-Dinitrotoluene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	121-14-2	M6
2,6-Dinitrotoluene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	606-20-2	
Di-n-octylphthalate	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	117-84-0	
1,2-Diphenylhydrazine	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	122-66-7	
bis(2-Ethylhexyl)phthalate	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	117-81-7	
Fluoranthene	**38200**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	206-44-0	M6
Fluorene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	86-73-7	M6
Hexachloro-1,3-butadiene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	87-68-3	
Hexachlorobenzene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	118-74-1	
Hexachloroethane	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	67-72-1	M6

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP17-SO1-041212 **Lab ID: 10189069001** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV	Analytical Method: EPA 8270 Preparation Method: EPA 3550							
Indeno(1,2,3-cd)pyrene	**11400**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	193-39-5	M6
Isophorone	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	78-59-1	
1-Methylnaphthalene	**11200**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	90-12-0	M6
2-Methylnaphthalene	**11600**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	91-57-6	M6
2-Methylphenol(o-Cresol)	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	95-48-7	
3&4-Methylphenol	ND	ug/kg	16200	20	04/25/12 13:15	04/27/12 17:40		
Naphthalene	**16600**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	91-20-3	M6
2-Nitroaniline	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	88-74-4	M6
3-Nitroaniline	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	99-09-2	M6
4-Nitroaniline	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	100-01-6	
Nitrobenzene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	98-95-3	
2-Nitrophenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	88-75-5	
4-Nitrophenol	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	100-02-7	M6
N-Nitrosodimethylamine	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	62-75-9	M6
N-Nitroso-di-n-propylamine	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	621-64-7	M6
N-Nitrosodiphenylamine	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	86-30-6	
Pentachlorophenol	ND	ug/kg	16500	20	04/25/12 13:15	04/27/12 17:40	87-86-5	
Phenanthrene	**33200**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	85-01-8	M6
Phenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	108-95-2	
Pyrene	**63600**	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	129-00-0	M6
1,2,4-Trichlorobenzene	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	120-82-1	
2,4,5-Trichlorophenol	ND	ug/kg	41700	20	04/25/12 13:15	04/27/12 17:40	95-95-4	M6
2,4,6-Trichlorophenol	ND	ug/kg	8100	20	04/25/12 13:15	04/27/12 17:40	88-06-2	
Surrogates								
Nitrobenzene-d5 (S)	0	%	30-141	20	04/25/12 13:15	04/27/12 17:40	4165-60-0	D4,S4
2-Fluorobiphenyl (S)	0	%	30-145	20	04/25/12 13:15	04/27/12 17:40	321-60-8	S4
Terphenyl-d14 (S)	0	%	30-150	20	04/25/12 13:15	04/27/12 17:40	1718-51-0	S4
Phenol-d6 (S)	0	%	30-142	20	04/25/12 13:15	04/27/12 17:40	13127-88-3	S4
2-Fluorophenol (S)	0	%	30-137	20	04/25/12 13:15	04/27/12 17:40	367-12-4	S4
2,4,6-Tribromophenol (S)	0	%	30-150	20	04/25/12 13:15	04/27/12 17:40	118-79-6	S4
8260 MSV 5030 Med Level	Analytical Method: EPA 8260 Preparation Method: EPA 5035/5030B							
Acetone	ND	ug/kg	7670	5	04/24/12 15:27	04/26/12 12:06	67-64-1	
Allyl chloride	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	107-05-1	
Benzene	**388**	ug/kg	123	5	04/24/12 15:27	04/26/12 12:06	71-43-2	
Bromobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	108-86-1	
Bromochloromethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	74-97-5	
Bromodichloromethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	75-27-4	
Bromoform	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	75-25-2	
Bromomethane	ND	ug/kg	3070	5	04/24/12 15:27	04/26/12 12:06	74-83-9	
2-Butanone (MEK)	ND	ug/kg	3070	5	04/24/12 15:27	04/26/12 12:06	78-93-3	
n-Butylbenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	104-51-8	
sec-Butylbenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	135-98-8	
tert-Butylbenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	98-06-6	
Carbon tetrachloride	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	56-23-5	
Chlorobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	108-90-7	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP17-SO1-041212 **Lab ID: 10189069001** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV 5030 Med Level	Analytical Method: EPA 8260 Preparation Method: EPA 5035/5030B							
Chloroethane	ND	ug/kg	3070	5	04/24/12 15:27	04/26/12 12:06	75-00-3	
Chloroform	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	67-66-3	
Chloromethane	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	74-87-3	
2-Chlorotoluene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	95-49-8	
4-Chlorotoluene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	96-12-8	
Dibromochloromethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	106-93-4	
Dibromomethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	74-95-3	
1,2-Dichlorobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	95-50-1	
1,3-Dichlorobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	541-73-1	
1,4-Dichlorobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	106-46-7	
Dichlorodifluoromethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	75-71-8	
1,1-Dichloroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	75-34-3	
1,2-Dichloroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	107-06-2	
1,1-Dichloroethene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	75-35-4	
cis-1,2-Dichloroethene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	156-59-2	
trans-1,2-Dichloroethene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	156-60-5	
Dichlorofluoromethane	ND	ug/kg	3070	5	04/24/12 15:27	04/26/12 12:06	75-43-4	L3
1,2-Dichloropropane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	78-87-5	
1,3-Dichloropropane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	142-28-9	
2,2-Dichloropropane	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	594-20-7	
1,1-Dichloropropene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	563-58-6	
cis-1,3-Dichloropropene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	60-29-7	
Ethylbenzene	**5160**	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/kg	1530	5	04/24/12 15:27	04/26/12 12:06	87-68-3	
Isopropylbenzene (Cumene)	**400**	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	98-82-8	
p-Isopropyltoluene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	99-87-6	
Methylene Chloride	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/kg	3070	5	04/24/12 15:27	04/26/12 12:06	108-10-1	
Methyl-tert-butyl ether	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	1634-04-4	
Naphthalene	**37600**	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	91-20-3	
n-Propylbenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	103-65-1	
Styrene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	630-20-6	
1,1,2,2-Tetrachloroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	79-34-5	
Tetrachloroethene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	127-18-4	
Tetrahydrofuran	ND	ug/kg	12300	5	04/24/12 15:27	04/26/12 12:06	109-99-9	
Toluene	**1100**	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	120-82-1	
1,1,1-Trichloroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	71-55-6	
1,1,2-Trichloroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	79-00-5	
Trichloroethene	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	79-01-6	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP17-SO1-041212 **Lab ID: 10189069001** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Solid

Results reported on a "dry-weight" basis

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 MSV 5030 Med Level	Analytical Method: EPA 8260 Preparation Method: EPA 5035/5030B							
Trichlorofluoromethane	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	75-69-4	
1,2,3-Trichloropropane	ND	ug/kg	1230	5	04/24/12 15:27	04/26/12 12:06	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	76-13-1	
1,2,4-Trimethylbenzene	**2260**	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	95-63-6	
1,3,5-Trimethylbenzene	**1070**	ug/kg	307	5	04/24/12 15:27	04/26/12 12:06	108-67-8	
Vinyl chloride	ND	ug/kg	123	5	04/24/12 15:27	04/26/12 12:06	75-01-4	
Xylene (Total)	**4080**	ug/kg	921	5	04/24/12 15:27	04/26/12 12:06	1330-20-7	
Surrogates								
Dibromofluoromethane (S)	90	%	55-127	5	04/24/12 15:27	04/26/12 12:06	1868-53-7	
1,2-Dichloroethane-d4 (S)	83	%	49-125	5	04/24/12 15:27	04/26/12 12:06	17060-07-0	
Toluene-d8 (S)	92	%	56-131	5	04/24/12 15:27	04/26/12 12:06	2037-26-5	
4-Bromofluorobenzene (S)	104	%	53-128	5	04/24/12 15:27	04/26/12 12:06	460-00-4	
1010 Flashpoint,Closed Cup	Analytical Method: EPA 1010							
Flashpoint	**>210**	deg F		1		05/08/12 15:40		
Reactive Sulfide	Analytical Method: SW-846 7.3.4.2							
Sulfide, Reactive	ND	mg/kg	100	1		04/30/12 12:00		
733C S Reactive Cyanide	Analytical Method: SW-846 7.3.3.2							
Cyanide, Reactive	ND	mg/kg	0.025	1		04/26/12 19:24		
9012 Cyanide, Amenable Soil	Analytical Method: EPA 9012							
Amenable Cyanide	ND	mg/kg	6.1	10		04/27/12 13:44	57-12-5	1M,2M, H1,N2

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP16-WO1-041212 **Lab ID: 10189069002** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6010 MET ICP	Analytical Method: EPA 6010 Preparation Method: EPA 3010							
Arsenic	ND	ug/L	10.0	1	04/25/12 14:26	04/26/12 12:31	7440-38-2	
Barium	**28.9**	ug/L	10.0	1	04/25/12 14:26	04/26/12 12:31	7440-39-3	
Cadmium	ND	ug/L	2.0	1	04/25/12 14:26	04/26/12 12:31	7440-43-9	
Chromium	ND	ug/L	10.0	1	04/25/12 14:26	04/26/12 12:31	7440-47-3	
Copper	**68.0**	ug/L	10.0	1	04/25/12 14:26	04/26/12 12:31	7440-50-8	
Lead	**29.8**	ug/L	3.0	1	04/25/12 14:26	04/26/12 12:31	7439-92-1	
Selenium	ND	ug/L	20.0	1	04/25/12 14:26	04/26/12 12:31	7782-49-2	
Silver	ND	ug/L	10.0	1	04/25/12 14:26	04/26/12 12:31	7440-22-4	
Zinc	**108**	ug/L	20.0	1	04/25/12 14:26	04/26/12 12:31	7440-66-6	
7470 Mercury	Analytical Method: EPA 7470 Preparation Method: EPA 7470							
Mercury	ND	ug/L	0.20	1	04/25/12 00:00	04/25/12 16:48	7439-97-6	
8270 MSSV	Analytical Method: EPA 8270 Preparation Method: EPA 3520							
Phenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	108-95-2	
bis(2-Chloroethyl) ether	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	111-44-4	
2-Chlorophenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	95-57-8	
1,3-Dichlorobenzene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	106-46-7	
1,2-Dichlorobenzene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	95-50-1	
2-Methylphenol(o-Cresol)	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	95-48-7	
bis(2-Chloroisopropyl) ether	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	108-60-1	
3&4-Methylphenol	ND	ug/L	20.2	1	04/25/12 18:34	04/30/12 09:58		
N-Nitroso-di-n-propylamine	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	621-64-7	
Hexachloroethane	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	67-72-1	
Nitrobenzene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	98-95-3	
Isophorone	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	78-59-1	
2-Nitrophenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	88-75-5	
2,4-Dimethylphenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	105-67-9	
bis(2-Chloroethoxy)methane	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	111-91-1	
2,4-Dichlorophenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	120-83-2	
1,2,4-Trichlorobenzene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	120-82-1	
Naphthalene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	91-20-3	
4-Chloroaniline	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	106-47-8	
Hexachloro-1,3-butadiene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	87-68-3	
4-Chloro-3-methylphenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	59-50-7	
2-Methylnaphthalene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	91-57-6	
2,4,6-Trichlorophenol	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	88-06-2	
2,4,5-Trichlorophenol	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	95-95-4	
2-Chloronaphthalene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	91-58-7	
2-Nitroaniline	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	88-74-4	
Dimethylphthalate	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	131-11-3	
Acenaphthylene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	208-96-8	
2,6-Dinitrotoluene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	606-20-2	
3-Nitroaniline	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	99-09-2	
Acenaphthene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	83-32-9	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP16-WO1-041212 **Lab ID: 10189069002** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8270 MSSV	Analytical Method: EPA 8270 Preparation Method: EPA 3520							
2,4-Dinitrophenol	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	51-28-5	
4-Nitrophenol	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	100-02-7	
Dibenzofuran	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	132-64-9	
2,4-Dinitrotoluene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	121-14-2	
Diethylphthalate	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	84-66-2	
4-Chlorophenylphenyl ether	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	7005-72-3	
Fluorene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	86-73-7	
4-Nitroaniline	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	100-01-6	
4,6-Dinitro-2-methylphenol	ND	ug/L	50.5	1	04/25/12 18:34	04/30/12 09:58	534-52-1	
N-Nitrosodiphenylamine	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	86-30-6	
4-Bromophenylphenyl ether	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	101-55-3	
Hexachlorobenzene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	118-74-1	
Pentachlorophenol	ND	ug/L	23.2	1	04/25/12 18:34	04/30/12 09:58	87-86-5	
Phenanthrene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	85-01-8	
Anthracene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	120-12-7	
Di-n-butylphthalate	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	84-74-2	
Fluoranthene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	206-44-0	
Pyrene	**20.8**	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	129-00-0	
Butylbenzylphthalate	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	85-68-7	
3,3'-Dichlorobenzidine	ND	ug/L	20.2	1	04/25/12 18:34	04/30/12 09:58	91-94-1	
Benzo(a)anthracene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	56-55-3	
Chrysene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	218-01-9	
bis(2-Ethylhexyl)phthalate	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	117-81-7	
Di-n-octylphthalate	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	117-84-0	
Benzo(b)fluoranthene	**12.0**	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	205-99-2	
Benzo(k)fluoranthene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	207-08-9	
Benzo(a)pyrene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	50-32-8	
Indeno(1,2,3-cd)pyrene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	193-39-5	
Dibenz(a,h)anthracene	ND	ug/L	20.2	1	04/25/12 18:34	04/30/12 09:58	53-70-3	
Benzo(g,h,i)perylene	**11.1**	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	191-24-2	
N-Nitrosodimethylamine	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	62-75-9	
1,2-Diphenylhydrazine	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	122-66-7	
Carbazole	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	86-74-8	
1-Methylnaphthalene	ND	ug/L	10.1	1	04/25/12 18:34	04/30/12 09:58	90-12-0	
Surrogates								
Nitrobenzene-d5 (S)	66	%	50-125	1	04/25/12 18:34	04/30/12 09:58	4165-60-0	H2
2-Fluorobiphenyl (S)	80	%	53-125	1	04/25/12 18:34	04/30/12 09:58	321-60-8	
Terphenyl-d14 (S)	76	%	56-125	1	04/25/12 18:34	04/30/12 09:58	1718-51-0	
Phenol-d6 (S)	69	%	30-125	1	04/25/12 18:34	04/30/12 09:58	13127-88-3	
2-Fluorophenol (S)	56	%	30-125	1	04/25/12 18:34	04/30/12 09:58	367-12-4	
2,4,6-Tribromophenol (S)	80	%	30-131	1	04/25/12 18:34	04/30/12 09:58	118-79-6	
8260 VOC	Analytical Method: EPA 8260							
Acetone	ND	ug/L	25.0	1		04/25/12 01:07	67-64-1	
Allyl chloride	ND	ug/L	4.0	1		04/25/12 01:07	107-05-1	
Benzene	ND	ug/L	1.0	1		04/25/12 01:07	71-43-2	
Bromobenzene	ND	ug/L	1.0	1		04/25/12 01:07	108-86-1	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP16-WO1-041212 **Lab ID: 10189069002** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 VOC	Analytical Method: EPA 8260							
Bromochloromethane	ND	ug/L	1.0	1		04/25/12 01:07	74-97-5	
Bromodichloromethane	ND	ug/L	1.0	1		04/25/12 01:07	75-27-4	
Bromoform	ND	ug/L	4.0	1		04/25/12 01:07	75-25-2	
Bromomethane	ND	ug/L	4.0	1		04/25/12 01:07	74-83-9	
2-Butanone (MEK)	ND	ug/L	4.0	1		04/25/12 01:07	78-93-3	
n-Butylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	104-51-8	
sec-Butylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	135-98-8	
tert-Butylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	98-06-6	
Carbon tetrachloride	ND	ug/L	1.0	1		04/25/12 01:07	56-23-5	
Chlorobenzene	ND	ug/L	1.0	1		04/25/12 01:07	108-90-7	
Chloroethane	ND	ug/L	1.0	1		04/25/12 01:07	75-00-3	
Chloroform	ND	ug/L	1.0	1		04/25/12 01:07	67-66-3	
Chloromethane	ND	ug/L	4.0	1		04/25/12 01:07	74-87-3	
2-Chlorotoluene	ND	ug/L	1.0	1		04/25/12 01:07	95-49-8	
4-Chlorotoluene	ND	ug/L	1.0	1		04/25/12 01:07	106-43-4	
1,2-Dibromo-3-chloropropane	ND	ug/L	4.0	1		04/25/12 01:07	96-12-8	
Dibromochloromethane	ND	ug/L	1.0	1		04/25/12 01:07	124-48-1	
1,2-Dibromoethane (EDB)	ND	ug/L	1.0	1		04/25/12 01:07	106-93-4	
Dibromomethane	ND	ug/L	4.0	1		04/25/12 01:07	74-95-3	
1,2-Dichlorobenzene	ND	ug/L	1.0	1		04/25/12 01:07	95-50-1	
1,3-Dichlorobenzene	ND	ug/L	1.0	1		04/25/12 01:07	541-73-1	
1,4-Dichlorobenzene	ND	ug/L	1.0	1		04/25/12 01:07	106-46-7	
Dichlorodifluoromethane	ND	ug/L	1.0	1		04/25/12 01:07	75-71-8	
1,1-Dichloroethane	ND	ug/L	1.0	1		04/25/12 01:07	75-34-3	
1,2-Dichloroethane	ND	ug/L	1.0	1		04/25/12 01:07	107-06-2	
1,1-Dichloroethene	ND	ug/L	1.0	1		04/25/12 01:07	75-35-4	
cis-1,2-Dichloroethene	ND	ug/L	1.0	1		04/25/12 01:07	156-59-2	
trans-1,2-Dichloroethene	ND	ug/L	1.0	1		04/25/12 01:07	156-60-5	
Dichlorofluoromethane	ND	ug/L	1.0	1		04/25/12 01:07	75-43-4	
1,2-Dichloropropane	ND	ug/L	4.0	1		04/25/12 01:07	78-87-5	
1,3-Dichloropropane	ND	ug/L	1.0	1		04/25/12 01:07	142-28-9	
2,2-Dichloropropane	ND	ug/L	4.0	1		04/25/12 01:07	594-20-7	
1,1-Dichloropropene	ND	ug/L	1.0	1		04/25/12 01:07	563-58-6	
cis-1,3-Dichloropropene	ND	ug/L	4.0	1		04/25/12 01:07	10061-01-5	
trans-1,3-Dichloropropene	ND	ug/L	4.0	1		04/25/12 01:07	10061-02-6	
Diethyl ether (Ethyl ether)	ND	ug/L	4.0	1		04/25/12 01:07	60-29-7	
Ethylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	100-41-4	
Hexachloro-1,3-butadiene	ND	ug/L	5.0	1		04/25/12 01:07	87-68-3	
Isopropylbenzene (Cumene)	ND	ug/L	1.0	1		04/25/12 01:07	98-82-8	
p-Isopropyltoluene	ND	ug/L	1.0	1		04/25/12 01:07	99-87-6	
Methylene Chloride	ND	ug/L	4.0	1		04/25/12 01:07	75-09-2	
4-Methyl-2-pentanone (MIBK)	ND	ug/L	4.0	1		04/25/12 01:07	108-10-1	
Methyl-tert-butyl ether	ND	ug/L	1.0	1		04/25/12 01:07	1634-04-4	
Naphthalene	ND	ug/L	4.0	1		04/25/12 01:07	91-20-3	
n-Propylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	103-65-1	
Styrene	ND	ug/L	1.0	1		04/25/12 01:07	100-42-5	
1,1,1,2-Tetrachloroethane	ND	ug/L	1.0	1		04/25/12 01:07	630-20-6	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

ANALYTICAL RESULTS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Sample: IWMGP-TP16-WO1-041212 **Lab ID: 10189069002** Collected: 04/12/12 11:00 Received: 04/17/12 09:11 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
8260 VOC	Analytical Method: EPA 8260							
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0	1		04/25/12 01:07	79-34-5	
Tetrachloroethene	ND	ug/L	1.0	1		04/25/12 01:07	127-18-4	
Tetrahydrofuran	ND	ug/L	10.0	1		04/25/12 01:07	109-99-9	
Toluene	ND	ug/L	1.0	1		04/25/12 01:07	108-88-3	
1,2,3-Trichlorobenzene	ND	ug/L	1.0	1		04/25/12 01:07	87-61-6	
1,2,4-Trichlorobenzene	ND	ug/L	1.0	1		04/25/12 01:07	120-82-1	
1,1,1-Trichloroethane	ND	ug/L	1.0	1		04/25/12 01:07	71-55-6	
1,1,2-Trichloroethane	ND	ug/L	1.0	1		04/25/12 01:07	79-00-5	
Trichloroethene	ND	ug/L	1.0	1		04/25/12 01:07	79-01-6	
Trichlorofluoromethane	ND	ug/L	1.0	1		04/25/12 01:07	75-69-4	
1,2,3-Trichloropropane	ND	ug/L	4.0	1		04/25/12 01:07	96-18-4	
1,1,2-Trichlorotrifluoroethane	ND	ug/L	1.0	1		04/25/12 01:07	76-13-1	
1,2,4-Trimethylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	95-63-6	
1,3,5-Trimethylbenzene	ND	ug/L	1.0	1		04/25/12 01:07	108-67-8	
Vinyl chloride	ND	ug/L	0.40	1		04/25/12 01:07	75-01-4	
Xylene (Total)	ND	ug/L	3.0	1		04/25/12 01:07	1330-20-7	
m&p-Xylene	ND	ug/L	2.0	1		04/25/12 01:07	179601-23-1	
o-Xylene	ND	ug/L	1.0	1		04/25/12 01:07	95-47-6	
Surrogates								
Dibromofluoromethane (S)	104	%	75-125	1		04/25/12 01:07	1868-53-7	
1,2-Dichloroethane-d4 (S)	103	%	75-125	1		04/25/12 01:07	17060-07-0	
Toluene-d8 (S)	92	%	75-125	1		04/25/12 01:07	2037-26-5	
4-Bromofluorobenzene (S)	94	%	75-125	1		04/25/12 01:07	460-00-4	
1010 Flashpoint,Closed Cup	Analytical Method: EPA 1010							
Flashpoint	**>210**	deg F		1		05/08/12 16:21		
1664 HEM, Oil and Grease	Analytical Method: EPA 1664 OG							
Oil and Grease	ND	mg/L	5.1	1		04/24/12 15:30		
4500S2F Sulfide, Iodometric	Analytical Method: SM 4500-S F (2000)							
Sulfide	ND	mg/L	5.0	1		04/19/12 09:18		
350.1 Ammonia	Analytical Method: EPA 350.1							
Nitrogen, Ammonia	**0.36**	mg/L	0.20	5		04/27/12 09:44	7664-41-7	
SM4500P-E, Total Phosphorus	Analytical Method: SM 4500-P E							
Phosphorus	**0.11**	mg/L	0.10	1		04/26/12 08:49	7723-14-0	M1

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: MERP/6735 | Analysis Method: EPA 7470
QC Batch Method: EPA 7470 | Analysis Description: 7470 Mercury
Associated Lab Samples: 10189069002

METHOD BLANK: 1181756 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ug/L	ND	0.20	04/25/12 16:44	

LABORATORY CONTROL SAMPLE: 1181757

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ug/L	5	4.9	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1181758 1181759

Parameter	Units	10189069002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ug/L	ND	5	5	4.6	4.6	90	90	80-120	.4	20	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: MPRP/32024 | Analysis Method: EPA 6010
QC Batch Method: EPA 3010 | Analysis Description: 6010 MET
Associated Lab Samples: 10189069002

METHOD BLANK: 1182186 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	ug/L	ND	10.0	04/26/12 12:23	
Barium	ug/L	ND	10.0	04/26/12 12:23	
Cadmium	ug/L	ND	2.0	04/26/12 12:23	
Chromium	ug/L	ND	10.0	04/26/12 12:23	
Copper	ug/L	ND	10.0	04/26/12 12:23	
Lead	ug/L	ND	3.0	04/26/12 12:23	
Selenium	ug/L	ND	20.0	04/26/12 12:23	
Silver	ug/L	ND	10.0	04/26/12 12:23	
Zinc	ug/L	ND	20.0	04/26/12 12:23	

LABORATORY CONTROL SAMPLE: 1182187

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	ug/L	1000	919	92	80-120	
Barium	ug/L	1000	925	93	80-120	
Cadmium	ug/L	1000	901	90	80-120	
Chromium	ug/L	1000	926	93	80-120	
Copper	ug/L	1000	908	91	80-120	
Lead	ug/L	1000	937	94	80-120	
Selenium	ug/L	1000	946	95	80-120	
Silver	ug/L	500	478	96	80-120	
Zinc	ug/L	1000	890	89	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1182188 1182189

Parameter	Units	10189069002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	ug/L	ND	1000	1000	961	968	96	97	80-120	.7	30	
Barium	ug/L	28.9	1000	1000	987	1010	96	98	80-120	2	30	
Cadmium	ug/L	ND	1000	1000	927	943	93	94	80-120	2	30	
Chromium	ug/L	ND	1000	1000	966	987	96	98	80-120	2	30	
Copper	ug/L	68.0	1000	1000	1030	1050	96	98	80-120	2	30	
Lead	ug/L	29.8	1000	1000	979	988	95	96	80-120	.9	30	
Selenium	ug/L	ND	1000	1000	969	979	97	98	80-120	1	30	
Silver	ug/L	ND	500	500	500	511	100	102	80-120	2	30	
Zinc	ug/L	108	1000	1000	992	999	88	89	80-120	.7	30	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: MPRP/31990
QC Batch Method: % Moisture
Analysis Method: % Moisture
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10189069001

SAMPLE DUPLICATE: 1180923

Parameter	Units	10189069001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	18.6	15.1	21	30	

SAMPLE DUPLICATE: 1180924

Parameter	Units	10189701005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	3.0	3.0	2	30	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: MSV/19984 | Analysis Method: EPA 8260
QC Batch Method: EPA 5035/5030B | Analysis Description: 8260 MSV 5030 Med Level
Associated Lab Samples: 10189069001

METHOD BLANK: 1181152 | Matrix: Solid
Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,1,1-Trichloroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,1,2,2-Tetrachloroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,1,2-Trichloroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,1-Dichloroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,1-Dichloroethene	ug/kg	ND	50.0	04/25/12 11:51	
1,1-Dichloropropene	ug/kg	ND	50.0	04/25/12 11:51	
1,2,3-Trichlorobenzene	ug/kg	ND	50.0	04/25/12 11:51	
1,2,3-Trichloropropane	ug/kg	ND	200	04/25/12 11:51	
1,2,4-Trichlorobenzene	ug/kg	ND	50.0	04/25/12 11:51	
1,2,4-Trimethylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
1,2-Dibromo-3-chloropropane	ug/kg	ND	200	04/25/12 11:51	
1,2-Dibromoethane (EDB)	ug/kg	ND	50.0	04/25/12 11:51	
1,2-Dichlorobenzene	ug/kg	ND	50.0	04/25/12 11:51	
1,2-Dichloroethane	ug/kg	ND	50.0	04/25/12 11:51	
1,2-Dichloropropane	ug/kg	ND	50.0	04/25/12 11:51	
1,3,5-Trimethylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
1,3-Dichlorobenzene	ug/kg	ND	50.0	04/25/12 11:51	
1,3-Dichloropropane	ug/kg	ND	50.0	04/25/12 11:51	
1,4-Dichlorobenzene	ug/kg	ND	50.0	04/25/12 11:51	
2,2-Dichloropropane	ug/kg	ND	200	04/25/12 11:51	
2-Butanone (MEK)	ug/kg	ND	500	04/25/12 11:51	
2-Chlorotoluene	ug/kg	ND	50.0	04/25/12 11:51	
4-Chlorotoluene	ug/kg	ND	50.0	04/25/12 11:51	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	500	04/25/12 11:51	
Acetone	ug/kg	ND	1250	04/25/12 11:51	
Allyl chloride	ug/kg	ND	200	04/25/12 11:51	
Benzene	ug/kg	ND	20.0	04/25/12 11:51	
Bromobenzene	ug/kg	ND	50.0	04/25/12 11:51	
Bromochloromethane	ug/kg	ND	50.0	04/25/12 11:51	
Bromodichloromethane	ug/kg	ND	50.0	04/25/12 11:51	
Bromoform	ug/kg	ND	200	04/25/12 11:51	
Bromomethane	ug/kg	ND	500	04/25/12 11:51	
Carbon tetrachloride	ug/kg	ND	50.0	04/25/12 11:51	
Chlorobenzene	ug/kg	ND	50.0	04/25/12 11:51	
Chloroethane	ug/kg	ND	500	04/25/12 11:51	
Chloroform	ug/kg	ND	50.0	04/25/12 11:51	
Chloromethane	ug/kg	ND	200	04/25/12 11:51	
cis-1,2-Dichloroethene	ug/kg	ND	50.0	04/25/12 11:51	
cis-1,3-Dichloropropene	ug/kg	ND	50.0	04/25/12 11:51	
Dibromochloromethane	ug/kg	ND	50.0	04/25/12 11:51	
Dibromomethane	ug/kg	ND	50.0	04/25/12 11:51	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

METHOD BLANK: 1181152 Matrix: Solid

Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dichlorodifluoromethane	ug/kg	ND	50.0	04/25/12 11:51	
Dichlorofluoromethane	ug/kg	ND	500	04/25/12 11:51	
Diethyl ether (Ethyl ether)	ug/kg	ND	200	04/25/12 11:51	
Ethylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
Hexachloro-1,3-butadiene	ug/kg	ND	250	04/25/12 11:51	
Isopropylbenzene (Cumene)	ug/kg	ND	50.0	04/25/12 11:51	
Methyl-tert-butyl ether	ug/kg	ND	50.0	04/25/12 11:51	
Methylene Chloride	ug/kg	ND	200	04/25/12 11:51	
n-Butylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
n-Propylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
Naphthalene	ug/kg	ND	200	04/25/12 11:51	
p-Isopropyltoluene	ug/kg	ND	50.0	04/25/12 11:51	
sec-Butylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
Styrene	ug/kg	ND	50.0	04/25/12 11:51	
tert-Butylbenzene	ug/kg	ND	50.0	04/25/12 11:51	
Tetrachloroethene	ug/kg	ND	50.0	04/25/12 11:51	
Tetrahydrofuran	ug/kg	ND	2000	04/25/12 11:51	
Toluene	ug/kg	ND	50.0	04/25/12 11:51	
trans-1,2-Dichloroethene	ug/kg	ND	50.0	04/25/12 11:51	
trans-1,3-Dichloropropene	ug/kg	ND	50.0	04/25/12 11:51	
Trichloroethene	ug/kg	ND	50.0	04/25/12 11:51	
Trichlorofluoromethane	ug/kg	ND	200	04/25/12 11:51	
Vinyl chloride	ug/kg	ND	20.0	04/25/12 11:51	
Xylene (Total)	ug/kg	ND	150	04/25/12 11:51	
1,2-Dichloroethane-d4 (S)	%	89	49-125	04/25/12 11:51	
4-Bromofluorobenzene (S)	%	96	53-128	04/25/12 11:51	
Dibromofluoromethane (S)	%	95	55-127	04/25/12 11:51	
Toluene-d8 (S)	%	97	56-131	04/25/12 11:51	

LABORATORY CONTROL SAMPLE & LCSD: 1181153 1181154

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	1000	875	953	87	95	72-125	9	20	
1,1,1-Trichloroethane	ug/kg	1000	878	942	88	94	68-134	7	20	
1,1,2,2-Tetrachloroethane	ug/kg	1000	920	965	92	96	74-125	5	20	
1,1,2-Trichloroethane	ug/kg	1000	813	915	81	92	75-125	12	20	
1,1,2-Trichlorotrifluoroethane	ug/kg	1000	994	1030	99	103	64-133	3	20	
1,1-Dichloroethane	ug/kg	1000	849	940	85	94	74-125	10	20	
1,1-Dichloroethene	ug/kg	1000	862	931	86	93	64-133	8	20	
1,1-Dichloropropene	ug/kg	1000	876	917	88	92	70-134	5	20	
1,2,3-Trichlorobenzene	ug/kg	1000	950	999	95	100	70-125	5	20	
1,2,3-Trichloropropane	ug/kg	1000	959	990	96	99	71-125	3	20	
1,2,4-Trichlorobenzene	ug/kg	1000	948	973	95	97	69-125	3	20	
1,2,4-Trimethylbenzene	ug/kg	1000	927	974	93	97	75-129	5	20	
1,2-Dibromo-3-chloropropane	ug/kg	1000	993	966	99	97	62-127	3	20	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE & LCSD: 1181153 1181154

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,2-Dibromoethane (EDB)	ug/kg	1000	820	911	82	91	73-125	11	20	
1,2-Dichlorobenzene	ug/kg	1000	915	962	92	96	75-125	5	20	
1,2-Dichloroethane	ug/kg	1000	797	906	80	91	70-131	13	20	
1,2-Dichloropropane	ug/kg	1000	818	911	82	91	75-125	11	20	
1,3,5-Trimethylbenzene	ug/kg	1000	919	975	92	98	74-130	6	20	
1,3-Dichlorobenzene	ug/kg	1000	932	971	93	97	75-125	4	20	
1,3-Dichloropropane	ug/kg	1000	808	912	81	91	75-125	12	20	
1,4-Dichlorobenzene	ug/kg	1000	921	964	92	96	75-125	5	20	
2,2-Dichloropropane	ug/kg	1000	901	979	90	98	46-144	8	20	
2-Butanone (MEK)	ug/kg	1000	653	798	65	80	41-150	20	20	
2-Chlorotoluene	ug/kg	1000	925	962	92	96	75-127	4	20	
4-Chlorotoluene	ug/kg	1000	950	954	95	95	75-127	.5	20	
4-Methyl-2-pentanone (MIBK)	ug/kg	1000	789	900	79	90	67-127	13	20	
Acetone	ug/kg	2500	2040	2190	81	88	30-150	8	20	
Allyl chloride	ug/kg	1000	897	978	90	98	68-139	9	20	
Benzene	ug/kg	1000	828	916	83	92	74-126	10	20	
Bromobenzene	ug/kg	1000	900	964	90	96	75-125	7	20	
Bromochloromethane	ug/kg	1000	808	921	81	92	75-128	13	20	
Bromodichloromethane	ug/kg	1000	818	915	82	92	69-130	11	20	
Bromoform	ug/kg	1000	898	974	90	97	64-124	8	20	
Bromomethane	ug/kg	1000	932	1010	93	101	54-139	8	20	
Carbon tetrachloride	ug/kg	1000	900	944	90	94	64-139	5	20	
Chlorobenzene	ug/kg	1000	852	925	85	92	75-125	8	20	
Chloroethane	ug/kg	1000	828	857	83	86	45-146	3	20	
Chloroform	ug/kg	1000	833	923	83	92	73-129	10	20	
Chloromethane	ug/kg	1000	772	844	77	84	55-125	9	20	
cis-1,2-Dichloroethene	ug/kg	1000	844	940	84	94	75-126	11	20	
cis-1,3-Dichloropropene	ug/kg	1000	809	899	81	90	70-130	11	20	
Dibromochloromethane	ug/kg	1000	850	945	85	94	69-125	11	20	
Dibromomethane	ug/kg	1000	832	931	83	93	73-125	11	20	
Dichlorodifluoromethane	ug/kg	1000	806	839	81	84	30-137	4	20	
Dichlorofluoromethane	ug/kg	1000	1760	1380	176	138	30-150	24	20	CH,D6,L0
Diethyl ether (Ethyl ether)	ug/kg	1000	778	913	78	91	68-131	16	20	
Ethylbenzene	ug/kg	1000	852	928	85	93	74-127	9	20	
Hexachloro-1,3-butadiene	ug/kg	500	579	560	116	112	59-130	3	20	
Isopropylbenzene (Cumene)	ug/kg	1000	914	973	91	97	72-131	6	20	
Methyl-tert-butyl ether	ug/kg	1000	775	884	77	88	65-132	13	20	
Methylene Chloride	ug/kg	1000	810	895	81	89	30-150	10	20	
n-Butylbenzene	ug/kg	1000	988	1010	99	101	66-134	3	20	
n-Propylbenzene	ug/kg	1000	939	976	94	98	74-131	4	20	
Naphthalene	ug/kg	1000	970	991	97	99	66-130	2	20	
p-Isopropyltoluene	ug/kg	1000	979	983	98	98	65-134	.4	20	
sec-Butylbenzene	ug/kg	1000	991	981	99	98	69-133	1	20	
Styrene	ug/kg	1000	886	965	89	97	75-125	9	20	
tert-Butylbenzene	ug/kg	1000	955	969	95	97	72-129	1	20	
Tetrachloroethene	ug/kg	1000	890	965	89	97	68-131	8	20	
Tetrahydrofuran	ug/kg	10000	7360	8540	74	85	67-131	15	20	
Toluene	ug/kg	1000	848	910	85	91	75-125	7	20	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE & LCSD: 1181153 1181154

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
trans-1,2-Dichloroethene	ug/kg	1000	873	946	87	95	74-129	8	20	
trans-1,3-Dichloropropene	ug/kg	1000	838	935	84	94	72-128	11	20	
Trichloroethene	ug/kg	1000	877	958	88	96	72-125	9	20	
Trichlorofluoromethane	ug/kg	1000	895	957	89	96	41-150	7	20	
Vinyl chloride	ug/kg	1000	851	892	85	89	54-128	5	20	
Xylene (Total)	ug/kg	3000	2620	2850	87	95	75-125	8	20	
1,2-Dichloroethane-d4 (S)	%				79	91	49-125			
4-Bromofluorobenzene (S)	%				89	94	53-128			
Dibromofluoromethane (S)	%				83	95	55-127			
Toluene-d8 (S)	%				85	94	56-131			

MATRIX SPIKE SAMPLE: 1181155

Parameter	Units	10189444005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	1590	1260	79	66-135	
1,1,1-Trichloroethane	ug/kg	ND	1590	1220	77	65-150	
1,1,2,2-Tetrachloroethane	ug/kg	ND	1590	1350	85	61-140	
1,1,2-Trichloroethane	ug/kg	ND	1590	1210	76	69-132	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	1590	1320	83	50-150	
1,1-Dichloroethane	ug/kg	ND	1590	1220	77	64-143	
1,1-Dichloroethene	ug/kg	ND	1590	1170	74	59-150	
1,1-Dichloropropene	ug/kg	ND	1590	1180	74	63-150	
1,2,3-Trichlorobenzene	ug/kg	ND	1590	1290	81	67-137	
1,2,3-Trichloropropane	ug/kg	ND	1590	1340	85	64-135	
1,2,4-Trichlorobenzene	ug/kg	ND	1590	1290	81	68-134	
1,2,4-Trimethylbenzene	ug/kg	ND	1590	1290	81	68-134	
1,2-Dibromo-3-chloropropane	ug/kg	ND	1590	1400	88	62-133	
1,2-Dibromoethane (EDB)	ug/kg	ND	1590	1220	76	65-136	
1,2-Dichlorobenzene	ug/kg	ND	1590	1290	81	66-138	
1,2-Dichloroethane	ug/kg	ND	1590	1150	72	59-141	
1,2-Dichloropropane	ug/kg	ND	1590	1170	74	64-141	
1,3,5-Trimethylbenzene	ug/kg	ND	1590	1280	80	65-147	
1,3-Dichlorobenzene	ug/kg	ND	1590	1300	82	67-138	
1,3-Dichloropropane	ug/kg	ND	1590	1180	74	64-138	
1,4-Dichlorobenzene	ug/kg	ND	1590	1270	80	66-136	
2,2-Dichloropropane	ug/kg	ND	1590	1240	78	39-150	
2-Butanone (MEK)	ug/kg	ND	1590	980	62	39-150	
2-Chlorotoluene	ug/kg	ND	1590	1270	80	70-141	
4-Chlorotoluene	ug/kg	ND	1590	1270	80	70-139	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	1590	1230	77	63-139	
Acetone	ug/kg	ND	3980	2720	68	30-150	
Allyl chloride	ug/kg	ND	1590	1240	78	60-150	
Benzene	ug/kg	ND	1590	1180	74	62-144	
Bromobenzene	ug/kg	ND	1590	1260	79	67-140	
Bromochloromethane	ug/kg	ND	1590	1160	73	69-139	
Bromodichloromethane	ug/kg	ND	1590	1160	73	64-138	
Bromoform	ug/kg	ND	1590	1300	82	60-134	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

MATRIX SPIKE SAMPLE: 1181155

Parameter	Units	10189444005 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Bromomethane	ug/kg	ND	1590	1250	71	52-150	
Carbon tetrachloride	ug/kg	ND	1590	1210	76	67-150	
Chlorobenzene	ug/kg	ND	1590	1200	76	65-139	
Chloroethane	ug/kg	ND	1590	1100	69	35-150	
Chloroform	ug/kg	ND	1590	1190	75	61-143	
Chloromethane	ug/kg	ND	1590	1010	63	44-136	
cis-1,2-Dichloroethene	ug/kg	ND	1590	1230	78	68-140	
cis-1,3-Dichloropropene	ug/kg	ND	1590	1150	72	60-143	
Dibromochloromethane	ug/kg	ND	1590	1230	77	64-134	
Dibromomethane	ug/kg	ND	1590	1200	75	65-135	
Dichlorodifluoromethane	ug/kg	ND	1590	933	59	30-150	
Dichlorofluoromethane	ug/kg	ND	1590	2320	146	30-150	CH
Diethyl ether (Ethyl ether)	ug/kg	ND	1590	1180	74	58-146	
Ethylbenzene	ug/kg	ND	1590	1210	76	65-146	
Hexachloro-1,3-butadiene	ug/kg	ND	795	743	93	60-150	
Isopropylbenzene (Cumene)	ug/kg	ND	1590	1270	80	73-143	
Methyl-tert-butyl ether	ug/kg	ND	1590	1180	74	57-145	
Methylene Chloride	ug/kg	ND	1590	1130	71	30-150	
n-Butylbenzene	ug/kg	ND	1590	1310	83	65-150	
n-Propylbenzene	ug/kg	ND	1590	1260	79	69-147	
Naphthalene	ug/kg	ND	1590	1370	86	60-142	
p-Isopropyltoluene	ug/kg	ND	1590	1310	82	65-149	
sec-Butylbenzene	ug/kg	ND	1590	1320	83	72-144	
Styrene	ug/kg	ND	1590	1240	78	69-138	
tert-Butylbenzene	ug/kg	ND	1590	1280	81	68-144	
Tetrachloroethene	ug/kg	ND	1590	1240	78	66-147	
Tetrahydrofuran	ug/kg	ND	15900	11100	70	59-142	
Toluene	ug/kg	ND	1590	1210	76	59-145	
trans-1,2-Dichloroethene	ug/kg	ND	1590	1210	76	63-148	
trans-1,3-Dichloropropene	ug/kg	ND	1590	1210	76	59-144	
Trichloroethene	ug/kg	ND	1590	1220	77	69-141	
Trichlorofluoromethane	ug/kg	ND	1590	1110	70	44-150	
Vinyl chloride	ug/kg	ND	1590	1080	68	51-144	
Xylene (Total)	ug/kg	ND	4760	3680	77	57-143	
1,2-Dichloroethane-d4 (S)	%				69	49-125	
4-Bromofluorobenzene (S)	%				75	53-128	
Dibromofluoromethane (S)	%				72	55-127	
Toluene-d8 (S)	%				72	56-131	

SAMPLE DUPLICATE: 1181156

Parameter	Units	10189444006 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/kg	ND	ND		30	
1,1,1-Trichloroethane	ug/kg	ND	ND		30	
1,1,2,2-Tetrachloroethane	ug/kg	ND	ND		30	
1,1,2-Trichloroethane	ug/kg	ND	ND		30	
1,1,2-Trichlorotrifluoroethane	ug/kg	ND	ND		30	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

SAMPLE DUPLICATE: 1181156

Parameter	Units	10189444006 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1-Dichloroethane	ug/kg	ND	ND		30	
1,1-Dichloroethene	ug/kg	ND	ND		30	
1,1-Dichloropropene	ug/kg	ND	ND		30	
1,2,3-Trichlorobenzene	ug/kg	ND	ND		30	
1,2,3-Trichloropropane	ug/kg	ND	ND		30	
1,2,4-Trichlorobenzene	ug/kg	ND	ND		30	
1,2,4-Trimethylbenzene	ug/kg	ND	ND		30	
1,2-Dibromo-3-chloropropane	ug/kg	ND	ND		30	
1,2-Dibromoethane (EDB)	ug/kg	ND	ND		30	
1,2-Dichlorobenzene	ug/kg	ND	ND		30	
1,2-Dichloroethane	ug/kg	ND	ND		30	
1,2-Dichloropropane	ug/kg	ND	ND		30	
1,3,5-Trimethylbenzene	ug/kg	ND	ND		30	
1,3-Dichlorobenzene	ug/kg	ND	ND		30	
1,3-Dichloropropane	ug/kg	ND	ND		30	
1,4-Dichlorobenzene	ug/kg	ND	ND		30	
2,2-Dichloropropane	ug/kg	ND	ND		30	
2-Butanone (MEK)	ug/kg	ND	ND		30	
2-Chlorotoluene	ug/kg	ND	ND		30	
4-Chlorotoluene	ug/kg	ND	ND		30	
4-Methyl-2-pentanone (MIBK)	ug/kg	ND	ND		30	
Acetone	ug/kg	ND	ND		30	
Allyl chloride	ug/kg	ND	ND		30	
Benzene	ug/kg	ND	ND		30	
Bromobenzene	ug/kg	ND	ND		30	
Bromochloromethane	ug/kg	ND	ND		30	
Bromodichloromethane	ug/kg	ND	ND		30	
Bromoform	ug/kg	ND	ND		30	
Bromomethane	ug/kg	ND	ND		30	
Carbon tetrachloride	ug/kg	ND	ND		30	
Chlorobenzene	ug/kg	ND	ND		30	
Chloroethane	ug/kg	ND	ND		30	
Chloroform	ug/kg	ND	ND		30	
Chloromethane	ug/kg	ND	ND		30	
cis-1,2-Dichloroethene	ug/kg	ND	ND		30	
cis-1,3-Dichloropropene	ug/kg	ND	ND		30	
Dibromochloromethane	ug/kg	ND	ND		30	
Dibromomethane	ug/kg	ND	ND		30	
Dichlorodifluoromethane	ug/kg	ND	ND		30	
Dichlorofluoromethane	ug/kg	ND	ND		30	
Diethyl ether (Ethyl ether)	ug/kg	ND	ND		30	
Ethylbenzene	ug/kg	ND	ND		30	
Hexachloro-1,3-butadiene	ug/kg	ND	ND		30	
Isopropylbenzene (Cumene)	ug/kg	ND	ND		30	
Methyl-tert-butyl ether	ug/kg	ND	ND		30	
Methylene Chloride	ug/kg	ND	ND		30	
n-Butylbenzene	ug/kg	ND	ND		30	
n-Propylbenzene	ug/kg	ND	ND		30	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

SAMPLE DUPLICATE: 1181156

Parameter	Units	10189444006 Result	Dup Result	RPD	Max RPD	Qualifiers
Naphthalene	ug/kg	ND	ND		30	
p-Isopropyltoluene	ug/kg	ND	ND		30	
sec-Butylbenzene	ug/kg	ND	ND		30	
Styrene	ug/kg	ND	ND		30	
tert-Butylbenzene	ug/kg	ND	ND		30	
Tetrachloroethene	ug/kg	ND	ND		30	
Tetrahydrofuran	ug/kg	ND	ND		30	
Toluene	ug/kg	ND	ND		30	
trans-1,2-Dichloroethene	ug/kg	ND	ND		30	
trans-1,3-Dichloropropene	ug/kg	ND	ND		30	
Trichloroethene	ug/kg	ND	ND		30	
Trichlorofluoromethane	ug/kg	ND	ND		30	
Vinyl chloride	ug/kg	ND	ND		30	
Xylene (Total)	ug/kg	ND	ND		30	
1,2-Dichloroethane-d4 (S)	%	92	125	27		
4-Bromofluorobenzene (S)	%	97	131	28		S3
Dibromofluoromethane (S)	%	99	134	27		S3
Toluene-d8 (S)	%	99	136	29		S3

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: MSV/19979 | Analysis Method: EPA 8260
QC Batch Method: EPA 8260 | Analysis Description: 8260 MSV 465 W
Associated Lab Samples: 10189069002

METHOD BLANK: 1180887 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	1.0	04/24/12 20:27	
1,1,1-Trichloroethane	ug/L	ND	1.0	04/24/12 20:27	
1,1,2,2-Tetrachloroethane	ug/L	ND	1.0	04/24/12 20:27	
1,1,2-Trichloroethane	ug/L	ND	1.0	04/24/12 20:27	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	1.0	04/24/12 20:27	
1,1-Dichloroethane	ug/L	ND	1.0	04/24/12 20:27	
1,1-Dichloroethene	ug/L	ND	1.0	04/24/12 20:27	
1,1-Dichloropropene	ug/L	ND	1.0	04/24/12 20:27	
1,2,3-Trichlorobenzene	ug/L	ND	1.0	04/24/12 20:27	
1,2,3-Trichloropropane	ug/L	ND	4.0	04/24/12 20:27	
1,2,4-Trichlorobenzene	ug/L	ND	1.0	04/24/12 20:27	
1,2,4-Trimethylbenzene	ug/L	ND	1.0	04/24/12 20:27	
1,2-Dibromo-3-chloropropane	ug/L	ND	4.0	04/24/12 20:27	
1,2-Dibromoethane (EDB)	ug/L	ND	1.0	04/24/12 20:27	
1,2-Dichlorobenzene	ug/L	ND	1.0	04/24/12 20:27	
1,2-Dichloroethane	ug/L	ND	1.0	04/24/12 20:27	
1,2-Dichloropropane	ug/L	ND	4.0	04/24/12 20:27	
1,3,5-Trimethylbenzene	ug/L	ND	1.0	04/24/12 20:27	
1,3-Dichlorobenzene	ug/L	ND	1.0	04/24/12 20:27	
1,3-Dichloropropane	ug/L	ND	1.0	04/24/12 20:27	
1,4-Dichlorobenzene	ug/L	ND	1.0	04/24/12 20:27	
2,2-Dichloropropane	ug/L	ND	4.0	04/24/12 20:27	
2-Butanone (MEK)	ug/L	ND	4.0	04/24/12 20:27	
2-Chlorotoluene	ug/L	ND	1.0	04/24/12 20:27	
4-Chlorotoluene	ug/L	ND	1.0	04/24/12 20:27	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	4.0	04/24/12 20:27	
Acetone	ug/L	ND	25.0	04/24/12 20:27	
Allyl chloride	ug/L	ND	4.0	04/24/12 20:27	
Benzene	ug/L	ND	1.0	04/24/12 20:27	
Bromobenzene	ug/L	ND	1.0	04/24/12 20:27	
Bromochloromethane	ug/L	ND	1.0	04/24/12 20:27	
Bromodichloromethane	ug/L	ND	1.0	04/24/12 20:27	
Bromoform	ug/L	ND	4.0	04/24/12 20:27	
Bromomethane	ug/L	ND	4.0	04/24/12 20:27	
Carbon tetrachloride	ug/L	ND	1.0	04/24/12 20:27	
Chlorobenzene	ug/L	ND	1.0	04/24/12 20:27	
Chloroethane	ug/L	ND	1.0	04/24/12 20:27	
Chloroform	ug/L	ND	1.0	04/24/12 20:27	
Chloromethane	ug/L	ND	4.0	04/24/12 20:27	
cis-1,2-Dichloroethene	ug/L	ND	1.0	04/24/12 20:27	
cis-1,3-Dichloropropene	ug/L	ND	4.0	04/24/12 20:27	
Dibromochloromethane	ug/L	ND	1.0	04/24/12 20:27	
Dibromomethane	ug/L	ND	4.0	04/24/12 20:27	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

METHOD BLANK: 1180887 Matrix: Water

Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Dichlorodifluoromethane	ug/L	ND	1.0	04/24/12 20:27	
Dichlorofluoromethane	ug/L	ND	1.0	04/24/12 20:27	
Diethyl ether (Ethyl ether)	ug/L	ND	4.0	04/24/12 20:27	
Ethylbenzene	ug/L	ND	1.0	04/24/12 20:27	
Hexachloro-1,3-butadiene	ug/L	ND	5.0	04/24/12 20:27	
Isopropylbenzene (Cumene)	ug/L	ND	1.0	04/24/12 20:27	
m&p-Xylene	ug/L	ND	2.0	04/24/12 20:27	
Methyl-tert-butyl ether	ug/L	ND	1.0	04/24/12 20:27	
Methylene Chloride	ug/L	ND	4.0	04/24/12 20:27	
n-Butylbenzene	ug/L	ND	1.0	04/24/12 20:27	
n-Propylbenzene	ug/L	ND	1.0	04/24/12 20:27	
Naphthalene	ug/L	ND	4.0	04/24/12 20:27	
o-Xylene	ug/L	ND	1.0	04/24/12 20:27	
p-Isopropyltoluene	ug/L	ND	1.0	04/24/12 20:27	
sec-Butylbenzene	ug/L	ND	1.0	04/24/12 20:27	
Styrene	ug/L	ND	1.0	04/24/12 20:27	
tert-Butylbenzene	ug/L	ND	1.0	04/24/12 20:27	
Tetrachloroethene	ug/L	ND	1.0	04/24/12 20:27	
Tetrahydrofuran	ug/L	ND	10.0	04/24/12 20:27	
Toluene	ug/L	ND	1.0	04/24/12 20:27	
trans-1,2-Dichloroethene	ug/L	ND	1.0	04/24/12 20:27	
trans-1,3-Dichloropropene	ug/L	ND	4.0	04/24/12 20:27	
Trichloroethene	ug/L	ND	1.0	04/24/12 20:27	
Trichlorofluoromethane	ug/L	ND	1.0	04/24/12 20:27	
Vinyl chloride	ug/L	ND	0.40	04/24/12 20:27	
Xylene (Total)	ug/L	ND	3.0	04/24/12 20:27	
1,2-Dichloroethane-d4 (S)	%	102	75-125	04/24/12 20:27	
4-Bromofluorobenzene (S)	%	95	75-125	04/24/12 20:27	
Dibromofluoromethane (S)	%	101	75-125	04/24/12 20:27	
Toluene-d8 (S)	%	93	75-125	04/24/12 20:27	

LABORATORY CONTROL SAMPLE: 1180888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	50	50.7	101	75-125	
1,1,1-Trichloroethane	ug/L	50	52.3	105	73-128	
1,1,2,2-Tetrachloroethane	ug/L	50	45.7	91	75-125	
1,1,2-Trichloroethane	ug/L	50	47.4	95	75-125	
1,1,2-Trichlorotrifluoroethane	ug/L	50	48.9	98	63-125	
1,1-Dichloroethane	ug/L	50	50.2	100	72-126	
1,1-Dichloroethene	ug/L	50	43.9	88	73-129	
1,1-Dichloropropene	ug/L	50	45.9	92	72-128	
1,2,3-Trichlorobenzene	ug/L	50	50.5	101	73-125	
1,2,3-Trichloropropane	ug/L	50	47.4	95	75-125	
1,2,4-Trichlorobenzene	ug/L	50	51.3	103	74-125	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE: 1180888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trimethylbenzene	ug/L	50	47.9	96	75-126	
1,2-Dibromo-3-chloropropane	ug/L	50	43.8	88	75-125	
1,2-Dibromoethane (EDB)	ug/L	50	46.7	93	75-125	
1,2-Dichlorobenzene	ug/L	50	48.5	97	75-125	
1,2-Dichloroethane	ug/L	50	52.2	104	75-132	
1,2-Dichloropropane	ug/L	50	50.1	100	75-125	
1,3,5-Trimethylbenzene	ug/L	50	48.3	97	75-126	
1,3-Dichlorobenzene	ug/L	50	48.1	96	75-125	
1,3-Dichloropropane	ug/L	50	46.9	94	75-125	
1,4-Dichlorobenzene	ug/L	50	48.8	98	75-125	
2,2-Dichloropropane	ug/L	50	49.2	98	72-133	
2-Butanone (MEK)	ug/L	50	48.5	97	52-138	
2-Chlorotoluene	ug/L	50	46.8	94	74-125	
4-Chlorotoluene	ug/L	50	46.9	94	75-125	
4-Methyl-2-pentanone (MIBK)	ug/L	50	44.7	89	75-125	
Acetone	ug/L	125	128	102	30-150	
Allyl chloride	ug/L	50	44.2	88	75-132	
Benzene	ug/L	50	48.4	97	75-132	
Bromobenzene	ug/L	50	46.8	94	75-125	
Bromochloromethane	ug/L	50	50.2	100	75-126	
Bromodichloromethane	ug/L	50	53.1	106	75-125	
Bromoform	ug/L	50	48.1	96	75-125	
Bromomethane	ug/L	50	36.7	73	52-150	
Carbon tetrachloride	ug/L	50	51.2	102	73-132	
Chlorobenzene	ug/L	50	47.6	95	75-125	
Chloroethane	ug/L	50	52.6	105	75-143	
Chloroform	ug/L	50	53.1	106	75-128	
Chloromethane	ug/L	50	45.7	91	56-136	
cis-1,2-Dichloroethene	ug/L	50	50.7	101	75-125	
cis-1,3-Dichloropropene	ug/L	50	48.2	96	75-125	
Dibromochloromethane	ug/L	50	48.5	97	75-125	
Dibromomethane	ug/L	50	49.9	100	75-125	
Dichlorodifluoromethane	ug/L	50	46.7	93	50-137	
Dichlorofluoromethane	ug/L	50	49.4	99	68-133	
Diethyl ether (Ethyl ether)	ug/L	50	46.7	93	75-125	
Ethylbenzene	ug/L	50	46.5	93	75-125	
Hexachloro-1,3-butadiene	ug/L	25	25.0	100	57-132	
Isopropylbenzene (Cumene)	ug/L	50	50.5	101	75-125	
m&p-Xylene	ug/L	100	92.3	92	75-125	
Methyl-tert-butyl ether	ug/L	50	52.9	106	74-130	
Methylene Chloride	ug/L	50	48.1	96	62-127	
n-Butylbenzene	ug/L	50	51.0	102	68-128	
n-Propylbenzene	ug/L	50	48.2	96	74-125	
Naphthalene	ug/L	50	48.1	96	75-125	
o-Xylene	ug/L	50	48.0	96	75-125	
p-Isopropyltoluene	ug/L	50	51.2	102	75-125	
sec-Butylbenzene	ug/L	50	51.6	103	71-125	
Styrene	ug/L	50	48.2	96	75-125	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE: 1180888

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
tert-Butylbenzene	ug/L	50	50.1	100	73-125	
Tetrachloroethene	ug/L	50	45.0	90	75-125	
Tetrahydrofuran	ug/L	500	482	96	75-128	
Toluene	ug/L	50	44.6	89	75-125	
trans-1,2-Dichloroethene	ug/L	50	44.5	89	75-125	
trans-1,3-Dichloropropene	ug/L	50	45.6	91	75-125	
Trichloroethene	ug/L	50	47.9	96	75-125	
Trichlorofluoromethane	ug/L	50	54.8	110	64-139	
Vinyl chloride	ug/L	50	51.1	102	75-150	
Xylene (Total)	ug/L	150	140	94	75-125	
1,2-Dichloroethane-d4 (S)	%			101	75-125	
4-Bromofluorobenzene (S)	%			95	75-125	
Dibromofluoromethane (S)	%			105	75-125	
Toluene-d8 (S)	%			94	75-125	

MATRIX SPIKE SAMPLE: 1180889

Parameter	Units	10189721001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	50	51.4	103	75-125	
1,1,1-Trichloroethane	ug/L	ND	50	59.5	119	75-145	
1,1,2,2-Tetrachloroethane	ug/L	ND	50	44.1	88	75-125	
1,1,2-Trichloroethane	ug/L	ND	50	46.6	93	75-125	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	50	62.6	125	75-150	
1,1-Dichloroethane	ug/L	ND	50	56.0	112	75-139	
1,1-Dichloroethene	ug/L	ND	50	59.0	118	75-148	
1,1-Dichloropropene	ug/L	ND	50	57.4	115	75-148	
1,2,3-Trichlorobenzene	ug/L	ND	50	50.5	101	75-127	
1,2,3-Trichloropropane	ug/L	ND	50	44.9	90	75-125	
1,2,4-Trichlorobenzene	ug/L	ND	50	51.9	104	75-126	
1,2,4-Trimethylbenzene	ug/L	ND	50	51.7	103	75-135	
1,2-Dibromo-3-chloropropane	ug/L	ND	50	42.8	86	75-125	
1,2-Dibromoethane (EDB)	ug/L	ND	50	48.0	96	75-125	
1,2-Dichlorobenzene	ug/L	ND	50	49.6	99	75-125	
1,2-Dichloroethane	ug/L	ND	50	54.6	109	75-139	
1,2-Dichloropropane	ug/L	ND	50	51.8	104	75-131	
1,3,5-Trimethylbenzene	ug/L	ND	50	52.9	106	75-134	
1,3-Dichlorobenzene	ug/L	ND	50	50.5	101	75-125	
1,3-Dichloropropane	ug/L	ND	50	47.2	94	75-127	
1,4-Dichlorobenzene	ug/L	ND	50	50.2	100	75-125	
2,2-Dichloropropane	ug/L	ND	50	55.3	111	75-150	
2-Butanone (MEK)	ug/L	ND	50	46.8	94	50-138	
2-Chlorotoluene	ug/L	ND	50	50.5	101	75-134	
4-Chlorotoluene	ug/L	ND	50	50.4	101	75-130	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	50	43.7	87	75-125	
Acetone	ug/L	ND	125	135	102	30-142	
Allyl chloride	ug/L	ND	50	53.0	106	75-146	
Benzene	ug/L	ND	50	55.3	111	75-146	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

MATRIX SPIKE SAMPLE: 1180889

Parameter	Units	10189721001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Bromobenzene	ug/L	ND	50	48.8	98	75-125	
Bromochloromethane	ug/L	ND	50	54.1	108	75-129	
Bromodichloromethane	ug/L	ND	50	52.6	105	75-130	
Bromoform	ug/L	ND	50	45.7	91	75-125	
Bromomethane	ug/L	ND	50	44.8	90	52-150	
Carbon tetrachloride	ug/L	ND	50	62.1	124	75-150	
Chlorobenzene	ug/L	ND	50	50.7	101	75-127	
Chloroethane	ug/L	ND	50	59.1	118	75-146	
Chloroform	ug/L	ND	50	57.1	114	75-137	
Chloromethane	ug/L	ND	50	48.8	98	64-150	
cis-1,2-Dichloroethene	ug/L	ND	50	55.9	112	75-139	
cis-1,3-Dichloropropene	ug/L	ND	50	49.5	99	75-129	
Dibromochloromethane	ug/L	ND	50	48.4	97	75-125	
Dibromomethane	ug/L	ND	50	52.3	105	75-126	
Dichlorodifluoromethane	ug/L	ND	50	58.9	118	75-150	
Dichlorofluoromethane	ug/L	ND	50	55.8	112	75-143	
Diethyl ether (Ethyl ether)	ug/L	ND	50	51.2	102	71-133	
Ethylbenzene	ug/L	ND	50	51.4	103	75-132	
Hexachloro-1,3-butadiene	ug/L	ND	25	28.6	114	62-147	
Isopropylbenzene (Cumene)	ug/L	ND	50	55.0	110	75-135	
m&p-Xylene	ug/L	ND	100	103	103	75-131	
Methyl-tert-butyl ether	ug/L	ND	50	52.8	106	71-137	
Methylene Chloride	ug/L	ND	50	53.9	108	57-134	
n-Butylbenzene	ug/L	ND	50	56.5	113	74-139	
n-Propylbenzene	ug/L	ND	50	53.3	107	75-137	
Naphthalene	ug/L	ND	50	47.1	94	75-129	
o-Xylene	ug/L	ND	50	51.2	102	75-128	
p-Isopropyltoluene	ug/L	ND	50	55.6	111	75-135	
sec-Butylbenzene	ug/L	ND	50	57.2	114	75-137	
Styrene	ug/L	ND	50	50.5	101	75-126	
tert-Butylbenzene	ug/L	ND	50	55.2	110	75-133	
Tetrachloroethene	ug/L	ND	50	54.2	108	75-138	
Tetrahydrofuran	ug/L	ND	500	475	95	74-128	
Toluene	ug/L	ND	50	50.0	100	75-131	
trans-1,2-Dichloroethene	ug/L	ND	50	56.0	112	75-140	
trans-1,3-Dichloropropene	ug/L	ND	50	46.0	92	75-129	
Trichloroethene	ug/L	ND	50	55.1	110	75-132	
Trichlorofluoromethane	ug/L	ND	50	67.4	135	75-150	
Vinyl chloride	ug/L	ND	50	61.1	122	75-150	
Xylene (Total)	ug/L	ND	150	154	103	75-129	
1,2-Dichloroethane-d4 (S)	%				102	75-125	
4-Bromofluorobenzene (S)	%				97	75-125	
Dibromofluoromethane (S)	%				106	75-125	
Toluene-d8 (S)	%				93	75-125	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

SAMPLE DUPLICATE: 1180890

Parameter	Units	10189721002 Result	Dup Result	RPD	Max RPD	Qualifiers
1,1,1,2-Tetrachloroethane	ug/L	ND	ND		30	
1,1,1-Trichloroethane	ug/L	ND	ND		30	
1,1,2,2-Tetrachloroethane	ug/L	ND	ND		30	
1,1,2-Trichloroethane	ug/L	ND	ND		30	
1,1,2-Trichlorotrifluoroethane	ug/L	ND	ND		30	
1,1-Dichloroethane	ug/L	ND	ND		30	
1,1-Dichloroethene	ug/L	ND	ND		30	
1,1-Dichloropropene	ug/L	ND	ND		30	
1,2,3-Trichlorobenzene	ug/L	ND	ND		30	
1,2,3-Trichloropropane	ug/L	ND	ND		30	
1,2,4-Trichlorobenzene	ug/L	ND	ND		30	
1,2,4-Trimethylbenzene	ug/L	ND	ND		30	
1,2-Dibromo-3-chloropropane	ug/L	ND	ND		30	
1,2-Dibromoethane (EDB)	ug/L	ND	ND		30	
1,2-Dichlorobenzene	ug/L	ND	ND		30	
1,2-Dichloroethane	ug/L	ND	ND		30	
1,2-Dichloropropane	ug/L	ND	ND		30	
1,3,5-Trimethylbenzene	ug/L	ND	ND		30	
1,3-Dichlorobenzene	ug/L	ND	ND		30	
1,3-Dichloropropane	ug/L	ND	ND		30	
1,4-Dichlorobenzene	ug/L	ND	ND		30	
2,2-Dichloropropane	ug/L	ND	ND		30	
2-Butanone (MEK)	ug/L	ND	ND		30	
2-Chlorotoluene	ug/L	ND	ND		30	
4-Chlorotoluene	ug/L	ND	ND		30	
4-Methyl-2-pentanone (MIBK)	ug/L	ND	ND		30	
Acetone	ug/L	ND	ND		30	
Allyl chloride	ug/L	ND	ND		30	
Benzene	ug/L	ND	.24J		30	
Bromobenzene	ug/L	ND	ND		30	
Bromochloromethane	ug/L	ND	ND		30	
Bromodichloromethane	ug/L	ND	ND		30	
Bromoform	ug/L	ND	ND		30	
Bromomethane	ug/L	ND	ND		30	
Carbon tetrachloride	ug/L	ND	ND		30	
Chlorobenzene	ug/L	ND	ND		30	
Chloroethane	ug/L	ND	ND		30	
Chloroform	ug/L	ND	ND		30	
Chloromethane	ug/L	ND	ND		30	
cis-1,2-Dichloroethene	ug/L	ND	ND		30	
cis-1,3-Dichloropropene	ug/L	ND	ND		30	
Dibromochloromethane	ug/L	ND	ND		30	
Dibromomethane	ug/L	ND	ND		30	
Dichlorodifluoromethane	ug/L	ND	ND		30	
Dichlorofluoromethane	ug/L	ND	ND		30	
Diethyl ether (Ethyl ether)	ug/L	ND	ND		30	
Ethylbenzene	ug/L	ND	ND		30	
Hexachloro-1,3-butadiene	ug/L	ND	ND		30	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

SAMPLE DUPLICATE: 1180890

Parameter	Units	10189721002 Result	Dup Result	RPD	Max RPD	Qualifiers
Isopropylbenzene (Cumene)	ug/L	ND	ND		30	
m&p-Xylene	ug/L	ND	ND		30	
Methyl-tert-butyl ether	ug/L	ND	ND		30	
Methylene Chloride	ug/L	ND	ND		30	
n-Butylbenzene	ug/L	ND	ND		30	
n-Propylbenzene	ug/L	ND	ND		30	
Naphthalene	ug/L	ND	ND		30	
o-Xylene	ug/L	ND	ND		30	
p-Isopropyltoluene	ug/L	ND	ND		30	
sec-Butylbenzene	ug/L	ND	ND		30	
Styrene	ug/L	ND	ND		30	
tert-Butylbenzene	ug/L	ND	ND		30	
Tetrachloroethene	ug/L	ND	ND		30	
Tetrahydrofuran	ug/L	ND	ND		30	
Toluene	ug/L	ND	ND		30	
trans-1,2-Dichloroethene	ug/L	ND	ND		30	
trans-1,3-Dichloropropene	ug/L	ND	ND		30	
Trichloroethene	ug/L	ND	ND		30	
Trichlorofluoromethane	ug/L	ND	ND		30	
Vinyl chloride	ug/L	ND	ND		30	
Xylene (Total)	ug/L	ND	ND		30	
1,2-Dichloroethane-d4 (S)	%	104	104	.03		
4-Bromofluorobenzene (S)	%	95	96	1		
Dibromofluoromethane (S)	%	103	102	1		
Toluene-d8 (S)	%	93	94	1		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: OEXT/18406 | Analysis Method: EPA 8270
QC Batch Method: EPA 3550 | Analysis Description: 8270 Solid MSSV
Associated Lab Samples: 10189069001

METHOD BLANK: 1182161 | Matrix: Solid
Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	ND	330	04/26/12 13:53	
1,2-Dichlorobenzene	ug/kg	ND	330	04/26/12 13:53	
1,2-Diphenylhydrazine	ug/kg	ND	1700	04/26/12 13:53	
1,3-Dichlorobenzene	ug/kg	ND	330	04/26/12 13:53	
1,4-Dichlorobenzene	ug/kg	ND	330	04/26/12 13:53	
1-Methylnaphthalene	ug/kg	ND	330	04/26/12 13:53	
2,4,5-Trichlorophenol	ug/kg	ND	1700	04/26/12 13:53	
2,4,6-Trichlorophenol	ug/kg	ND	330	04/26/12 13:53	
2,4-Dichlorophenol	ug/kg	ND	330	04/26/12 13:53	
2,4-Dimethylphenol	ug/kg	ND	330	04/26/12 13:53	
2,4-Dinitrophenol	ug/kg	ND	1700	04/26/12 13:53	
2,4-Dinitrotoluene	ug/kg	ND	330	04/26/12 13:53	
2,6-Dinitrotoluene	ug/kg	ND	330	04/26/12 13:53	
2-Chloronaphthalene	ug/kg	ND	330	04/26/12 13:53	
2-Chlorophenol	ug/kg	ND	330	04/26/12 13:53	
2-Methylnaphthalene	ug/kg	ND	330	04/26/12 13:53	
2-Methylphenol(o-Cresol)	ug/kg	ND	330	04/26/12 13:53	
2-Nitroaniline	ug/kg	ND	1700	04/26/12 13:53	
2-Nitrophenol	ug/kg	ND	330	04/26/12 13:53	
3&4-Methylphenol	ug/kg	ND	660	04/26/12 13:53	
3,3'-Dichlorobenzidine	ug/kg	ND	670	04/26/12 13:53	
3-Nitroaniline	ug/kg	ND	1700	04/26/12 13:53	
4,6-Dinitro-2-methylphenol	ug/kg	ND	1700	04/26/12 13:53	
4-Bromophenylphenyl ether	ug/kg	ND	330	04/26/12 13:53	
4-Chloro-3-methylphenol	ug/kg	ND	330	04/26/12 13:53	
4-Chloroaniline	ug/kg	ND	330	04/26/12 13:53	
4-Chlorophenylphenyl ether	ug/kg	ND	330	04/26/12 13:53	
4-Nitroaniline	ug/kg	ND	1700	04/26/12 13:53	
4-Nitrophenol	ug/kg	ND	1700	04/26/12 13:53	
Acenaphthene	ug/kg	ND	330	04/26/12 13:53	
Acenaphthylene	ug/kg	ND	330	04/26/12 13:53	
Anthracene	ug/kg	ND	330	04/26/12 13:53	
Benzo(a)anthracene	ug/kg	ND	330	04/26/12 13:53	
Benzo(a)pyrene	ug/kg	ND	330	04/26/12 13:53	
Benzo(b)fluoranthene	ug/kg	ND	330	04/26/12 13:53	
Benzo(g,h,i)perylene	ug/kg	ND	330	04/26/12 13:53	
Benzo(k)fluoranthene	ug/kg	ND	330	04/26/12 13:53	
bis(2-Chloroethoxy)methane	ug/kg	ND	330	04/26/12 13:53	
bis(2-Chloroethyl) ether	ug/kg	ND	330	04/26/12 13:53	
bis(2-Chloroisopropyl) ether	ug/kg	ND	330	04/26/12 13:53	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	330	04/26/12 13:53	
Butylbenzylphthalate	ug/kg	ND	330	04/26/12 13:53	
Carbazole	ug/kg	ND	330	04/26/12 13:53	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

METHOD BLANK: 1182161 Matrix: Solid

Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chrysene	ug/kg	ND	330	04/26/12 13:53	
Di-n-butylphthalate	ug/kg	ND	330	04/26/12 13:53	
Di-n-octylphthalate	ug/kg	ND	330	04/26/12 13:53	
Dibenz(a,h)anthracene	ug/kg	ND	330	04/26/12 13:53	
Dibenzofuran	ug/kg	ND	330	04/26/12 13:53	
Diethylphthalate	ug/kg	ND	330	04/26/12 13:53	
Dimethylphthalate	ug/kg	ND	330	04/26/12 13:53	
Fluoranthene	ug/kg	ND	330	04/26/12 13:53	
Fluorene	ug/kg	ND	330	04/26/12 13:53	
Hexachloro-1,3-butadiene	ug/kg	ND	330	04/26/12 13:53	
Hexachlorobenzene	ug/kg	ND	330	04/26/12 13:53	
Hexachloroethane	ug/kg	ND	330	04/26/12 13:53	
Indeno(1,2,3-cd)pyrene	ug/kg	ND	330	04/26/12 13:53	
Isophorone	ug/kg	ND	330	04/26/12 13:53	
N-Nitroso-di-n-propylamine	ug/kg	ND	330	04/26/12 13:53	
N-Nitrosodimethylamine	ug/kg	ND	330	04/26/12 13:53	
N-Nitrosodiphenylamine	ug/kg	ND	330	04/26/12 13:53	
Naphthalene	ug/kg	ND	330	04/26/12 13:53	
Nitrobenzene	ug/kg	ND	330	04/26/12 13:53	
Pentachlorophenol	ug/kg	ND	670	04/26/12 13:53	
Phenanthrene	ug/kg	ND	330	04/26/12 13:53	
Phenol	ug/kg	ND	330	04/26/12 13:53	
Pyrene	ug/kg	ND	330	04/26/12 13:53	
2,4,6-Tribromophenol (S)	%	72	30-150	04/26/12 13:53	
2-Fluorobiphenyl (S)	%	67	30-145	04/26/12 13:53	
2-Fluorophenol (S)	%	67	30-137	04/26/12 13:53	
Nitrobenzene-d5 (S)	%	65	30-141	04/26/12 13:53	
Phenol-d6 (S)	%	67	30-142	04/26/12 13:53	
Terphenyl-d14 (S)	%	76	30-150	04/26/12 13:53	

LABORATORY CONTROL SAMPLE: 1182162

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
1,2,4-Trichlorobenzene	ug/kg	1670	1020	61	51-125	
1,2-Dichlorobenzene	ug/kg	1670	911	55	53-125	
1,2-Diphenylhydrazine	ug/kg	1670	1220J	73	61-125	
1,3-Dichlorobenzene	ug/kg	1670	890	53	53-125	
1,4-Dichlorobenzene	ug/kg	1670	900	54	53-125	
1-Methylnaphthalene	ug/kg	1670	1080	65	61-125	
2,4,5-Trichlorophenol	ug/kg	1670	1220J	73	67-125	
2,4,6-Trichlorophenol	ug/kg	1670	1180	71	64-125	
2,4-Dichlorophenol	ug/kg	1670	1120	67	60-125	
2,4-Dimethylphenol	ug/kg	1670	1130	68	56-125	
2,4-Dinitrophenol	ug/kg	1670	1000J	60	30-125	
2,4-Dinitrotoluene	ug/kg	1670	1190	72	60-125	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE: 1182162

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
2,6-Dinitrotoluene	ug/kg	1670	1240	74	62-125	
2-Chloronaphthalene	ug/kg	1670	1140	68	62-125	
2-Chlorophenol	ug/kg	1670	959	58	51-125	
2-Methylnaphthalene	ug/kg	1670	1060	64	58-125	
2-Methylphenol(o-Cresol)	ug/kg	1670	1080	65	52-125	
2-Nitroaniline	ug/kg	1670	1210J	73	64-125	
2-Nitrophenol	ug/kg	1670	1030	62	53-125	
3&4-Methylphenol	ug/kg	1670	1100	66	54-125	
3,3'-Dichlorobenzidine	ug/kg	1670	1010	61	49-125	
3-Nitroaniline	ug/kg	1670	1150J	69	51-125	
4,6-Dinitro-2-methylphenol	ug/kg	1670	1170J	70	30-127	
4-Bromophenylphenyl ether	ug/kg	1670	1290	77	64-125	
4-Chloro-3-methylphenol	ug/kg	1670	1170	70	61-125	
4-Chloroaniline	ug/kg	1670	866	52	39-125	
4-Chlorophenylphenyl ether	ug/kg	1670	1200	72	62-125	
4-Nitroaniline	ug/kg	1670	1200J	72	59-125	
4-Nitrophenol	ug/kg	1670	1160J	69	57-125	
Acenaphthene	ug/kg	1670	1170	70	61-125	
Acenaphthylene	ug/kg	1670	1230	74	64-125	
Anthracene	ug/kg	1670	1260	75	64-125	
Benzo(a)anthracene	ug/kg	1670	1220	73	62-125	
Benzo(a)pyrene	ug/kg	1670	1220	73	62-125	
Benzo(b)fluoranthene	ug/kg	1670	1210	73	62-125	
Benzo(g,h,i)perylene	ug/kg	1670	1200	72	62-125	
Benzo(k)fluoranthene	ug/kg	1670	1240	75	65-125	
bis(2-Chloroethoxy)methane	ug/kg	1670	1070	64	54-125	
bis(2-Chloroethyl) ether	ug/kg	1670	902	54	45-125	
bis(2-Chloroisopropyl) ether	ug/kg	1670	923	55	42-125	
bis(2-Ethylhexyl)phthalate	ug/kg	1670	1210	73	63-125	
Butylbenzylphthalate	ug/kg	1670	1230	74	62-125	
Carbazole	ug/kg	1670	1250	75	64-125	
Chrysene	ug/kg	1670	1220	73	63-125	
Di-n-butylphthalate	ug/kg	1670	1250	75	66-125	
Di-n-octylphthalate	ug/kg	1670	1190	71	64-125	
Dibenz(a,h)anthracene	ug/kg	1670	1220	73	63-125	
Dibenzofuran	ug/kg	1670	1200	72	64-125	
Diethylphthalate	ug/kg	1670	1220	73	63-125	
Dimethylphthalate	ug/kg	1670	1210	73	63-125	
Fluoranthene	ug/kg	1670	1210	73	64-125	
Fluorene	ug/kg	1670	1210	73	61-125	
Hexachloro-1,3-butadiene	ug/kg	1670	934	56	48-125	
Hexachlorobenzene	ug/kg	1670	1250	75	64-125	
Hexachloroethane	ug/kg	1670	877	53	41-125	
Indeno(1,2,3-cd)pyrene	ug/kg	1670	1210	73	63-125	
Isophorone	ug/kg	1670	1090	65	55-125	
N-Nitroso-di-n-propylamine	ug/kg	1670	1050	63	50-125	
N-Nitrosodimethylamine	ug/kg	1670	947	57	41-125	
N-Nitrosodiphenylamine	ug/kg	1670	1250	75	65-125	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE: 1182162

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Naphthalene	ug/kg	1670	1010	60	49-125	
Nitrobenzene	ug/kg	1670	1000	60	53-125	
Pentachlorophenol	ug/kg	1670	1170	70	40-125	
Phenanthrene	ug/kg	1670	1240	74	63-125	
Phenol	ug/kg	1670	1020	61	49-125	
Pyrene	ug/kg	1670	1250	75	64-125	
2,4,6-Tribromophenol (S)	%			75	30-150	
2-Fluorobiphenyl (S)	%			69	30-145	
2-Fluorophenol (S)	%			57	30-137	
Nitrobenzene-d5 (S)	%			61	30-141	
Phenol-d6 (S)	%			63	30-142	
Terphenyl-d14 (S)	%			74	30-150	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1182163 1182164

Parameter	Units	10189069001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
1,2,4-Trichlorobenzene	ug/kg	ND	2040	2050	ND	ND	64	78	48-125		30	
1,2-Dichlorobenzene	ug/kg	ND	2040	2050	ND	ND	56	67	41-125		30	
1,2-Diphenylhydrazine	ug/kg	ND	2040	2050	1250J	1470J	62	72	53-125		30	
1,3-Dichlorobenzene	ug/kg	ND	2040	2050	ND	ND	52	65	39-125		30	
1,4-Dichlorobenzene	ug/kg	ND	2040	2050	ND	ND	53	66	40-125		30	
1-Methylnaphthalene	ug/kg	11200	2040	2050	20800	23100	472	580	59-125	10	30	M6
2,4,5-Trichlorophenol	ug/kg	ND	2040	2050	ND	1500J	58	73	63-125		30	M6
2,4,6-Trichlorophenol	ug/kg	ND	2040	2050	1270J	1450J	62	71	59-125		30	
2,4-Dichlorophenol	ug/kg	ND	2040	2050	ND	1460J	55	72	60-125		30	M6
2,4-Dimethylphenol	ug/kg	ND	2040	2050	ND	ND	71	85	52-125		30	
2,4-Dinitrophenol	ug/kg	ND	2040	2050	ND	ND	0	0	30-125		30	M6
2,4-Dinitrotoluene	ug/kg	ND	2040	2050	1950J	ND	96	52	57-125		30	M6
2,6-Dinitrotoluene	ug/kg	ND	2040	2050	1470J	1710J	72	84	60-125		30	
2-Chloronaphthalene	ug/kg	ND	2040	2050	1320J	1620J	65	79	59-125		30	
2-Chlorophenol	ug/kg	ND	2040	2050	ND	ND	57	73	48-125		30	
2-Methylnaphthalene	ug/kg	11600	2040	2050	22400	25000	531	653	58-125	11	30	M6
2-Methylphenol(o-Cresol)	ug/kg	ND	2040	2050	1410J	1490J	69	73	49-125		30	
2-Nitroaniline	ug/kg	ND	2040	2050	ND	1640J	49	80	61-125		30	M6
2-Nitrophenol	ug/kg	ND	2040	2050	ND	1510J	61	74	47-125		30	
3&4-Methylphenol	ug/kg	ND	2040	2050	1370J	1550J	67	76	52-125		30	
3,3'-Dichlorobenzidine	ug/kg	ND	2040	2050	ND	ND	0	0	30-131		30	M6
3-Nitroaniline	ug/kg	ND	2040	2050	ND	ND	0	0	42-125		30	M6
4,6-Dinitro-2-methylphenol	ug/kg	ND	2040	2050	ND	ND	0	37	30-135		30	M6
4-Bromophenylphenyl ether	ug/kg	ND	2040	2050	1450J	1670J	71	81	62-125		30	
4-Chloro-3-methylphenol	ug/kg	ND	2040	2050	1460J	1820J	72	89	61-125		30	
4-Chloroaniline	ug/kg	ND	2040	2050	ND	ND	0	0	30-125		30	M6
4-Chlorophenylphenyl ether	ug/kg	ND	2040	2050	1400J	1620J	68	79	60-125		30	
4-Nitroaniline	ug/kg	ND	2040	2050	ND	ND	52	83	47-125		30	
4-Nitrophenol	ug/kg	ND	2040	2050	ND	ND	0	0	30-139		30	M6
Acenaphthene	ug/kg	ND	2040	2050	4400J	5610J	129	188	59-125		30	M6

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1182163 1182164

Parameter	Units	10189069001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Acenaphthylene	ug/kg	10700	2040	2050	21000	22300	506	567	60-125	6	30	M6
Anthracene	ug/kg	8450	2040	2050	16400	16100	392	374	63-125	2	30	M6
Benzo(a)anthracene	ug/kg	23500	2040	2050	41200	44400	864	1020	60-125	7	30	M6
Benzo(a)pyrene	ug/kg	19700	2040	2050	34900	35500	746	775	60-125	2	30	M6
Benzo(b)fluoranthene	ug/kg	24300	2040	2050	41700	46400	857	1080	58-125	10	30	M6
Benzo(g,h,i)perylene	ug/kg	15000	2040	2050	28500	30000	661	733	30-141	5	30	M6
Benzo(k)fluoranthene	ug/kg	9200	2040	2050	20600	18100	557	437	62-125	13	30	M6
bis(2-Chloroethoxy)methane	ug/kg	ND	2040	2050	ND	1530J	67	75	54-125		30	
bis(2-Chloroethyl) ether	ug/kg	ND	2040	2050	ND	ND	66	75	39-125		30	
bis(2-Chloroisopropyl) ether	ug/kg	ND	2040	2050	ND	ND	57	66	40-125		30	
bis(2-Ethylhexyl)phthalate	ug/kg	ND	2040	2050	ND	ND	70	84	57-125		30	
Butylbenzylphthalate	ug/kg	ND	2040	2050	1530J	1670J	75	82	57-125		30	
Carbazole	ug/kg	ND	2040	2050	2040J	2320J	100	113	65-125		30	
Chrysene	ug/kg	25300	2040	2050	45800	45900	1000	1000	61-125	.2	30	M6
Di-n-butylphthalate	ug/kg	ND	2040	2050	1530J	1750J	75	86	66-125		30	
Di-n-octylphthalate	ug/kg	ND	2040	2050	1340J	1630J	66	79	62-125		30	
Dibenz(a,h)anthracene	ug/kg	ND	2040	2050	7420J	7740J	196	211	60-125		30	M6
Dibenzofuran	ug/kg	ND	2040	2050	3520J	3910J	109	128	59-125		30	M6
Diethylphthalate	ug/kg	ND	2040	2050	1380J	1650J	68	81	62-125		30	
Dimethylphthalate	ug/kg	ND	2040	2050	1350J	1600J	66	78	62-125		30	
Fluoranthene	ug/kg	38200	2040	2050	65700	67600	1350	1440	58-125	3	30	M6
Fluorene	ug/kg	ND	2040	2050	12900	14000	286	336	61-125	8	30	M6
Hexachloro-1,3-butadiene	ug/kg	ND	2040	2050	ND	ND	62	73	42-125		30	
Hexachlorobenzene	ug/kg	ND	2040	2050	1430J	1710J	70	83	60-125		30	
Hexachloroethane	ug/kg	ND	2040	2050	3290J	3480J	161	170	34-125		30	M6
Indeno(1,2,3-cd)pyrene	ug/kg	11400	2040	2050	21500	22800	499	560	61-125	6	30	M6
Isophorone	ug/kg	ND	2040	2050	1270J	1540J	62	75	50-125		30	
N-Nitroso-di-n-propylamine	ug/kg	ND	2040	2050	ND	ND	0	0	49-125		30	M6
N-Nitrosodimethylamine	ug/kg	ND	2040	2050	ND	ND	28	39	33-125		30	M6
N-Nitrosodiphenylamine	ug/kg	ND	2040	2050	2000J	2080J	98	101	64-125		30	
Naphthalene	ug/kg	16600	2040	2050	26100	29200	469	617	47-125	11	30	M6
Nitrobenzene	ug/kg	ND	2040	2050	1740J	1850J	85	90	45-125		30	
Pentachlorophenol	ug/kg	ND	2040	2050	ND	ND	52	60	30-140		30	
Phenanthrene	ug/kg	33200	2040	2050	58000	59300	1220	1280	56-125	2	30	M6
Phenol	ug/kg	ND	2040	2050	ND	1500J	63	73	49-125		30	
Pyrene	ug/kg	63600	2040	2050	107000	112000	2110	2370	56-125	5	30	M6
2,4,6-Tribromophenol (S)	%						0	0	30-150			S4
2-Fluorobiphenyl (S)	%						0	0	30-145			S4
2-Fluorophenol (S)	%						0	0	30-137			S4
Nitrobenzene-d5 (S)	%						0	0	30-141			D4,S4
Phenol-d6 (S)	%						0	0	30-142			S4
Terphenyl-d14 (S)	%						0	0	30-150			S4

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: OEXT/18407 | Analysis Method: EPA 8270
QC Batch Method: EPA 3520 | Analysis Description: 8270 Water MSSV
Associated Lab Samples: 10189069002

METHOD BLANK: 1182635 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
1,2,4-Trichlorobenzene	ug/L	ND	10.0	04/27/12 19:01	
1,2-Dichlorobenzene	ug/L	ND	10.0	04/27/12 19:01	
1,2-Diphenylhydrazine	ug/L	ND	10.0	04/27/12 19:01	
1,3-Dichlorobenzene	ug/L	ND	10.0	04/27/12 19:01	
1,4-Dichlorobenzene	ug/L	ND	10.0	04/27/12 19:01	
1-Methylnaphthalene	ug/L	ND	10.0	04/27/12 19:01	
2,4,5-Trichlorophenol	ug/L	ND	50.0	04/27/12 19:01	
2,4,6-Trichlorophenol	ug/L	ND	10.0	04/27/12 19:01	
2,4-Dichlorophenol	ug/L	ND	10.0	04/27/12 19:01	
2,4-Dimethylphenol	ug/L	ND	10.0	04/27/12 19:01	
2,4-Dinitrophenol	ug/L	ND	50.0	04/27/12 19:01	
2,4-Dinitrotoluene	ug/L	ND	10.0	04/27/12 19:01	
2,6-Dinitrotoluene	ug/L	ND	10.0	04/27/12 19:01	
2-Chloronaphthalene	ug/L	ND	10.0	04/27/12 19:01	
2-Chlorophenol	ug/L	ND	10.0	04/27/12 19:01	
2-Methylnaphthalene	ug/L	ND	10.0	04/27/12 19:01	
2-Methylphenol(o-Cresol)	ug/L	ND	10.0	04/27/12 19:01	
2-Nitroaniline	ug/L	ND	50.0	04/27/12 19:01	
2-Nitrophenol	ug/L	ND	10.0	04/27/12 19:01	
3&4-Methylphenol	ug/L	ND	20.0	04/27/12 19:01	
3,3'-Dichlorobenzidine	ug/L	ND	20.0	04/27/12 19:01	
3-Nitroaniline	ug/L	ND	50.0	04/27/12 19:01	
4,6-Dinitro-2-methylphenol	ug/L	ND	50.0	04/27/12 19:01	
4-Bromophenylphenyl ether	ug/L	ND	10.0	04/27/12 19:01	
4-Chloro-3-methylphenol	ug/L	ND	10.0	04/27/12 19:01	
4-Chloroaniline	ug/L	ND	50.0	04/27/12 19:01	
4-Chlorophenylphenyl ether	ug/L	ND	10.0	04/27/12 19:01	
4-Nitroaniline	ug/L	ND	50.0	04/27/12 19:01	
4-Nitrophenol	ug/L	ND	50.0	04/27/12 19:01	
Acenaphthene	ug/L	ND	10.0	04/27/12 19:01	
Acenaphthylene	ug/L	ND	10.0	04/27/12 19:01	
Anthracene	ug/L	ND	10.0	04/27/12 19:01	
Benzo(a)anthracene	ug/L	ND	10.0	04/27/12 19:01	
Benzo(a)pyrene	ug/L	ND	10.0	04/27/12 19:01	
Benzo(b)fluoranthene	ug/L	ND	10.0	04/27/12 19:01	
Benzo(g,h,i)perylene	ug/L	ND	10.0	04/27/12 19:01	
Benzo(k)fluoranthene	ug/L	ND	10.0	04/27/12 19:01	
bis(2-Chloroethoxy)methane	ug/L	ND	10.0	04/27/12 19:01	
bis(2-Chloroethyl) ether	ug/L	ND	10.0	04/27/12 19:01	
bis(2-Chloroisopropyl) ether	ug/L	ND	10.0	04/27/12 19:01	
bis(2-Ethylhexyl)phthalate	ug/L	ND	10.0	04/27/12 19:01	
Butylbenzylphthalate	ug/L	ND	10.0	04/27/12 19:01	
Carbazole	ug/L	ND	10.0	04/27/12 19:01	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

METHOD BLANK: 1182635 Matrix: Water

Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Chrysene	ug/L	ND	10.0	04/27/12 19:01	
Di-n-butylphthalate	ug/L	ND	10.0	04/27/12 19:01	
Di-n-octylphthalate	ug/L	ND	10.0	04/27/12 19:01	
Dibenz(a,h)anthracene	ug/L	ND	20.0	04/27/12 19:01	
Dibenzofuran	ug/L	ND	10.0	04/27/12 19:01	
Diethylphthalate	ug/L	ND	10.0	04/27/12 19:01	
Dimethylphthalate	ug/L	ND	10.0	04/27/12 19:01	
Fluoranthene	ug/L	ND	10.0	04/27/12 19:01	
Fluorene	ug/L	ND	10.0	04/27/12 19:01	
Hexachloro-1,3-butadiene	ug/L	ND	10.0	04/27/12 19:01	
Hexachlorobenzene	ug/L	ND	10.0	04/27/12 19:01	
Hexachloroethane	ug/L	ND	10.0	04/27/12 19:01	
Indeno(1,2,3-cd)pyrene	ug/L	ND	10.0	04/27/12 19:01	
Isophorone	ug/L	ND	10.0	04/27/12 19:01	
N-Nitroso-di-n-propylamine	ug/L	ND	10.0	04/27/12 19:01	
N-Nitrosodimethylamine	ug/L	ND	10.0	04/27/12 19:01	
N-Nitrosodiphenylamine	ug/L	ND	10.0	04/27/12 19:01	
Naphthalene	ug/L	ND	10.0	04/27/12 19:01	
Nitrobenzene	ug/L	ND	10.0	04/27/12 19:01	
Pentachlorophenol	ug/L	ND	23.0	04/27/12 19:01	
Phenanthrene	ug/L	ND	10.0	04/27/12 19:01	
Phenol	ug/L	ND	10.0	04/27/12 19:01	
Pyrene	ug/L	ND	10.0	04/27/12 19:01	
2,4,6-Tribromophenol (S)	%	80	30-131	04/27/12 19:01	
2-Fluorobiphenyl (S)	%	71	53-125	04/27/12 19:01	
2-Fluorophenol (S)	%	73	30-125	04/27/12 19:01	
Nitrobenzene-d5 (S)	%	73	50-125	04/27/12 19:01	
Phenol-d6 (S)	%	74	30-125	04/27/12 19:01	
Terphenyl-d14 (S)	%	76	56-125	04/27/12 19:01	

LABORATORY CONTROL SAMPLE & LCSD: 1182636 1182637

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
1,2,4-Trichlorobenzene	ug/L	50	40.9	41.3	82	83	64-125	.9	20	
1,2-Dichlorobenzene	ug/L	50	36.3	36.5	73	73	56-125	.5	20	
1,2-Diphenylhydrazine	ug/L	50	42.7	42.9	85	86	75-125	.4	20	
1,3-Dichlorobenzene	ug/L	50	35.3	35.5	71	71	51-125	.7	20	
1,4-Dichlorobenzene	ug/L	50	35.2	36.0	70	72	53-125	2	20	
1-Methylnaphthalene	ug/L	50	41.6	42.1	83	84	75-125	1	20	
2,4,5-Trichlorophenol	ug/L	50	42.4J	43.9J	85	88	75-125		20	
2,4,6-Trichlorophenol	ug/L	50	43.0	42.2	86	84	75-125	2	20	
2,4-Dichlorophenol	ug/L	50	42.5	41.9	85	84	75-125	1	20	
2,4-Dimethylphenol	ug/L	50	40.3	40.7	81	81	46-125	1	20	
2,4-Dinitrophenol	ug/L	50	35.7J	34.4J	71	69	30-142		20	
2,4-Dinitrotoluene	ug/L	50	44.0	43.6	88	87	75-125	.9	20	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE & LCSD: 1182636 1182637

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
2,6-Dinitrotoluene	ug/L	50	44.0	44.5	88	89	75-125	1	20	
2-Chloronaphthalene	ug/L	50	42.5	42.5	85	85	73-125	.04	20	
2-Chlorophenol	ug/L	50	38.3	38.3	77	77	63-125	.1	20	
2-Methylnaphthalene	ug/L	50	40.7	40.7	81	81	75-125	.09	20	
2-Methylphenol(o-Cresol)	ug/L	50	40.2	40.6	80	81	65-125	1	20	
2-Nitroaniline	ug/L	50	43.2J	43.8J	86	88	75-125		20	
2-Nitrophenol	ug/L	50	41.6	41.2	83	82	69-125	.9	20	
3&4-Methylphenol	ug/L	50	40.1	40.0	80	80	66-125	.2	20	
3,3'-Dichlorobenzidine	ug/L	50	46.8	48.3	94	97	70-130	3	20	
3-Nitroaniline	ug/L	50	48.8J	48.5J	98	97	68-125		20	
4,6-Dinitro-2-methylphenol	ug/L	50	42.9J	41.6J	86	83	52-141		20	
4-Bromophenylphenyl ether	ug/L	50	45.1	45.9	90	92	75-125	2	20	
4-Chloro-3-methylphenol	ug/L	50	43.8	43.9	88	88	75-125	.1	20	
4-Chloroaniline	ug/L	50	39.8J	42.1J	80	84	55-125		20	
4-Chlorophenylphenyl ether	ug/L	50	43.1	43.4	86	87	75-125	.8	20	
4-Nitroaniline	ug/L	50	43.8J	44.6J	88	89	70-125		20	
4-Nitrophenol	ug/L	50	40.7J	40.3J	81	81	72-125		20	
Acenaphthene	ug/L	50	42.9	42.1	86	84	75-125	2	20	
Acenaphthylene	ug/L	50	44.0	44.1	88	88	75-125	.2	20	
Anthracene	ug/L	50	44.7	45.7	89	91	75-125	2	20	
Benzo(a)anthracene	ug/L	50	42.7	43.6	85	87	75-125	2	20	
Benzo(a)pyrene	ug/L	50	43.3	44.2	87	88	75-125	2	20	
Benzo(b)fluoranthene	ug/L	50	44.1	42.5	88	85	75-125	4	20	
Benzo(g,h,i)perylene	ug/L	50	38.8	39.8	78	80	75-125	3	20	
Benzo(k)fluoranthene	ug/L	50	43.4	46.2	87	92	75-125	6	20	
bis(2-Chloroethoxy)methane	ug/L	50	40.3	40.6	81	81	68-125	.6	20	
bis(2-Chloroethyl) ether	ug/L	50	36.3	36.4	73	73	59-125	.3	20	
bis(2-Chloroisopropyl) ether	ug/L	50	35.0	35.6	70	71	53-125	2	20	
bis(2-Ethylhexyl)phthalate	ug/L	50	44.4	45.0	89	90	75-125	1	20	
Butylbenzylphthalate	ug/L	50	44.6	45.4	89	91	75-125	2	20	
Carbazole	ug/L	50	44.6	45.8	89	92	75-125	2	20	
Chrysene	ug/L	50	42.9	44.0	86	88	75-125	2	20	
Di-n-butylphthalate	ug/L	50	45.3	46.6	91	93	75-125	3	20	
Di-n-octylphthalate	ug/L	50	44.3	44.8	89	90	75-125	1	20	
Dibenz(a,h)anthracene	ug/L	50	43.4	43.6	87	87	75-125	.5	20	
Dibenzofuran	ug/L	50	43.8	44.1	88	88	75-125	.7	20	
Diethylphthalate	ug/L	50	44.6	44.9	89	90	75-125	.6	20	
Dimethylphthalate	ug/L	50	43.6	44.4	87	89	75-125	2	20	
Fluoranthene	ug/L	50	44.2	45.4	88	91	75-125	3	20	
Fluorene	ug/L	50	43.3	43.7	87	87	75-125	.8	20	
Hexachloro-1,3-butadiene	ug/L	50	38.8	38.7	78	77	61-125	.2	20	
Hexachlorobenzene	ug/L	50	44.6	45.9	89	92	75-125	3	20	
Hexachloroethane	ug/L	50	34.8	35.1	70	70	46-125	.8	20	
Indeno(1,2,3-cd)pyrene	ug/L	50	43.1	43.3	86	87	75-125	.5	20	
Isophorone	ug/L	50	41.6	42.0	83	84	75-125	1	20	
N-Nitroso-di-n-propylamine	ug/L	50	40.2	40.2	80	80	70-125	.1	20	
N-Nitrosodimethylamine	ug/L	50	36.6	37.7	73	75	63-125	3	20	
N-Nitrosodiphenylamine	ug/L	50	44.1	45.2	88	90	75-125	2	20	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

LABORATORY CONTROL SAMPLE & LCSD: 1182636 1182637

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Naphthalene	ug/L	50	39.8	40.1	80	80	67-125	.9	20	
Nitrobenzene	ug/L	50	39.2	39.8	78	80	69-125	2	20	
Pentachlorophenol	ug/L	50	41.5	42.7	83	85	58-125	3	20	
Phenanthrene	ug/L	50	43.5	44.7	87	89	75-125	3	20	
Phenol	ug/L	50	37.5	38.5	75	77	63-125	3	20	
Pyrene	ug/L	50	43.8	44.4	88	89	75-125	1	20	
2,4,6-Tribromophenol (S)	%				87	85	30-131			
2-Fluorobiphenyl (S)	%				80	78	53-125			
2-Fluorophenol (S)	%				71	69	30-125			
Nitrobenzene-d5 (S)	%				77	75	50-125			
Phenol-d6 (S)	%				72	70	30-125			
Terphenyl-d14 (S)	%				83	82	56-125			

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WET/11564 | Analysis Method: EPA 1010
QC Batch Method: EPA 1010 | Analysis Description: 1010 Flash Point, Closed Cup
Associated Lab Samples: 10189069001, 10189069002

LABORATORY CONTROL SAMPLE: 602527

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Flashpoint	deg F		81.3			

SAMPLE DUPLICATE: 602713

Parameter	Units	10190679001 Result	Dup Result	RPD	Max RPD	Qualifiers
Flashpoint	deg F	>210	>210			

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WET/25585 | Analysis Method: EPA 1664 OG
QC Batch Method: EPA 1664 OG | Analysis Description: 1664 HEM, Oil and Grease
Associated Lab Samples: 10189069002

METHOD BLANK: 1178753 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Oil and Grease	mg/L	ND	5.1	04/24/12 15:30	

LABORATORY CONTROL SAMPLE: 1178754

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Oil and Grease	mg/L	40.8	40.0	98	78-114	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1178755 1178756

Parameter	Units	10188651005 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Oil and Grease	mg/L	ND	40.8	40.8	40.7	39.5	88	85	78-114	3	18	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WET/11553 | Analysis Method: SM 4500-S F (2000)
QC Batch Method: SM 4500-S F (2000) | Analysis Description: 4500S2F Sulfide, Iodometric
Associated Lab Samples: 10189069002

METHOD BLANK: 602084 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide	mg/L	ND	5.0	04/19/12 09:12	

LABORATORY CONTROL SAMPLE: 602085

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide	mg/L	48.8	48.0	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 602086 602087

Parameter	Units	10189069002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Sulfide	mg/L	ND	48.8	48.8	47.2	48.8	96	100	80-120	3	20	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WET/34788 | Analysis Method: SW-846 7.3.4.2
QC Batch Method: SW-846 7.3.4.2 | Analysis Description: Reactive Sulfide
Associated Lab Samples: 10189069001

METHOD BLANK: 989992 | Matrix: Solid
Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Sulfide, Reactive	mg/kg	ND	100	04/30/12 12:00	

LABORATORY CONTROL SAMPLE: 989993

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Sulfide, Reactive	mg/kg	200	190	95	77-110	

MATRIX SPIKE SAMPLE: 989994

Parameter	Units	10189069001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Sulfide, Reactive	mg/kg	ND	500	485	97	67-116	

SAMPLE DUPLICATE: 989995

Parameter	Units	4059213009 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfide, Reactive	mg/kg	<12.9	ND		30	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WETA/12099 | Analysis Method: EPA 350.1
QC Batch Method: EPA 350.1 | Analysis Description: 350.1 Ammonia
Associated Lab Samples: 10189069002

METHOD BLANK: 1183010 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Nitrogen, Ammonia	mg/L	ND	0.040	04/27/12 09:25	

LABORATORY CONTROL SAMPLE: 1183011

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Nitrogen, Ammonia	mg/L	1	1.0	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1183012 1183013

Parameter	Units	10189559001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Ammonia	mg/L	ND	1	1	0.58	ND	58	0	90-110		20	M1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1183014 1183015

Parameter	Units	10188935001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Nitrogen, Ammonia	mg/L	ND	1	1	ND	ND	0	1	90-110		20	M1

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WETA/19985 | Analysis Method: SW-846 7.3.3.2
QC Batch Method: SW-846 7.3.3.2 | Analysis Description: 733C Reactive Cyanide
Associated Lab Samples: 10189069001

METHOD BLANK: 987976 | Matrix: Solid
Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Cyanide, Reactive	mg/kg	ND	0.025	04/26/12 19:20	

LABORATORY CONTROL SAMPLE: 987977

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Cyanide, Reactive	mg/kg	.5	0.45	90	71-123	

MATRIX SPIKE SAMPLE: 987978

Parameter	Units	10189069001 Result	Spike Conc.	MS Result	MS % Rec	% Rec Limits	Qualifiers
Cyanide, Reactive	mg/kg	ND	.5	0.47	92	57-132	

SAMPLE DUPLICATE: 987979

Parameter	Units	4059213009 Result	Dup Result	RPD	Max RPD	Qualifiers
Cyanide, Reactive	mg/kg	<0.0017	ND		23	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WETA/7916 | Analysis Method: EPA 9012
QC Batch Method: EPA 9012 | Analysis Description: 9012 Cyanide, Amenable Soil
Associated Lab Samples: 10189069001

METHOD BLANK: 725879 | Matrix: Solid
Associated Lab Samples: 10189069001

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Amenable Cyanide	mg/kg	ND	0.50	04/27/12 13:24	N2

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

QC Batch: WETA/12082 | Analysis Method: SM 4500-P E
QC Batch Method: SM 4500-P E | Analysis Description: SM4500P-E, Total Phosphorus
Associated Lab Samples: 10189069002

METHOD BLANK: 1180871 | Matrix: Water
Associated Lab Samples: 10189069002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Phosphorus	mg/L	ND	0.10	04/26/12 08:48	

LABORATORY CONTROL SAMPLE: 1180872

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Phosphorus	mg/L	2.5	2.5	100	90-110	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1180873 1180874

Parameter	Units	10189069002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	0.11	2.5	2.5	0.86	0.83	30	29	80-120	4	30	M1

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1180875 1180876

Parameter	Units	10189460011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Phosphorus	mg/L	0.17	2.5	2.5	0.90	0.94	29	31	80-120	5	30	M1

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-D	Pace Analytical Services - Dallas
PASI-G	Pace Analytical Services - Green Bay
PASI-I	Pace Analytical Services - Indianapolis
PASI-K	Pace Analytical Services - Kansas City
PASI-M	Pace Analytical Services - Minneapolis

BATCH QUALIFIERS

Batch: MSSV/7991

[M5]	A matrix spike/matrix spike duplicate was not performed for this batch due to insufficient sample volume.

ANALYTE QUALIFIERS

1M	Results of chlorinated sample aliquot were greater than the Total Cyanide aliquot analyzed, due to suspected matrix interferences. As a result, no amenable cyanide is present or reported. ddm 4-30-12
2M	Sample was prepared for total cyanide and amenabilized cyanide analysis within EPA recommended hold period. However, due to limited sample hold time remaining after receipt, analysis was conducted the following day outside of EPA recommended hold period. ddm 4-30-12
CH	The continuing calibration for this compound is outside of Pace Analytical acceptance limits. The results may be biased high.
D4	Sample was diluted due to the presence of high levels of target analytes.
D6	The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.
H1	Analysis conducted outside the EPA method holding time.
H2	Extraction or preparation was conducted outside of the recognized method holding time.
L0	Analyte recovery in the laboratory control sample (LCS) was outside QC limits.
L3	Analyte recovery in the laboratory control sample (LCS) exceeded QC limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALIFIERS

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.
M6	Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.
N2	The lab does not hold TNI accreditation for this parameter.
S3	Surrogate recovery exceeded laboratory control limits. Analyte presence below reporting limits in associated samples. Results unaffected by high bias.
S4	Surrogate recovery not evaluated against control limits due to sample dilution.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189069

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10189069002	**IWMGP-TP16-WO1-041212**	EPA 3010	MPRP/32024	EPA 6010	ICP/13277
10189069002	**IWMGP-TP16-WO1-041212**	EPA 7470	MERP/6735	EPA 7470	MERC/7518
10189069001	**IWMGP-TP17-SO1-041212**	% Moisture	MPRP/31990		
10189069001	**IWMGP-TP17-SO1-041212**	EPA 3550	OEXT/18406	EPA 8270	MSSV/7984
10189069002	**IWMGP-TP16-WO1-041212**	EPA 3520	OEXT/18407	EPA 8270	MSSV/7991
10189069001	**IWMGP-TP17-SO1-041212**	EPA 5035/5030B	MSV/19984	EPA 8260	MSV/19985
10189069002	**IWMGP-TP16-WO1-041212**	EPA 8260	MSV/19979		
10189069001	**IWMGP-TP17-SO1-041212**	EPA 1010	WET/11564		
10189069002	**IWMGP-TP16-WO1-041212**	EPA 1010	WET/11564		
10189069002	**IWMGP-TP16-WO1-041212**	EPA 1664 OG	WET/25585		
10189069002	**IWMGP-TP16-WO1-041212**	SM 4500-S F (2000)	WET/11553		
10189069001	**IWMGP-TP17-SO1-041212**	SW-846 7.3.4.2	WET/34788		
10189069002	**IWMGP-TP16-WO1-041212**	EPA 350.1	WETA/12099		
10189069001	**IWMGP-TP17-SO1-041212**	SW-846 7.3.3.2	WETA/19985		
10189069001	**IWMGP-TP17-SO1-041212**	EPA 9012	WETA/7916		
10189069002	**IWMGP-TP16-WO1-041212**	SM 4500-P E	WETA/12082		

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical e-Report

Report prepared for:
PACE ANALYTICAL SERVICES
1241 BELLEVUE STREET
SUITE 9
GREEN BAY, WI 54302
CONTACT: DIANE J. ANDERSON

Project ID: 20405.012.001.1273.00 IRONWOOD
Sampling Date(s): April 12, 2012
Lab Report ID: 12050098
Client Service Contact: William Kotas (518) 346-4592 ext. 17

Analysis Included:
Total Organic Carbon

Test results meet all National Environmental Laboratory Accreditation Conference (NELAC) requirements unless noted in the case narrative. The results contained within this document relate only to the samples included in this report.This report shall not be reproduced, except in full, without the written consent of Pace Analytical Services, Inc.

Dan Pfalzer
Laboratory Director

Certifications: NYS (EPA: NY00906, ELAP: 11078), NJ (NY026), CT (PH-0337), MA(M-NY906), NC (668)

Pace Analytical Services, Inc.| 2190 Technology Drive | Schenectady, NY 12308
Phone: 518.346.4592 | internet: www.pacelabs.com

This page intentionally left blank.

Table of Contents

Section 1: CASE NARRATIVE 4

Section 2: QUALIFIERS 6

Section 3: SAMPLE CHAIN OF CUSTODY 8

Section 4: Wet Chemistry - TOC 10

Section 5: Quality Control Samples (Field) 12

Section 6: Quality Control Samples (Lab) 15

CASE NARRATIVE

May 10, 2012

CASE NARRATIVE

This data package (SDG ID: 12050098) consists of 1 solid sample received on 05/09/2012. The sample is from Project Name: 20405.012.001.1273.00 IRONWOOD.

This sample delivery group consists of the following samples:

1

Lab Sample ID	Client ID	Collection Date
AP05999	IWMGP-TP17-SO1-041212	04/12/2012 11:00

Sample Delivery and Receipt Conditions

(1.) All samples were delivered to the laboratory via FEDEX delivery service on 05/09/2012.

(2.) All samples were received at the laboratory intact and within holding times.

(3.) The following cooler temperature was recorded at sample receipt (Control limits are between 0-6 Degrees Celsius): 1.3 degrees Celsius. Please see Chain of Custody for details.

Total Organic Carbon Analysis

Analysis for Total Organic Carbon was performed by EPA Lloyd Kahn Method for solid samples. The following technical and administrative items were noted for the analysis:

(1.) The percent recovery for the matrix spike sample was outside quality acceptance limits for sample (LAB ID: AP05999M). Please see associated matrix spike certificate for details.

(2.) The relative percent difference between the sample and the duplicate sample was outside quality acceptance limits for sample (LAB ID: AP05999D). Please see associated duplicate certificate for details.

Respectfully submitted,

William A. Kotas
Client Services Manager

S:\Lims Data\1205\12050098\Package\CN_12050098_Rev00.doc

QUALIFIERS

Organic Laboratory Qualifiers Defined

B - Denotes analyte observed in associated method blank or extraction blank. Analyte concentration should be considered as estimated.

D - Surrogate was diluted out. The analysis of the sample required a dilution such that the surrogate concentration was diluted below the laboratory acceptance criteria.

E - Denotes analyte concentration exceeded calibration range of instrument. Sample could not be re-analyzed at secondary dilution due to insufficient sample amount, quick turn-around request, sample matrix interference or hold time excursion. Concentration result should be considered as estimated.

J - Denotes an estimated concentration. The concentration result is greater than or equal to the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

P - Indicates relative percent difference (RPD) between primary and secondary GC column analysis exceeds 40 % or indicates percent difference (PD) between primary and secondary GC column analysis exceeds 25 %.

U - Denotes analyte not detected at concentration greater than or equal to the RL. RL's are adjusted for sample weight/volume and dilution factors.

Z - Chromatographic interference due to PCB co-elution.

* - Value not within control limits.

Inorganic Laboratory Qualifiers Defined

B - Denotes analyte observed in associated method blank or digestion blank. Analyte concentration should be considered as estimated.

E - Denotes analyte concentration exceeded calibration range of instrument. Sample could not be re-analyzed at secondary dilution due to insufficient sample amount, quick turn-around request, sample matrix interference or hold time excursion. Concentration result should be considered as estimated.

J - Denotes an estimated concentration. The concentration result is greater than or equal to the Method Detection Limit (MDL) but less than the Reporting Limit (RL).

U - Denotes analyte not detected at concentration greater than or equal to the RL. RL's are adjusted for sample weight/volume and dilution factors.

* - Value not within control limits.

SAMPLE CHAIN OF CUSTODY

Chain of Custody

Pace Analytical
www.pacelabs.com

Workorder: 10189069 **Workorder Name:** 20405.012.001.1273.00 Ironwood **Owner Received Date:** 4/17/2012 **Results Requested By:** ~~4/30/2012~~ ASAP

Report To

Diane J. Anderson
Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone (612)607-1700
Fax (612)607-6444

Subcontract To

Pace Analytical New York
2190 Technology Drive
Schenectady, NY 12308
Phone (518)346-4592

<12050098P1>

120500981

24 hrs

Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	Preserved Containers: Unpreserved	Requested Analysis: TOC	LAB USE ONLY
1	IWMGP-TP17-SO1-041212	PS	4/12/2012 11:00	10189069001	Solid	1	X	AP05999
2								
3								
4								
5								

Transfers	Released By	Date/Time	Received By	Date/Time
1	[illegible] (Pace Hpl)	5/8/12 0800		5/8/12
2	[illegible]	5/8/12 1500	FedEx	~~9:21~~ AP 5/9/12 15:00
3	FedEx	5/9/12 9:21	[illegible]	5/9/12 9:21

Comments

Cooler Temperature on Receipt 1.3 °C **Custody Seal** (Y) or N **Received on Ice** (Y) or N **Samples Intact** (Y) or N

Tuesday, May 08, 2012 9:38:13 AM FMT-ALL-C-002rev.00 24March2009 Page 1 of 1

Wet Chemistry - TOC

4

Analytical Sample Results

Job Number: 12050098

Pace Analytical Services, Inc.
2190 Technology Drive
Schenectady, NY 12308
Phone: 518.346.4592
Fax: 518.381.6055

Client: PACE ANALYTICAL SERVICES
Project: 20405.012.001.1273.00 IRONWOOD
Client Sample ID: IWMGP-TP17-SO1-041212
Lab Sample ID: 12050098-01 (AP05999)

Collection Date: 04/12/2012 11:00
Sample Matrix: SOLID
Received Date: 05/09/2012 09:21
Percent Solid: 84.5 - Results are based on dry weight unless otherwise noted.

	Batch ID	Method	Date	Analyst	Init Wt./Vol.	Final Vol.	Column
Analysis 1:	670	EPA Lloyd Kahn	05/09/2012	MAH	NA	NA	NA

Analyte	CAS No.	Result (mg/kg)	PQL	Dilution Factor	Flags	File ID
Total Organic Carbon	TOC	**57000**	510	1.00		670

ND: Denotes analyte not detected at a concentration greater than the PQL.
PQL (Practical Quantitation Limit). Denotes lowest analyte concentration reportable for the sample.

4

This report may not be reproduced except in full, without the written approval of Pace Analytical Services, Inc.

Quality Control Samples (Field)

5

Quality Control Results
Matrix Spike Sample
Job Number: 12050098

Pace Analytical Services, Inc.
2190 Technology Drive
Schenectady, NY 12308
Phone: 518.346.4592
Fax: 518.381.6055

Client: PACE ANALYTICAL SERVICES
Project: 20405.012.001.1273.00 IRONWOOD
Client Sample ID: IWMGP-TP17-SO1-041212 MS
Lab Sample ID: 12050098-01M (AP05999M)

Collection Date: N/A
Sample Matrix: SOLID
Received Date: N/A
Percent Solid: 84.5 - Results are based on dry weight unless otherwise noted.

	Batch ID	Method	Date	Analyst	Init Wt./Vol.	Final Vol.	Column
Analysis 1:	670	EPA Lloyd Kahn	05/09/2012	MAH	NA	NA	NA

Analyte	CAS No.	Result (mg/kg)	PQL	Dilution Factor	Flags	File ID
Total Organic Carbon	TOC	**63000**	510	1.00		670

Analyte Spiked	CAS No.	Sample (mg/kg)	Added (mg/kg)	MS (mg/kg)	MS % Rec.	Q[1]	Limits (%)
Total Organic Carbon	TOC	57000	26000	63000	21.8	*	75.0-125

[1]Qualifier column where '*' denotes value outside the control limits. Note: RPD criteria does not apply if either the sample and duplicate sample are not detected.

5

ND: Denotes analyte not detected at a concentration greater than the PQL.
PQL (Practical Quantitation Limit). Denotes lowest analyte concentration reportable for the sample.

This report may not be reproduced except in full, without the written approval of Pace Analytical Services, Inc.

Quality Control Results
Duplicate Sample
Job Number: 12050098

Pace Analytical Services, Inc.
2190 Technology Drive
Schenectady, NY 12308
Phone: 518.346.4592
Fax: 518.381.6055

Client: PACE ANALYTICAL SERVICES
Project: 20405.012.001.1273.00 IRONWOOD
Client Sample ID: IWMGP-TP17-SO1-041212 DUP
Lab Sample ID: 12050098-01D (AP05999D)

Collection Date: N/A
Sample Matrix: SOLID
Received Date: N/A
Percent Solid: 84.5 - Results are based on dry weight unless otherwise noted.

	Batch ID	Method	Date	Analyst	Init Wt./Vol.	Final Vol.	Column
Analysis 1:	670	EPA Lloyd Kahn	05/09/2012	MAH	NA	NA	NA

Analyte	CAS No.	Result (mg/kg)	PQL	Dilution Factor	Flags	File ID
Total Organic Carbon	TOC	**37000**	450	1.00		670

Analyte	CAS No.	Duplicate (mg/kg)	Precision: Sample (mg/kg)	RPD	Q[1]	Limits (%)
Total Organic Carbon	TOC	37000	ND	43.8	*	20

[1]Qualifier column where '*' denotes value outside the control limits. Note: RPD criteria does not apply if either the sample and duplicate sample are not detected.

5

ND: Denotes analyte not detected at a concentration greater than the PQL.
PQL (Practical Quantitation Limit). Denotes lowest analyte concentration reportable for the sample.

This report may not be reproduced except in full, without the written approval of Pace Analytical Services, Inc.

Quality Control Samples (Lab)

6

Quality Control Results
Method Blank

Job Number: 12050098

Pace Analytical Services, Inc.
2190 Technology Drive
Schenectady, NY 12308
Phone: 518.346.4592
Fax: 518.381.6055

Client: PACE ANALYTICAL SERVICES
Project: 20405.012.001.1273.00 IRONWOOD
Client Sample ID: Method Blank (AP05999B)
Lab Sample ID: BLANK-01

Collection Date: N/A
Sample Matrix: SOLID
Received Date: N/A
Percent Solid: N/A

	Batch ID	Method	Date	Analyst	Init Wt./Vol.	Final Vol.	Column
Analysis 1:	670	EPA Lloyd Kahn	05/09/2012	MAH	NA	NA	NA

Analyte	CAS No.	Result (mg/kg)	PQL	Dilution Factor	Flags	File ID
Total Organic Carbon	TOC	ND	430	1.00	U	670

ND: Denotes analyte not detected at a concentration greater than the PQL.
PQL (Practical Quantitation Limit). Denotes lowest analyte concentration reportable for the sample.

6

This report may not be reproduced except in full, without the written approval of Pace Analytical Services, Inc.

Quality Control Results
Lab Control Sample

Job Number: 12050098

Pace Analytical Services, Inc.
2190 Technology Drive
Schenectady, NY 12308
Phone: 518.346.4592
Fax: 518.381.6055

Client: PACE ANALYTICAL SERVICES
Project: 20405.012.001.1273.00 IRONWOOD
Client Sample ID: Lab Control Sample (AP05999L)
Lab Sample ID: LCS-01

Collection Date: N/A
Sample Matrix: SOLID
Received Date: N/A
Percent Solid: N/A

	Batch ID	Method	Date	Analyst	Init Wt./Vol.	Final Vol.	Column
Analysis 1:	670	EPA Lloyd Kahn	05/09/2012	MAH	NA	NA	NA

Analyte Spiked	CAS No.	Added (mg/kg)	LCS (mg/kg)	LCS % Rec.	Q[1]	Limits (%)
Total Organic Carbon	TOC	4100	3400	82.6		33.1-167

[1]Qualifier column where '*' denotes value outside the control limits. Note: RPD criteria does not apply if either the sample and duplicate sample are not detected.

ND: Denotes analyte not detected at a concentration greater than the PQL.
PQL (Practical Quantitation Limit). Denotes lowest analyte concentration reportable for the sample.

6

This report may not be reproduced except in full, without the written approval of Pace Analytical Services, Inc.
2190 Technology Drive | Schenectady, NY 12308 | Phone 518.346.4592 | Fax 518.381.6055 | www.pacelabs.com

Pace Analytical®
www.pacelabs.com

1151, 1152

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10189069

Page: 1 of 1

1531986

Section A Required Client Information:

Company: WESTON SOLUTIONS
Address: 600 E. LAKESHORE DR. #600, HOUGHTON, MI 49931
Email To: daniel-liebau@westonsolutions.com
Phone: 906-482-2361 Fax:
Requested Due Date/TAT: STANDARD

Section B Required Project Information:

Report To: DAN LIEBAU
Copy To: —
Purchase Order No.: —
Project Name: IRONWOOD MGP
Project Number: 20405.012.001.1273.00

Section C Invoice Information:

Attention: SAME
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY: ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MI

Section D Required Client Information

Matrix Codes (MATRIX / CODE): Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	VOC 8260	SVOC 8270	TOC 415.2	CYANIDE-AMENABLE	CYANIDE-REACTIVE	SULFIDE-REACTIVE	FLASHPOINT 1010	OIL+GREASE 1664	SULFIDE	METALS-MN 10	MOISTURE	TOTAL P, AMMONIA	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	IWMGP-TP17-SO1-041212	SL		4/12/12	11:00				8									X	X	X	X	X	X				X			4-40mL, 1-4oz, 1-5-100mL
2	IWMGP-TP16-WO1-041212	WT		4/12/12	9:30				13									X	X		X		X	X	X	X		X		6-40mL, 3-1L, 3-250mL, 1-500mL
3																														
4																														
5																														
6																														
7																														
8																														
9																														
10																														
11																														
12																														

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME
	WESTON	04/12/12	1600	~~FEDEX~~	04/12/12	1600
	EPA	4/13/12	1710	Pace	4/13/12	1710
	Pace	4/16/12	1730	Waltco		
				Pace	4/17/12	0911

SAMPLE CONDITIONS

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
Rolls	Y	N	Y
2.5	Y	Y	Y

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: DANIEL LIEBAU

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 04/12/12

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

Client Name: Weston Solutions Project # _____

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☑ Bubble Bags ☐ None Other

Thermometer Used JB **Type of Ice:** (Wet) Blue Dry None ☑ Samples on ice, cooling process has begun.

Cooler Temperature 5 **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☑ yes ☐ no

Optional
Proj. Due Date:
Proj. Name:

Temp should be above freezing to 6°C for all sample except Biota.
Biota Samples should be received ≤ 0°C.

Person examining contents:
Date: 4/13/12
Initials: KF

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☐Yes ☑No ☐N/A	10. SP001: 1-4oz aq received with cracked lid. KF 4/13/12
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC:	☑Yes ☐No ☐N/A	12.
-Includes date/time/ID/Analysis Matrix: W/S		
All containers needing preservation have been checked.	☑Yes ☐No ☐N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☑Yes ☐No ☐N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed KF / Lot # of added preservative
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☑No ☐N/A	15.
Trip Blank Present:	☐Yes ☑No ☐N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** _____

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

F-GB-C-031-Rev.00 (29Sept2011) SCUR Form

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: **F-MN-L-213-rev.02**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Pace Green Bay Project # 10148906 9

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other Waltco

Tracking #: _____

Optional Proj. Due Date: Proj. Name:

Custody Seal on Cooler/Box Present: ☒ yes ☐ no Seals intact: ☒ yes ☐ no

Packing Material: ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____ Temp Blank: Yes X No _____

Thermometer Used 80344042 or 80512447 **Type of Ice:** Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 2.5 **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: 4/17/12 BA

		Comments:
Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	☒Yes ☐No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: WT	☒Yes ☐No ☐N/A	12. missing 1 250 preserved and 1 500 preserved.
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☒Yes ☐No ☐N/A	13. ☒ HNO3 ☒ H2SO4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	☒Yes ☐No ☐N/A	Samp # 002 1of1 002 1of1
Exceptions: VOA,Coliform,(TOC) Oil and Grease, WI-DRO (water) BA 4/17/12	☒Yes ☐No BA 4/17/12	Initial when completed BA Lot # of added preservative
Headspace in VOA Vials (>6mm):	☐Yes ☒No ☒N/A	14.
Trip Blank Present:	☐Yes ☒No ☐N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

Project Manager Review: _____ **Date:** _____

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23754

Official Laboratory Report

Report To: DAN LIEBAU-WESTON SOLUTIONS
600 E LAKESHORE DR
STE 200
HOUGHTON MI 49931

System Name/Owner:	DAVID & JOY KANTALA	WSSN/Pool ID:		
Collection Address:	N10339 VANDERHAGEN RD,IRONWO	Source:	Single Family Dwelling	
Collected By:	CHRIS TUFTS	Site Code:	456689	
Township/Well#/Section:	IRONWOOD//	Collector:	Other	
County:	Gogebic	Date Collected:	04/12/2012	10:20
Sample Point:	BELOW PRESSURE TANK @ SPIGOT	Date Received:	04/17/2012	11:32
Water System:	Untreated Private Well	Purpose:	Other	

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Aromatic Compounds by GC/MS						
1 Methylnaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	90-12-0
2 Chloronaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	91-58-7
2 Methylnaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	91-57-6
2,4 Dinitrotoluene	Not Detected	04/20/2012	0.001		EPA 525.2	121-14-2
2,6 Dinitrotoluene	Not Detected	04/20/2012	0.001		EPA 525.2	606-20-2
Acenaphthene	Not Detected	04/20/2012	0.001		EPA 525.2	83-32-9
Acenaphthylene	Not Detected	04/20/2012	0.001		EPA 525.2	208-96-8
Anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	120-12-7
Benzo[a]anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	56-55-3
Benzo[a]pyrene	Not Detected	04/20/2012	0.00006	0.0002	EPA 525.2	50-32-8
Benzo[b]fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	205-99-2
Benzo[g,h,i]perylene	Not Detected	04/20/2012	0.001		EPA 525.2	191-24-2
Benzo[k]fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	207-08-9
Chrysene	Not Detected	04/20/2012	0.001		EPA 525.2	218-01-9
Di(2-ethylhexyl)adipate	Not Detected	04/20/2012	0.0006	0.4	EPA 525.2	103-23-1
Di(2-ethylhexyl)phthalate	Not Detected	04/20/2012	0.0018	0.006	EPA 525.2	117-81-7
Dibenz[a,h]anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	53-70-3
Fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	206-44-0
Fluorene	Not Detected	04/20/2012	0.001		EPA 525.2	86-73-7
Indeno(1,2,3,c,d)pyrene	Not Detected	04/20/2012	0.001		EPA 525.2	193-39-5
Phenanthrene	Not Detected	04/20/2012	0.001		EPA 525.2	85-01-8
Pyrene	Not Detected	04/20/2012	0.001		EPA 525.2	129-00-0

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23754

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Volatile Organic Compounds						
1,1 Dichloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	75-34-3
1,1 Dichloroethylene	Not Detected	04/26/2012	0.0005	0.007	EPA 524.2	75-35-4
1,1 Dichloropropene	Not Detected	04/26/2012	0.0005		EPA 524.2	563-58-6
1,1,1 Trichloroethane	Not Detected	04/26/2012	0.0005	0.2	EPA 524.2	71-55-6
1,1,1,2 Tetrachloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	630-20-6
1,1,2 Trichloroethane	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	79-00-5
1,1,2,2 Tetrachloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	79-34-5
1,2 Dichlorobenzene	Not Detected	04/26/2012	0.0005	0.6	EPA 524.2	95-50-1
1,2 Dichloroethane	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	107-06-2
1,2 Dichloropropane	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	78-87-5
1,2,3 Trichlorobenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	87-61-6
1,2,3 Trichloropropane	Not Detected	04/26/2012	0.0005		EPA 524.2	96-18-4
1,2,4 Trichlorobenzene	Not Detected	04/26/2012	0.0005	0.07	EPA 524.2	120-82-1
1,2,4 Trimethylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	95-63-6
1,3 Dichlorobenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	541-73-1
1,3 Dichloropropane	Not Detected	04/26/2012	0.0005		EPA 524.2	142-28-9
1,3,5 Trimethylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	108-67-8
1,4 Dichlorobenzene	Not Detected	04/26/2012	0.0005	0.075	EPA 524.2	106-46-7
2,2 Dichloropropane	Not Detected	04/26/2012	0.0005		EPA 524.2	594-20-7
Benzene	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	71-43-2
Bromobenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	108-86-1
Bromochloromethane	Not Detected	04/26/2012	0.0005		EPA 524.2	74-97-5
Bromodichloromethane	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	75-27-4
Bromoform	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	75-25-2
Bromomethane	Not Detected	04/26/2012	0.001		EPA 524.2	74-83-9
Carbon tetrachloride	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	56-23-5
Chlorobenzene	Not Detected	04/26/2012	0.0005	0.1	EPA 524.2	108-90-7
Chlorodibromomethane	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	124-48-1
Chloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	75-00-3
Chloroform	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	67-66-3
Chloromethane	Not Detected	04/26/2012	0.0005		EPA 524.2	74-87-3
cis-1,2 Dichloroethylene	Not Detected	04/26/2012	0.0005	0.07	EPA 524.2	156-59-2
cis-1,3 Dichloropropene	Not Detected	04/26/2012	0.0005		EPA 524.2	10061-01-5
Dibromomethane	Not Detected	04/26/2012	0.0005		EPA 524.2	74-95-3
Dichlorodifluoromethane	Not Detected	04/26/2012	0.001		EPA 524.2	75-71-8
Dichloromethane	Not Detected	04/26/2012	0.0006	0.005	EPA 524.2	75-09-2
Ethylbenzene	Not Detected	04/26/2012	0.0005	0.7	EPA 524.2	100-41-4
Fluorotrichloromethane	Not Detected	04/26/2012	0.001		EPA 524.2	75-69-4
Hexachlorobutadiene	Not Detected	04/26/2012	0.0005		EPA 524.2	87-68-3

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23754

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Volatile Organic Compounds						
Isopropylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	98-82-8
m & p-Xylene	Not Detected	04/26/2012	0.0005	10	EPA 524.2	XYLMP-00-C
Methyl ethyl ketone	Not Detected	04/26/2012	0.005		EPA 524.2	78-93-3
Methyl isobutyl ketone	Not Detected	04/26/2012	0.005		EPA 524.2	108-10-1
Methyl-tert-butyl ether (MTBE)	Not Detected	04/26/2012	0.001		EPA 524.2	1634-04-4
Naphthalene	Not Detected	04/26/2012	0.0005		EPA 524.2	91-20-3
n-Butylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	104-51-8
Nitrobenzene	Not Detected	04/26/2012	0.01		EPA 524.2	98-95-3
n-Propylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	103-65-1
o-Chlorotoluene	Not Detected	04/26/2012	0.0005		EPA 524.2	95-49-8
o-Xylene	Not Detected	04/26/2012	0.0005	10	EPA 524.2	95-47-6
p-Chlorotoluene	Not Detected	04/26/2012	0.0005		EPA 524.2	106-43-4
p-Isopropyltoluene	Not Detected	04/26/2012	0.0005		EPA 524.2	99-87-6
sec-Butylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	135-98-8
Styrene	Not Detected	04/26/2012	0.0005	0.1	EPA 524.2	100-42-5
tert-Butylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	98-06-6
Tetrachloroethylene	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	127-18-4
Tetrahydrofuran	Not Detected	04/26/2012	0.005		EPA 524.2	109-99-9
Toluene	Not Detected	04/26/2012	0.0005	1	EPA 524.2	108-88-3
Total Trihalomethanes	Not Detected	04/26/2012	NA	0.080	EPA 524.2	TTHM-00-C
Total Xylenes	Not Detected	04/26/2012	NA	10	EPA 524.2	1330-20-7
trans-1,2 Dichloroethylene	Not Detected	04/26/2012	0.0005	0.1	EPA 524.2	156-60-5
trans-1,3 Dichloropropene	Not Detected	04/26/2012	0.0005		EPA 524.2	10061-02-6
Trichloroethylene	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	79-01-6
Vinyl chloride	Not Detected	04/26/2012	0.0004	0.002	EPA 524.2	75-01-4

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Western Upper Peninsula District
210 N. Moore St.
Bessemer, MI 49911
906 667-0263

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23753

Official Laboratory Report

Report To: DAN LIEBAU-WESTON SOLUTIONS
600 E LAKESHORE DR
STE 200
HOUGHTON MI 49931

System Name/Owner:	JOHN MATTSON	WSSN/Pool ID:		
Collection Address:	N10307 VANDERHAGEN RD,IRONWO	Source:	Single Family Dwelling	
Collected By:	CHRIS TUFTS	Site Code:	456689	
Township/Well#/Section:	IRONWOOD//	Collector:	Other	
County:	Gogebic	Date Collected:	04/12/2012	11:15
Sample Point:	SPIGOT @ PRESSURE TANK	Date Received:	04/17/2012	11:32
Water System:	Untreated Private Well	Purpose:	Other	

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Aromatic Compounds by GC/MS						
1 Methylnaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	90-12-0
2 Chloronaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	91-58-7
2 Methylnaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	91-57-6
2,4 Dinitrotoluene	Not Detected	04/20/2012	0.001		EPA 525.2	121-14-2
2,6 Dinitrotoluene	Not Detected	04/20/2012	0.001		EPA 525.2	606-20-2
Acenaphthene	Not Detected	04/20/2012	0.001		EPA 525.2	83-32-9
Acenaphthylene	Not Detected	04/20/2012	0.001		EPA 525.2	208-96-8
Anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	120-12-7
Benzo[a]anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	56-55-3
Benzo[a]pyrene	Not Detected	04/20/2012	0.00006	0.0002	EPA 525.2	50-32-8
Benzo[b]fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	205-99-2
Benzo[g,h,i]perylene	Not Detected	04/20/2012	0.001		EPA 525.2	191-24-2
Benzo[k]fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	207-08-9
Chrysene	Not Detected	04/20/2012	0.001		EPA 525.2	218-01-9
Di(2-ethylhexyl)adipate	Not Detected	04/20/2012	0.0006	0.4	EPA 525.2	103-23-1
Di(2-ethylhexyl)phthalate	Not Detected	04/20/2012	0.0018	0.006	EPA 525.2	117-81-7
Dibenz[a,h]anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	53-70-3
Fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	206-44-0
Fluorene	Not Detected	04/20/2012	0.001		EPA 525.2	86-73-7
Indeno(1,2,3,c,d)pyrene	Not Detected	04/20/2012	0.001		EPA 525.2	193-39-5
Phenanthrene	Not Detected	04/20/2012	0.001		EPA 525.2	85-01-8
Pyrene	Not Detected	04/20/2012	0.001		EPA 525.2	129-00-0

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY
USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23753

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #

Quality control results for benzo(b)fluoranthene and dibenz(ah)anthracene were outside allowed limits due to matrix interferences.

Volatile Organic Compounds

1,1 Dichloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	75-34-3
1,1 Dichloroethylene	Not Detected	04/26/2012	0.0005	0.007	EPA 524.2	75-35-4
1,1 Dichloropropene	Not Detected	04/26/2012	0.0005		EPA 524.2	563-58-6
1,1,1 Trichloroethane	Not Detected	04/26/2012	0.0005	0.2	EPA 524.2	71-55-6
1,1,1,2 Tetrachloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	630-20-6
1,1,2 Trichloroethane	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	79-00-5
1,1,2,2 Tetrachloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	79-34-5
1,2 Dichlorobenzene	Not Detected	04/26/2012	0.0005	0.6	EPA 524.2	95-50-1
1,2 Dichloroethane	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	107-06-2
1,2 Dichloropropane	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	78-87-5
1,2,3 Trichlorobenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	87-61-6
1,2,3 Trichloropropane	Not Detected	04/26/2012	0.0005		EPA 524.2	96-18-4
1,2,4 Trichlorobenzene	Not Detected	04/26/2012	0.0005	0.07	EPA 524.2	120-82-1
1,2,4 Trimethylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	95-63-6
1,3 Dichlorobenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	541-73-1
1,3 Dichloropropane	Not Detected	04/26/2012	0.0005		EPA 524.2	142-28-9
1,3,5 Trimethylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	108-67-8
1,4 Dichlorobenzene	Not Detected	04/26/2012	0.0005	0.075	EPA 524.2	106-46-7
2,2 Dichloropropane	Not Detected	04/26/2012	0.0005		EPA 524.2	594-20-7
Benzene	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	71-43-2
Bromobenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	108-86-1
Bromochloromethane	Not Detected	04/26/2012	0.0005		EPA 524.2	74-97-5
Bromodichloromethane	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	75-27-4
Bromoform	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	75-25-2
Bromomethane	Not Detected	04/26/2012	0.001		EPA 524.2	74-83-9
Carbon tetrachloride	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	56-23-5
Chlorobenzene	Not Detected	04/26/2012	0.0005	0.1	EPA 524.2	108-90-7
Chlorodibromomethane	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	124-48-1
Chloroethane	Not Detected	04/26/2012	0.0005		EPA 524.2	75-00-3
Chloroform	Not Detected	04/26/2012	0.0005	0.080	EPA 524.2	67-66-3
Chloromethane	Not Detected	04/26/2012	0.0005		EPA 524.2	74-87-3
cis-1,2 Dichloroethylene	Not Detected	04/26/2012	0.0005	0.07	EPA 524.2	156-59-2
cis-1,3 Dichloropropene	Not Detected	04/26/2012	0.0005		EPA 524.2	10061-01-5
Dibromomethane	Not Detected	04/26/2012	0.0005		EPA 524.2	74-95-3
Dichlorodifluoromethane	Not Detected	04/26/2012	0.001		EPA 524.2	75-71-8

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23753

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Volatile Organic Compounds						
Dichloromethane	Not Detected	04/26/2012	0.0006	0.005	EPA 524.2	75-09-2
Ethylbenzene	Not Detected	04/26/2012	0.0005	0.7	EPA 524.2	100-41-4
Fluorotrichloromethane	Not Detected	04/26/2012	0.001		EPA 524.2	75-69-4
Hexachlorobutadiene	Not Detected	04/26/2012	0.0005		EPA 524.2	87-68-3
Isopropylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	98-82-8
m & p-Xylene	Not Detected	04/26/2012	0.0005	10	EPA 524.2	XYLMP-00-C
Methyl ethyl ketone	Not Detected	04/26/2012	0.005		EPA 524.2	78-93-3
Methyl isobutyl ketone	Not Detected	04/26/2012	0.005		EPA 524.2	108-10-1
Methyl-tert-butyl ether (MTBE)	Not Detected	04/26/2012	0.001		EPA 524.2	1634-04-4
Naphthalene	Not Detected	04/26/2012	0.0005		EPA 524.2	91-20-3
n-Butylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	104-51-8
Nitrobenzene	Not Detected	04/26/2012	0.01		EPA 524.2	98-95-3
n-Propylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	103-65-1
o-Chlorotoluene	Not Detected	04/26/2012	0.0005		EPA 524.2	95-49-8
o-Xylene	Not Detected	04/26/2012	0.0005	10	EPA 524.2	95-47-6
p-Chlorotoluene	Not Detected	04/26/2012	0.0005		EPA 524.2	106-43-4
p-Isopropyltoluene	Not Detected	04/26/2012	0.0005		EPA 524.2	99-87-6
sec-Butylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	135-98-8
Styrene	Not Detected	04/26/2012	0.0005	0.1	EPA 524.2	100-42-5
tert-Butylbenzene	Not Detected	04/26/2012	0.0005		EPA 524.2	98-06-6
Tetrachloroethylene	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	127-18-4
Tetrahydrofuran	Not Detected	04/26/2012	0.005		EPA 524.2	109-99-9
Toluene	Not Detected	04/26/2012	0.0005	1	EPA 524.2	108-88-3
Total Trihalomethanes	Not Detected	04/26/2012	NA	0.080	EPA 524.2	TTHM-00-C
Total Xylenes	Not Detected	04/26/2012	NA	10	EPA 524.2	1330-20-7
trans-1,2 Dichloroethylene	Not Detected	04/26/2012	0.0005	0.1	EPA 524.2	156-60-5
trans-1,3 Dichloropropene	Not Detected	04/26/2012	0.0005		EPA 524.2	10061-02-6
Trichloroethylene	Not Detected	04/26/2012	0.0005	0.005	EPA 524.2	79-01-6
Vinyl chloride	Not Detected	04/26/2012	0.0004	0.002	EPA 524.2	75-01-4

A trip blank was not available for analysis with this sample. This sample contained acetone at a concentration of 60 ppb.

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23753

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Western Upper Peninsula District
210 N. Moore St.
Bessemer, MI 49911
906 667-0263

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23755

Official Laboratory Report

Report To: DAN LIEBAU-WESTON SOLUTIONS
600 E LAKESHORE DR
STE 200
HOUGHTON MI 49931

System Name/Owner:	DARRYL JOHNSON	WSSN/Pool ID:		
Collection Address:	N10290 JUNET RD,IRONWOOD	Source:	Single Family Dwelling	
Collected By:	DAN LIEBAU	Site Code:	456689	
Township/Well#/Section:	IRONWOOD//	Collector:	Other	
County:	Gogebic	Date Collected:	04/13/2012	10:30
Sample Point:	@ PRESSURE TANK	Date Received:	04/17/2012	11:32
Water System:	Untreated Private Well	Purpose:	Other	

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Aromatic Compounds by GC/MS						
1 Methylnaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	90-12-0
2 Chloronaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	91-58-7
2 Methylnaphthalene	Not Detected	04/20/2012	0.001		EPA 525.2	91-57-6
2,4 Dinitrotoluene	Not Detected	04/20/2012	0.001		EPA 525.2	121-14-2
2,6 Dinitrotoluene	Not Detected	04/20/2012	0.001		EPA 525.2	606-20-2
Acenaphthene	Not Detected	04/20/2012	0.001		EPA 525.2	83-32-9
Acenaphthylene	Not Detected	04/20/2012	0.001		EPA 525.2	208-96-8
Anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	120-12-7
Benzo[a]anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	56-55-3
Benzo[a]pyrene	Not Detected	04/20/2012	0.00006	0.0002	EPA 525.2	50-32-8
Benzo[b]fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	205-99-2
Benzo[g,h,i]perylene	Not Detected	04/20/2012	0.001		EPA 525.2	191-24-2
Benzo[k]fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	207-08-9
Chrysene	Not Detected	04/20/2012	0.001		EPA 525.2	218-01-9
Di(2-ethylhexyl)adipate	Not Detected	04/20/2012	0.0006	0.4	EPA 525.2	103-23-1
Di(2-ethylhexyl)phthalate	Not Detected	04/20/2012	0.0018	0.006	EPA 525.2	117-81-7
Dibenz[a,h]anthracene	Not Detected	04/20/2012	0.001		EPA 525.2	53-70-3
Fluoranthene	Not Detected	04/20/2012	0.001		EPA 525.2	206-44-0
Fluorene	Not Detected	04/20/2012	0.001		EPA 525.2	86-73-7
Indeno(1,2,3,c,d)pyrene	Not Detected	04/20/2012	0.001		EPA 525.2	193-39-5
Phenanthrene	Not Detected	04/20/2012	0.001		EPA 525.2	85-01-8
Pyrene	Not Detected	04/20/2012	0.001		EPA 525.2	129-00-0

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23755

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Volatile Organic Compounds						
1,1 Dichloroethane	Not Detected	04/27/2012	0.0005		EPA 524.2	75-34-3
1,1 Dichloroethylene	Not Detected	04/27/2012	0.0005	0.007	EPA 524.2	75-35-4
1,1 Dichloropropene	Not Detected	04/27/2012	0.0005		EPA 524.2	563-58-6
1,1,1 Trichloroethane	Not Detected	04/27/2012	0.0005	0.2	EPA 524.2	71-55-6
1,1,1,2 Tetrachloroethane	Not Detected	04/27/2012	0.0005		EPA 524.2	630-20-6
1,1,2 Trichloroethane	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	79-00-5
1,1,2,2 Tetrachloroethane	Not Detected	04/27/2012	0.0005		EPA 524.2	79-34-5
1,2 Dichlorobenzene	Not Detected	04/27/2012	0.0005	0.6	EPA 524.2	95-50-1
1,2 Dichloroethane	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	107-06-2
1,2 Dichloropropane	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	78-87-5
1,2,3 Trichlorobenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	87-61-6
1,2,3 Trichloropropane	Not Detected	04/27/2012	0.0005		EPA 524.2	96-18-4
1,2,4 Trichlorobenzene	Not Detected	04/27/2012	0.0005	0.07	EPA 524.2	120-82-1
1,2,4 Trimethylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	95-63-6
1,3 Dichlorobenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	541-73-1
1,3 Dichloropropane	Not Detected	04/27/2012	0.0005		EPA 524.2	142-28-9
1,3,5 Trimethylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	108-67-8
1,4 Dichlorobenzene	Not Detected	04/27/2012	0.0005	0.075	EPA 524.2	106-46-7
2,2 Dichloropropane	Not Detected	04/27/2012	0.0005		EPA 524.2	594-20-7
Benzene	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	71-43-2
Bromobenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	108-86-1
Bromochloromethane	Not Detected	04/27/2012	0.0005		EPA 524.2	74-97-5
Bromodichloromethane	Not Detected	04/27/2012	0.0005	0.080	EPA 524.2	75-27-4
Bromoform	Not Detected	04/27/2012	0.0005	0.080	EPA 524.2	75-25-2
Bromomethane	Not Detected	04/27/2012	0.001		EPA 524.2	74-83-9
Carbon tetrachloride	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	56-23-5
Chlorobenzene	Not Detected	04/27/2012	0.0005	0.1	EPA 524.2	108-90-7
Chlorodibromomethane	Not Detected	04/27/2012	0.0005	0.080	EPA 524.2	124-48-1
Chloroethane	Not Detected	04/27/2012	0.0005		EPA 524.2	75-00-3
Chloroform	Not Detected	04/27/2012	0.0005	0.080	EPA 524.2	67-66-3
Chloromethane	Not Detected	04/27/2012	0.0005		EPA 524.2	74-87-3
cis-1,2 Dichloroethylene	Not Detected	04/27/2012	0.0005	0.07	EPA 524.2	156-59-2
cis-1,3 Dichloropropene	Not Detected	04/27/2012	0.0005		EPA 524.2	10061-01-5
Dibromomethane	Not Detected	04/27/2012	0.0005		EPA 524.2	74-95-3
Dichlorodifluoromethane	Not Detected	04/27/2012	0.001		EPA 524.2	75-71-8
Dichloromethane	Not Detected	04/27/2012	0.0006	0.005	EPA 524.2	75-09-2
Ethylbenzene	Not Detected	04/27/2012	0.0005	0.7	EPA 524.2	100-41-4
Fluorotrichloromethane	Not Detected	04/27/2012	0.001		EPA 524.2	75-69-4
Hexachlorobutadiene	Not Detected	04/27/2012	0.0005		EPA 524.2	87-68-3

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
DRINKING WATER LABORATORY

USEPA Region V Drinking Water Cert. No. MI00003
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-8184
FAX: (517) 335-8562

Sample Number
LE23755

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Volatile Organic Compounds						
Isopropylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	98-82-8
m & p-Xylene	Not Detected	04/27/2012	0.0005	10	EPA 524.2	XYLMP-00-C
Methyl ethyl ketone	Not Detected	04/27/2012	0.005		EPA 524.2	78-93-3
Methyl isobutyl ketone	Not Detected	04/27/2012	0.005		EPA 524.2	108-10-1
Methyl-tert-butyl ether (MTBE)	Not Detected	04/27/2012	0.001		EPA 524.2	1634-04-4
Naphthalene	Not Detected	04/27/2012	0.0005		EPA 524.2	91-20-3
n-Butylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	104-51-8
Nitrobenzene	Not Detected	04/27/2012	0.01		EPA 524.2	98-95-3
n-Propylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	103-65-1
o-Chlorotoluene	Not Detected	04/27/2012	0.0005		EPA 524.2	95-49-8
o-Xylene	Not Detected	04/27/2012	0.0005	10	EPA 524.2	95-47-6
p-Chlorotoluene	Not Detected	04/27/2012	0.0005		EPA 524.2	106-43-4
p-Isopropyltoluene	Not Detected	04/27/2012	0.0005		EPA 524.2	99-87-6
sec-Butylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	135-98-8
Styrene	Not Detected	04/27/2012	0.0005	0.1	EPA 524.2	100-42-5
tert-Butylbenzene	Not Detected	04/27/2012	0.0005		EPA 524.2	98-06-6
Tetrachloroethylene	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	127-18-4
Tetrahydrofuran	Not Detected	04/27/2012	0.005		EPA 524.2	109-99-9
Toluene	Not Detected	04/27/2012	0.0005	1	EPA 524.2	108-88-3
Total Trihalomethanes	Not Detected	04/27/2012	NA	0.080	EPA 524.2	TTHM-00-C
Total Xylenes	Not Detected	04/27/2012	NA	10	EPA 524.2	1330-20-7
trans-1,2 Dichloroethylene	Not Detected	04/27/2012	0.0005	0.1	EPA 524.2	156-60-5
trans-1,3 Dichloropropene	Not Detected	04/27/2012	0.0005		EPA 524.2	10061-02-6
Trichloroethylene	Not Detected	04/27/2012	0.0005	0.005	EPA 524.2	79-01-6
Vinyl chloride	Not Detected	04/27/2012	0.0004	0.002	EPA 524.2	75-01-4

The analyses performed by the MDEQ Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.

Your local health department has detailed information about the quality of drinking water in your area. If you have concerns about the health risks related to the test results of your sample, please contact the Environmental Health Section through the address and telephone number listed below:

Western Upper Peninsula District
210 N. Moore St.
Bessemer, MI 49911
906 667-0263

CAS# : Chemical Abstract Service Registry Number
MCL : Maximum Contaminant Level
AL : Action Level
RL : Reporting Limit

mg/L : milligrams / Liter (ppm)
ppm : parts per million
MPN : Most Probable Number
CFU : Colony Forming Unit

Laboratory Contacts
Drinking Water Unit Mgr: Julia Pieper
Systems Mgmt. Unit Mgr: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Division: RD
Report to: STEVE HARRINGTON
MDEQ-RD-UP
UP DISTRICT
420 FIFTH ST, GWINN, MI 49841

Total: $3,404.50

Lab Work Order # : 20400124
Work Site ID : 27000066
Site Name : IRONWOOD MGP SITE
Received: 04/17/2012
Reported: 05/23/2012
Collected By: CHRISTINE TUFTS

Samples Received :

No:	Sample ID	Sample Description	Matrix:	Collection Date
01	AB94459	IWMGP-S01-SED01-041112	SEDIMENT	04/11/2012
02	AB94460	IWMGP-S02-SED02-041112	SEDIMENT	04/11/2012
03	AB94461	IWMGP-S03-SED03-041112	SEDIMENT	04/11/2012
04	AB94462	IWMGP-S04-SED04-041112	SEDIMENT	04/11/2012
05	AB94463	IWMGP-TB-5	SEDIMENT	04/04/2012

I certify that the analysis performed by the MDEQ Environmental Laboratory are accurate and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency and other appropriate regulatory agencies.

George L. Krisztian,
Laboratory Director

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94459 IWMGP-S01-SED01-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/04/2012 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	68.8			
SURROGATE	#2,4,6-Tribromophenol#	71.0			
SURROGATE	#2-Fluorophenol#	65.2			
SURROGATE	#Nitrobenzene - D5#	64.7			
SURROGATE	#Phenol - D6#	71.6			
SURROGATE	#p-Terphenyl-d14#	74.9			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	510		2.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	840		2.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	840		2.0
120-83-2	2,4-Dichlorophenol	Not Detected	840		2.0
105-67-9	2,4-Dimethylphenol	Not Detected	840		2.0
51-28-5	2,4-Dinitrophenol	Not Detected	4300	Z	2.0
121-14-2	2,4-Dinitrotoluene	Not Detected	640		2.0
606-20-2	2,6-Dinitrotoluene	Not Detected	640		2.0
91-58-7	2-Chloronaphthalene	Not Detected	510		2.0
95-57-8	2-Chlorophenol	Not Detected	840		2.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	4300	Z	2.0
91-57-6	2-Methylnaphthalene	Not Detected	640		2.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	840		2.0
88-74-4	2-Nitroaniline	Not Detected	1300		2.0
88-75-5	2-Nitrophenol	Not Detected	840		2.0
108394,106445	3 & 4-Methylphenol	Not Detected	1700		2.0
99-09-2	3-Nitroaniline	Not Detected	1300		2.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	510		2.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	510		2.0
7005-72-3	4-Chlorodiphenylether	Not Detected	250		2.0
100-01-6	4-Nitroaniline	Not Detected	1300		2.0
100-02-7	4-Nitrophenol	Not Detected	4300	Z	2.0
83-32-9	Acenaphthene	Not Detected	250		2.0
208-96-8	Acenaphthylene	Not Detected	250		2.0
120-12-7	Anthracene	Not Detected	250		2.0
103-33-3	Azobenzene	Not Detected	510		2.0
56-55-3	Benzo[a]anthracene	Not Detected	250		2.0
50-32-8	Benzo[a]pyrene	Not Detected	510		2.0
205-99-2	Benzo[b]fluoranthene	Not Detected	510		2.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	510		2.0
207-08-9	Benzo[k]fluoranthene	Not Detected	510		2.0
100-51-6	Benzyl Alcohol	Not Detected	6400		2.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	510		2.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	250		2.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94459 IWMGP-S01-SED01-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/04/2012 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	250		2.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	640		2.0
85-68-7	Butyl benzyl phthalate	Not Detected	640		2.0
86-74-8	Carbazole	Not Detected	640		2.0
218-01-9	Chrysene	Not Detected	250		2.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	510		2.0
132-64-9	Dibenzofuran	Not Detected	640		2.0
84-66-2	Diethylphthalate	Not Detected	640		2.0
131-11-3	Dimethyl phthalate	Not Detected	640		2.0
84-74-2	Di-n-butyl phthalate	Not Detected	640		2.0
117-84-0	Di-n-octyl phthalate	Not Detected	640		2.0
206-44-0	Fluoranthene	Not Detected	250		2.0
86-73-7	Fluorene	Not Detected	250		2.0
118-74-1	Hexachlorobenzene	Not Detected	510		2.0
87-68-3	Hexachlorobutadiene	Not Detected	250	Z	2.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	2500	Z	2.0
67-72-1	Hexachloroethane	Not Detected	250		2.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	510		2.0
78-59-1	Isophorone	Not Detected	250		2.0
91-20-3	Naphthalene	Not Detected	250		2.0
98-95-3	Nitrobenzene	Not Detected	510		2.0
67-75-9	N-Nitrosodimethylamine	Not Detected	640		2.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	510		2.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	510		2.0
87-86-5	Pentachlorophenol	Not Detected	4300	Z=800	2.0
85-01-8	Phenanthrene	Not Detected	250		2.0
108-95-2	Phenol	Not Detected	840		2.0
129-00-0	Pyrene	Not Detected	250		2.0

RLs raised due to matrix.

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
	##Weight of sample(grams)	9.02			
SURROGATE	#Bromofluorobenzene#	99.9			
SURROGATE	#Dibromofluoromethane#	109			
SURROGATE	#Toluene-d8#	101			

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94459 IWMGP-S01-SED01-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	84		50
71-55-6	1,1,1-Trichloroethane	Not Detected	84		50
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	84		50
79-00-5	1,1,2-Trichloroethane	Not Detected	84		50
75-34-3	1,1-Dichloroethane	Not Detected	84		50
75-35-4	1,1-Dichloroethylene	Not Detected	84		50
87-61-6	1,2,3-Trichlorobenzene	Not Detected	420		50
96-18-4	1,2,3-Trichloropropane	Not Detected	84		50
526-73-8	1,2,3-Trimethylbenzene	Not Detected	84		50
120-82-1	1,2,4-Trichlorobenzene	Not Detected	420		50
95-63-6	1,2,4-Trimethylbenzene	Not Detected	84		50
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	420		50
106-93-4	1,2-Dibromoethane	Not Detected	84	Z	50
95-50-1	1,2-Dichlorobenzene	Not Detected	84		50
107-06-2	1,2-Dichloroethane	Not Detected	84		50
78-87-5	1,2-Dichloropropane	Not Detected	84		50
108-67-8	1,3,5-Trimethylbenzene	Not Detected	84		50
541-73-1	1,3-Dichlorobenzene	Not Detected	84		50
106-46-7	1,4-Dichlorobenzene	Not Detected	84		50
78-93-3	2-Butanone (MEK)	Not Detected	420		50
591-78-6	2-Hexanone	Not Detected	420		50
91-57-6	2-Methylnaphthalene	Not Detected	420	X	50
67-64-1	2-Propanone (acetone)	Not Detected	1700	G	50
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	420		50
107-13-1	Acrylonitrile	Not Detected	420	Z	50
71-43-2	Benzene	Not Detected	84		50
108-86-1	Bromobenzene	Not Detected	84		50
74-97-5	Bromochloromethane	Not Detected	84		50
75-27-4	Bromodichloromethane	Not Detected	84		50
75-25-2	Bromoform	Not Detected	84		50
74-83-9	Bromomethane	Not Detected	340		50
75-15-0	Carbon disulfide	Not Detected	84		50
56-23-5	Carbon tetrachloride	Not Detected	84		50
108-90-7	Chlorobenzene	Not Detected	84		50
75-00-3	Chloroethane	Not Detected	420		50
67-66-3	Chloroform	Not Detected	84		50
74-87-3	Chloromethane	Not Detected	420		50
156-59-2	cis-1,2-Dichloroethylene	Not Detected	84		50
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	84		50
110-82-7	Cyclohexane	Not Detected	420		50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94459 IWMGP-S01-SED01-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
124-48-1	Dibromochloromethane	Not Detected	84		50
74-95-3	Dibromomethane	Not Detected	84		50
75-71-8	Dichlorodifluoromethane	Not Detected	420		50
60-29-7	Diethyl ether	Not Detected	340		50
108-20-3	Diisopropyl Ether	Not Detected	420		50
100-41-4	Ethylbenzene	Not Detected	84		50
637-92-3	Ethyltertiarybutylether	Not Detected	420		50
67-72-1	Hexachloroethane	Not Detected	420		50
98-82-8	Isopropylbenzene	Not Detected	84		50
108383,106423	m & p - Xylene	Not Detected	170		50
74-88-4	Methyl iodide	Not Detected	84		50
75-09-2	Methylene chloride	Not Detected	170		50
1634-04-4	Methyltertiarybutylether	Not Detected	84		50
91-20-3	Naphthalene	Not Detected	420	X	50
104-51-8	n-Butylbenzene	Not Detected	84		50
103-65-1	n-Propylbenzene	Not Detected	84		50
95-47-6	o-Xylene	Not Detected	84		50
99-87-6	p-Isopropyl toluene	Not Detected	84		50
135-98-8	sec-Butylbenzene	Not Detected	84		50
100-42-5	Styrene	Not Detected	84		50
98-06-6	tert-Butylbenzene	Not Detected	84		50
75-65-0	tertiary Butyl Alcohol	Not Detected	4200		50
994-05-8	tertiaryAmylmethylether	Not Detected	420		50
127-18-4	Tetrachloroethylene	Not Detected	84		50
109-99-9	Tetrahydrofuran	Not Detected	420		50
108-88-3	Toluene	Not Detected	84		50
156-60-5	trans-1,2-Dichloroethylene	Not Detected	84		50
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	84		50
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	420	7Z	50
79-01-6	Trichloroethylene	Not Detected	84		50
75-69-4	Trichlorofluoromethane	Not Detected	84		50
75-01-4	Vinyl chloride	Not Detected	84	Z	50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94459 IWMGP-S01-SED01-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_ AVAL	Cyanide - Available	0.2	mg/Kg	0.10		04/19/2012	ASTM D 688	MB
57-12-5	Cyanide - Sediment	0.3	mg/Kg dry	0.1		04/19/2012	9010	MB
	Cyanide-Available Extraction	Completed				04/17/2012	9013	MB
	Cyanide-Extraction	Completed				04/17/2012	9013	MB
	Digest Mercury - Sediment	Completed				04/25/2012	7471	TB
7439-97-6	Mercury - Sediment	ND	mg/Kg dry	0.05	N	04/26/2012	7471	TS
7440-70-2	Calcium - Sediment	3000	mg/Kg dry	50		04/27/2012	6010	WN
7439-95-4	Magnesium - Sediment	5400	mg/Kg dry	500	D	04/27/2012	6010	WN
7440-09-7	Potassium - Sediment	240	mg/Kg dry	5		04/27/2012	6010	WN
7440-23-5	Sodium - Sediment	85	mg/Kg dry	50		04/27/2012	6010	WN
7429-90-5	Aluminum - Sediment	5400	mg/Kg dry	1		04/27/2012	6020	TK
7440-36-0	Antimony - Sediment	ND	mg/Kg dry	0.3	3	04/27/2012	6020	TK
7440-38-2	Arsenic - Sediment	3.7	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-39-3	Barium - Sediment	24	mg/Kg dry	1		04/27/2012	6020	TK
7440-41-7	Beryllium - Sediment	0.26	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-47-3	Chromium - Sediment	12	mg/Kg dry	2		04/27/2012	6020	TK
7440-48-4	Cobalt - Sediment	5.6	mg/Kg dry	.5		04/27/2012	6020	TK
7440-50-8	Copper - Sediment	11	mg/Kg dry	1		04/27/2012	6020	TK
	Digest Antimony - Sediment	Completed				04/23/2012	3050	TB
	Digest Metals - Sediment	Completed				04/26/2012	3050	TB
7439-89-6	Iron - Sediment	26000	mg/Kg dry	50	D	04/27/2012	6010	WN
7439-92-1	Lead - Sediment	6.0	mg/Kg dry	1		04/27/2012	6020	TK
7439-96-5	Manganese - Sediment	180	mg/Kg dry	1		04/27/2012	6020	TK
7439-98-7	Molybdenum - Sediment	ND	mg/Kg dry	1		04/27/2012	6020	TK
7440-02-0	Nickel - Sediment	11	mg/Kg dry	1		04/27/2012	6020	TK
7782-49-2	Selenium - Sediment	ND	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.1		04/27/2012	6020	TK
7440-28-0	Thallium - Sediment	ND	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-62-2	Vanadium - Sediment	27	mg/Kg dry	1		04/27/2012	6020	TK
7440-66-6	Zinc - Sediment	37	mg/Kg dry	1		04/27/2012	6020	TK
	% Total Solids	78.7	%	0.1		04/18/2012	2540B SM	JW
	Drying and Grinding - Sediment	COMPLETE				04/18/2012		JW
	Gel Permeation Cleanup-SVOC Analy	Completed				04/24/2012	3640	DT

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94460 IWMGP-S02-SED02-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/04/2012 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	81.0			
SURROGATE	#2,4,6-Tribromophenol#	56.0			
SURROGATE	#2-Fluorophenol#	66.5			
SURROGATE	#Nitrobenzene - D5#	68.0			
SURROGATE	#Phenol - D6#	73.5			
SURROGATE	#p-Terphenyl-d14#	116			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	13000		50
95-95-4	2,4,5-Trichlorophenol	Not Detected	22000		50
88-06-2	2,4,6-Trichlorophenol	Not Detected	22000		50
120-83-2	2,4-Dichlorophenol	Not Detected	22000		50
105-67-9	2,4-Dimethylphenol	Not Detected	22000		50
51-28-5	2,4-Dinitrophenol	Not Detected	110000	Z	50
121-14-2	2,4-Dinitrotoluene	Not Detected	16000		50
606-20-2	2,6-Dinitrotoluene	Not Detected	16000		50
91-58-7	2-Chloronaphthalene	Not Detected	13000		50
95-57-8	2-Chlorophenol	Not Detected	22000		50
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	110000	Z	50
91-57-6	2-Methylnaphthalene	140000	16000		50
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	22000		50
88-74-4	2-Nitroaniline	Not Detected	33000		50
88-75-5	2-Nitrophenol	Not Detected	22000		50
108394,106445	3 & 4-Methylphenol	Not Detected	43000		50
99-09-2	3-Nitroaniline	Not Detected	33000		50
101-55-3	4-Bromophenyl phenyl ether	Not Detected	13000		50
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	13000		50
7005-72-3	4-Chlorodiphenylether	Not Detected	6500		50
100-01-6	4-Nitroaniline	Not Detected	33000		50
100-02-7	4-Nitrophenol	Not Detected	110000	Z	50
83-32-9	Acenaphthene	240000	6500		50
208-96-8	Acenaphthylene	28000	6500		50
120-12-7	Anthracene	400000	6500		50
103-33-3	Azobenzene	Not Detected	13000		50
56-55-3	Benzo[a]anthracene	88000	6500		50
50-32-8	Benzo[a]pyrene	79000	13000		50
205-99-2	Benzo[b]fluoranthene	62000	13000		50
191-24-2	Benzo[g,h,i]perylene	31000	13000		50
207-08-9	Benzo[k]fluoranthene	21000	13000		50
100-51-6	Benzyl Alcohol	Not Detected	160000		50
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	13000		50
111-44-4	Bis(2-chloroethyl)ether	Not Detected	6500		50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94460 IWMGP-S02-SED02-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/04/2012 **Analyst:** SMH
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	6500		50
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	16000		50
85-68-7	Butyl benzyl phthalate	Not Detected	16000		50
86-74-8	Carbazole	Not Detected	16000		50
218-01-9	Chrysene	81000	6500		50
53-70-3	Dibenz[a,h]anthracene	Not Detected	13000		50
132-64-9	Dibenzofuran	20000	16000		50
84-66-2	Diethylphthalate	Not Detected	16000		50
131-11-3	Dimethyl phthalate	Not Detected	16000		50
84-74-2	Di-n-butyl phthalate	Not Detected	16000		50
117-84-0	Di-n-octyl phthalate	Not Detected	16000		50
206-44-0	Fluoranthene	200000	6500		50
86-73-7	Fluorene	140000	6500		50
118-74-1	Hexachlorobenzene	Not Detected	13000		50
87-68-3	Hexachlorobutadiene	Not Detected	6500	Z	50
77-47-4	Hexachlorocyclopentadiene	Not Detected	65000	Z	50
67-72-1	Hexachloroethane	Not Detected	6500		50
193-39-5	Indeno(1,2,3-c,d)pyrene	25000	13000		50
78-59-1	Isophorone	Not Detected	6500		50
91-20-3	Naphthalene	190000	6500		50
98-95-3	Nitrobenzene	Not Detected	13000		50
67-75-9	N-Nitrosodimethylamine	Not Detected	16000		50
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	13000		50
86-30-6	N-Nitrosodiphenylamine	Not Detected	13000		50
87-86-5	Pentachlorophenol	Not Detected	110000	Z=800	50
85-01-8	Phenanthrene	540000	65000		500
108-95-2	Phenol	Not Detected	22000		50
129-00-0	Pyrene	300000	6500		50

Probable petroleum product(s) present.
RLs raised due to matrix interference.

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
	##Weight of sample(grams)	12.63			
SURROGATE	#Bromofluorobenzene#	Not Applicable		V	
SURROGATE	#Dibromofluoromethane#	Not Applicable		V	

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94460 IWMGP-S02-SED02-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Toluene-d8#	Not Applicable		V	
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1600		1000
71-55-6	1,1,1-Trichloroethane	Not Detected	1600		1000
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1600		1000
79-00-5	1,1,2-Trichloroethane	Not Detected	1600		1000
75-34-3	1,1-Dichloroethane	Not Detected	1600		1000
75-35-4	1,1-Dichloroethylene	Not Detected	1600		1000
87-61-6	1,2,3-Trichlorobenzene	Not Detected	8200		1000
96-18-4	1,2,3-Trichloropropane	Not Detected	1600		1000
526-73-8	1,2,3-Trimethylbenzene	5700	1600		1000
120-82-1	1,2,4-Trichlorobenzene	Not Detected	8200		1000
95-63-6	1,2,4-Trimethylbenzene	17000	1600		1000
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	8200		1000
106-93-4	1,2-Dibromoethane	Not Detected	1600	Z	1000
95-50-1	1,2-Dichlorobenzene	Not Detected	1600		1000
107-06-2	1,2-Dichloroethane	Not Detected	1600		1000
78-87-5	1,2-Dichloropropane	Not Detected	1600		1000
108-67-8	1,3,5-Trimethylbenzene	6200	1600		1000
541-73-1	1,3-Dichlorobenzene	Not Detected	1600		1000
106-46-7	1,4-Dichlorobenzene	Not Detected	1600		1000
78-93-3	2-Butanone (MEK)	Not Detected	8200		1000
591-78-6	2-Hexanone	Not Detected	8200		1000
91-57-6	2-Methylnaphthalene	300000	8200	X 6	1000
67-64-1	2-Propanone (acetone)	Not Detected	33000	G	1000
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	8200		1000
107-13-1	Acrylonitrile	Not Detected	8200	Z	1000
71-43-2	Benzene	Not Detected	1600		1000
108-86-1	Bromobenzene	Not Detected	1600		1000
74-97-5	Bromochloromethane	Not Detected	1600		1000
75-27-4	Bromodichloromethane	Not Detected	1600		1000
75-25-2	Bromoform	Not Detected	1600		1000
74-83-9	Bromomethane	Not Detected	6600		1000
75-15-0	Carbon disulfide	Not Detected	1600		1000
56-23-5	Carbon tetrachloride	Not Detected	1600		1000
108-90-7	Chlorobenzene	Not Detected	1600		1000
75-00-3	Chloroethane	Not Detected	8200		1000
67-66-3	Chloroform	Not Detected	1600		1000
74-87-3	Chloromethane	Not Detected	8200		1000
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1600		1000
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1600		1000

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94460 IWMGP-S02-SED02-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
110-82-7	Cyclohexane	Not Detected	8200		1000
124-48-1	Dibromochloromethane	Not Detected	1600		1000
74-95-3	Dibromomethane	Not Detected	1600		1000
75-71-8	Dichlorodifluoromethane	Not Detected	8200		1000
60-29-7	Diethyl ether	Not Detected	6600		1000
108-20-3	Diisopropyl Ether	Not Detected	8200		1000
100-41-4	Ethylbenzene	5600	1600		1000
637-92-3	Ethyltertiarybutylether	Not Detected	8200		1000
67-72-1	Hexachloroethane	Not Detected	8200		1000
98-82-8	Isopropylbenzene	1800	1600		1000
108383,106423	m & p - Xylene	3700	3300		1000
74-88-4	Methyl iodide	Not Detected	1600		1000
75-09-2	Methylene chloride	Not Detected	3300		1000
1634-04-4	Methyltertiarybutylether	Not Detected	1600		1000
91-20-3	Naphthalene	410000	66000	X	8000
104-51-8	n-Butylbenzene	Not Detected	1600		1000
103-65-1	n-Propylbenzene	Not Detected	1600		1000
95-47-6	o-Xylene	2400	1600		1000
99-87-6	p-Isopropyl toluene	2200	1600		1000
135-98-8	sec-Butylbenzene	Not Detected	1600		1000
100-42-5	Styrene	Not Detected	1600		1000
98-06-6	tert-Butylbenzene	Not Detected	1600		1000
75-65-0	tertiary Butyl Alcohol	Not Detected	82000		1000
994-05-8	tertiaryAmylmethylether	Not Detected	8200		1000
127-18-4	Tetrachloroethylene	Not Detected	1600		1000
109-99-9	Tetrahydrofuran	Not Detected	8200		1000
108-88-3	Toluene	Not Detected	1600		1000
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1600		1000
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1600		1000
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	8200	7Z	1000
79-01-6	Trichloroethylene	Not Detected	1600		1000
75-69-4	Trichlorofluoromethane	Not Detected	1600		1000
75-01-4	Vinyl chloride	Not Detected	1600	Z	1000

Unidentified peaks present in sample.

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94460 IWMGP-S02-SED02-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_ AVAL	Cyanide - Available	0.6	mg/Kg	0.10		04/19/2012	ASTM D 688	MB
57-12-5	Cyanide - Sediment	5.2	mg/Kg dry	0.1		04/19/2012	9010	MB
	Cyanide-Available Extraction	Completed				04/17/2012	9013	MB
	Cyanide-Extraction	Completed				04/17/2012	9013	MB
	Digest Mercury - Sediment	Completed				04/25/2012	7471	TB
7439-97-6	Mercury - Sediment	ND	mg/Kg dry	0.05	N	04/26/2012	7471	TS
7440-70-2	Calcium - Sediment	3600	mg/Kg dry	50		04/27/2012	6010	WN
7439-95-4	Magnesium - Sediment	9400	mg/Kg dry	500	D	04/27/2012	6010	WN
7440-09-7	Potassium - Sediment	550	mg/Kg dry	5		04/27/2012	6010	WN
7440-23-5	Sodium - Sediment	130	mg/Kg dry	50		04/27/2012	6010	WN
7429-90-5	Aluminum - Sediment	8100	mg/Kg dry	1		04/27/2012	6020	TK
7440-36-0	Antimony - Sediment	0.99	mg/Kg dry	0.3	3	04/27/2012	6020	TK
7440-38-2	Arsenic - Sediment	3.1	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-39-3	Barium - Sediment	38	mg/Kg dry	1		04/27/2012	6020	TK
7440-41-7	Beryllium - Sediment	0.31	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-43-9	Cadmium - Sediment	0.28	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-47-3	Chromium - Sediment	28	mg/Kg dry	2		04/27/2012	6020	TK
7440-48-4	Cobalt - Sediment	9.4	mg/Kg dry	.5		04/27/2012	6020	TK
7440-50-8	Copper - Sediment	26	mg/Kg dry	1		04/27/2012	6020	TK
	Digest Antimony - Sediment	Completed				04/23/2012	3050	TB
	Digest Metals - Sediment	Completed				04/26/2012	3050	TB
7439-89-6	Iron - Sediment	48000	mg/Kg dry	50	D	04/27/2012	6010	WN
7439-92-1	Lead - Sediment	34	mg/Kg dry	1		04/27/2012	6020	TK
7439-96-5	Manganese - Sediment	250	mg/Kg dry	1		04/27/2012	6020	TK
7439-98-7	Molybdenum - Sediment	ND	mg/Kg dry	1		04/27/2012	6020	TK
7440-02-0	Nickel - Sediment	25	mg/Kg dry	1		04/27/2012	6020	TK
7782-49-2	Selenium - Sediment	0.30	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.1		04/27/2012	6020	TK
7440-28-0	Thallium - Sediment	ND	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-62-2	Vanadium - Sediment	37	mg/Kg dry	1		04/27/2012	6020	TK
7440-66-6	Zinc - Sediment	110	mg/Kg dry	1		04/27/2012	6020	TK
	% Total Solids	76.7	%	0.1		04/18/2012	2540B SM	JW
	Drying and Grinding - Sediment	COMPLETE				04/18/2012		JW
	Gel Permeation Cleanup-SVOC Analy	Completed				04/24/2012	3640	DT

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94461 IWMGP-S03-SED03-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/10/2012 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	72.9			
SURROGATE	#2,4,6-Tribromophenol#	76.6			
SURROGATE	#2-Fluorophenol#	61.8			
SURROGATE	#Nitrobenzene - D5#	63.3			
SURROGATE	#Phenol - D6#	64.8			
SURROGATE	#p-Terphenyl-d14#	77.9			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	490		2.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	810		2.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	810		2.0
120-83-2	2,4-Dichlorophenol	Not Detected	810		2.0
105-67-9	2,4-Dimethylphenol	Not Detected	810		2.0
51-28-5	2,4-Dinitrophenol	Not Detected	4200	Z	2.0
121-14-2	2,4-Dinitrotoluene	Not Detected	610		2.0
606-20-2	2,6-Dinitrotoluene	Not Detected	610		2.0
91-58-7	2-Chloronaphthalene	Not Detected	490		2.0
95-57-8	2-Chlorophenol	Not Detected	810		2.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	4200	Z	2.0
91-57-6	2-Methylnaphthalene	Not Detected	610		2.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	810		2.0
88-74-4	2-Nitroaniline	Not Detected	1200		2.0
88-75-5	2-Nitrophenol	Not Detected	810		2.0
108394,106445	3 & 4-Methylphenol	Not Detected	1600		2.0
99-09-2	3-Nitroaniline	Not Detected	1200		2.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	490		2.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	490		2.0
7005-72-3	4-Chlorodiphenylether	Not Detected	240		2.0
100-01-6	4-Nitroaniline	Not Detected	1200		2.0
100-02-7	4-Nitrophenol	Not Detected	4200	Z	2.0
83-32-9	Acenaphthene	Not Detected	240		2.0
208-96-8	Acenaphthylene	Not Detected	240		2.0
120-12-7	Anthracene	Not Detected	240		2.0
103-33-3	Azobenzene	Not Detected	490		2.0
56-55-3	Benzo[a]anthracene	Not Detected	240		2.0
50-32-8	Benzo[a]pyrene	Not Detected	490		2.0
205-99-2	Benzo[b]fluoranthene	Not Detected	490		2.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	490		2.0
207-08-9	Benzo[k]fluoranthene	Not Detected	490		2.0
100-51-6	Benzyl Alcohol	Not Detected	6100		2.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	490		2.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	240		2.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94461 IWMGP-S03-SED03-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/10/2012 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	240		2.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	610		2.0
85-68-7	Butyl benzyl phthalate	Not Detected	610		2.0
86-74-8	Carbazole	Not Detected	610		2.0
218-01-9	Chrysene	Not Detected	240		2.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	490		2.0
132-64-9	Dibenzofuran	Not Detected	610		2.0
84-66-2	Diethylphthalate	Not Detected	610		2.0
131-11-3	Dimethyl phthalate	Not Detected	610		2.0
84-74-2	Di-n-butyl phthalate	Not Detected	610		2.0
117-84-0	Di-n-octyl phthalate	Not Detected	610		2.0
206-44-0	Fluoranthene	Not Detected	240		2.0
86-73-7	Fluorene	Not Detected	240		2.0
118-74-1	Hexachlorobenzene	Not Detected	490		2.0
87-68-3	Hexachlorobutadiene	Not Detected	240	Z	2.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	2400	Z	2.0
67-72-1	Hexachloroethane	Not Detected	240		2.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	490		2.0
78-59-1	Isophorone	Not Detected	240		2.0
91-20-3	Naphthalene	Not Detected	240		2.0
98-95-3	Nitrobenzene	Not Detected	490		2.0
67-75-9	N-Nitrosodimethylamine	Not Detected	610		2.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	490		2.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	490		2.0
87-86-5	Pentachlorophenol	Not Detected	4200	Z=800	2.0
85-01-8	Phenanthrene	Not Detected	240		2.0
108-95-2	Phenol	Not Detected	810		2.0
129-00-0	Pyrene	300	240		2.0

RLs raised due to matrix.

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
	##Weight of sample(grams)	12.66			
SURROGATE	#Bromofluorobenzene#	110			
SURROGATE	#Dibromofluoromethane#	116			
SURROGATE	#Toluene-d8#	114			

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94461 IWMGP-S03-SED03-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	74		50
71-55-6	1,1,1-Trichloroethane	Not Detected	74		50
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	74		50
79-00-5	1,1,2-Trichloroethane	Not Detected	74		50
75-34-3	1,1-Dichloroethane	Not Detected	74		50
75-35-4	1,1-Dichloroethylene	Not Detected	74		50
87-61-6	1,2,3-Trichlorobenzene	Not Detected	370		50
96-18-4	1,2,3-Trichloropropane	Not Detected	74		50
526-73-8	1,2,3-Trimethylbenzene	Not Detected	74		50
120-82-1	1,2,4-Trichlorobenzene	Not Detected	370		50
95-63-6	1,2,4-Trimethylbenzene	Not Detected	74		50
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	370		50
106-93-4	1,2-Dibromoethane	Not Detected	74	Z	50
95-50-1	1,2-Dichlorobenzene	Not Detected	74		50
107-06-2	1,2-Dichloroethane	Not Detected	74		50
78-87-5	1,2-Dichloropropane	Not Detected	74		50
108-67-8	1,3,5-Trimethylbenzene	Not Detected	74		50
541-73-1	1,3-Dichlorobenzene	Not Detected	74		50
106-46-7	1,4-Dichlorobenzene	Not Detected	74		50
78-93-3	2-Butanone (MEK)	Not Detected	370		50
591-78-6	2-Hexanone	Not Detected	370		50
91-57-6	2-Methylnaphthalene	Not Detected	370	X	50
67-64-1	2-Propanone (acetone)	Not Detected	1500	G	50
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	370		50
107-13-1	Acrylonitrile	Not Detected	370	Z	50
71-43-2	Benzene	Not Detected	74		50
108-86-1	Bromobenzene	Not Detected	74		50
74-97-5	Bromochloromethane	Not Detected	74		50
75-27-4	Bromodichloromethane	Not Detected	74		50
75-25-2	Bromoform	Not Detected	74		50
74-83-9	Bromomethane	Not Detected	290		50
75-15-0	Carbon disulfide	Not Detected	74		50
56-23-5	Carbon tetrachloride	Not Detected	74		50
108-90-7	Chlorobenzene	Not Detected	74		50
75-00-3	Chloroethane	Not Detected	370		50
67-66-3	Chloroform	Not Detected	74		50
74-87-3	Chloromethane	Not Detected	370		50
156-59-2	cis-1,2-Dichloroethylene	Not Detected	74		50
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	74		50
110-82-7	Cyclohexane	Not Detected	370		50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94461 IWMGP-S03-SED03-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
124-48-1	Dibromochloromethane	Not Detected	74		50
74-95-3	Dibromomethane	Not Detected	74		50
75-71-8	Dichlorodifluoromethane	Not Detected	370		50
60-29-7	Diethyl ether	Not Detected	290		50
108-20-3	Diisopropyl Ether	Not Detected	370		50
100-41-4	Ethylbenzene	Not Detected	74		50
637-92-3	Ethyltertiarybutylether	Not Detected	370		50
67-72-1	Hexachloroethane	Not Detected	370		50
98-82-8	Isopropylbenzene	Not Detected	74		50
108383,106423	m & p - Xylene	Not Detected	150		50
74-88-4	Methyl iodide	Not Detected	74		50
75-09-2	Methylene chloride	Not Detected	150		50
1634-04-4	Methyltertiarybutylether	Not Detected	74		50
91-20-3	Naphthalene	Not Detected	370	X	50
104-51-8	n-Butylbenzene	Not Detected	74		50
103-65-1	n-Propylbenzene	Not Detected	74		50
95-47-6	o-Xylene	Not Detected	74		50
99-87-6	p-Isopropyl toluene	Not Detected	74		50
135-98-8	sec-Butylbenzene	Not Detected	74		50
100-42-5	Styrene	Not Detected	74		50
98-06-6	tert-Butylbenzene	Not Detected	74		50
75-65-0	tertiary Butyl Alcohol	Not Detected	3700		50
994-05-8	tertiaryAmylmethylether	Not Detected	370		50
127-18-4	Tetrachloroethylene	Not Detected	74		50
109-99-9	Tetrahydrofuran	Not Detected	370		50
108-88-3	Toluene	Not Detected	74		50
156-60-5	trans-1,2-Dichloroethylene	Not Detected	74		50
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	74		50
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	370	7Z	50
79-01-6	Trichloroethylene	Not Detected	74		50
75-69-4	Trichlorofluoromethane	Not Detected	74		50
75-01-4	Vinyl chloride	Not Detected	74	Z	50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94461 IWMGP-S03-SED03-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_ AVAL	Cyanide - Available	ND	mg/Kg	0.10		04/19/2012	ASTM D 688	MB
57-12-5	Cyanide - Sediment	0.1	mg/Kg dry	0.1		04/19/2012	9010	MB
	Cyanide-Available Extraction	Completed				04/17/2012	9013	MB
	Cyanide-Extraction	Completed				04/17/2012	9013	MB
	Digest Mercury - Sediment	Completed				04/25/2012	7471	TB
7439-97-6	Mercury - Sediment	ND	mg/Kg dry	0.05	N	04/26/2012	7471	TS
7440-70-2	Calcium - Sediment	5600	mg/Kg dry	500	D	04/27/2012	6010	WN
7439-95-4	Magnesium - Sediment	5900	mg/Kg dry	500	D	04/27/2012	6010	WN
7440-09-7	Potassium - Sediment	280	mg/Kg dry	5		04/27/2012	6010	WN
7440-23-5	Sodium - Sediment	160	mg/Kg dry	50		04/27/2012	6010	WN
7429-90-5	Aluminum - Sediment	7600	mg/Kg dry	1		04/27/2012	6020	TK
7440-36-0	Antimony - Sediment	ND	mg/Kg dry	0.3	3	04/27/2012	6020	TK
7440-38-2	Arsenic - Sediment	0.91	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-39-3	Barium - Sediment	19	mg/Kg dry	1		04/27/2012	6020	TK
7440-41-7	Beryllium - Sediment	0.30	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-47-3	Chromium - Sediment	20	mg/Kg dry	2		04/27/2012	6020	TK
7440-48-4	Cobalt - Sediment	8.4	mg/Kg dry	.5		04/27/2012	6020	TK
7440-50-8	Copper - Sediment	29	mg/Kg dry	1		04/27/2012	6020	TK
	Digest Antimony - Sediment	Completed				04/23/2012	3050	TB
	Digest Metals - Sediment	Completed				04/26/2012	3050	TB
7439-89-6	Iron - Sediment	18000	mg/Kg dry	50	D	04/27/2012	6010	WN
7439-92-1	Lead - Sediment	13	mg/Kg dry	1		04/27/2012	6020	TK
7439-96-5	Manganese - Sediment	230	mg/Kg dry	1		04/27/2012	6020	TK
7439-98-7	Molybdenum - Sediment	ND	mg/Kg dry	1		04/27/2012	6020	TK
7440-02-0	Nickel - Sediment	22	mg/Kg dry	1		04/27/2012	6020	TK
7782-49-2	Selenium - Sediment	ND	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.1		04/27/2012	6020	TK
7440-28-0	Thallium - Sediment	ND	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-62-2	Vanadium - Sediment	37	mg/Kg dry	1		04/27/2012	6020	TK
7440-66-6	Zinc - Sediment	52	mg/Kg dry	1		04/27/2012	6020	TK
	% Total Solids	81.9	%	0.1		04/18/2012	2540B SM	JW
	Drying and Grinding - Sediment	COMPLETE				04/18/2012		JW
	Gel Permeation Cleanup-SVOC Analy	Completed				04/24/2012	3640	DT

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94462 IWMGP-S04-SED04-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/14/2012 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	85.2			
SURROGATE	#2,4,6-Tribromophenol#	71.8			
SURROGATE	#2-Fluorophenol#	74.2			
SURROGATE	#Nitrobenzene - D5#	79.2			
SURROGATE	#Phenol - D6#	83.6			
SURROGATE	#p-Terphenyl-d14#	110			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2500		10
95-95-4	2,4,5-Trichlorophenol	Not Detected	4100		10
88-06-2	2,4,6-Trichlorophenol	Not Detected	4100		10
120-83-2	2,4-Dichlorophenol	Not Detected	4100		10
105-67-9	2,4-Dimethylphenol	Not Detected	4100		10
51-28-5	2,4-Dinitrophenol	Not Detected	21000	5Z	10
121-14-2	2,4-Dinitrotoluene	Not Detected	3100		10
606-20-2	2,6-Dinitrotoluene	Not Detected	3100		10
91-58-7	2-Chloronaphthalene	Not Detected	2500		10
95-57-8	2-Chlorophenol	Not Detected	4100		10
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	21000	Z	10
91-57-6	2-Methylnaphthalene	Not Detected	3100		10
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	4100		10
88-74-4	2-Nitroaniline	Not Detected	6300		10
88-75-5	2-Nitrophenol	Not Detected	4100		10
108394,106445	3 & 4-Methylphenol	Not Detected	8300		10
99-09-2	3-Nitroaniline	Not Detected	6300		10
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2500		10
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	2500		10
7005-72-3	4-Chlorodiphenylether	Not Detected	1300		10
100-01-6	4-Nitroaniline	Not Detected	6300		10
100-02-7	4-Nitrophenol	Not Detected	21000	Z	10
83-32-9	Acenaphthene	Not Detected	1300		10
208-96-8	Acenaphthylene	Not Detected	1300		10
120-12-7	Anthracene	1300	1300	*	10
103-33-3	Azobenzene	Not Detected	2500		10
56-55-3	Benzo[a]anthracene	2500	1300		10
50-32-8	Benzo[a]pyrene	2400	2500	T	10
205-99-2	Benzo[b]fluoranthene	2200	2500	T	10
191-24-2	Benzo[g,h,i]perylene	Not Detected	2500		10
207-08-9	Benzo[k]fluoranthene	Not Detected	2500		10
100-51-6	Benzyl Alcohol	Not Detected	31000		10
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2500		10
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1300		10

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94462 IWMGP-S04-SED04-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 05/14/2012 **Analyst:** MF
Extraction Method: 3545 **Extraction Date:** 04/23/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1300		10
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	3100		10
85-68-7	Butyl benzyl phthalate	Not Detected	3100		10
86-74-8	Carbazole	Not Detected	3100		10
218-01-9	Chrysene	2400	1300		10
53-70-3	Dibenz[a,h]anthracene	3100	2500		10
132-64-9	Dibenzofuran	Not Detected	3100		10
84-66-2	Diethylphthalate	Not Detected	3100		10
131-11-3	Dimethyl phthalate	Not Detected	3100		10
84-74-2	Di-n-butyl phthalate	Not Detected	3100		10
117-84-0	Di-n-octyl phthalate	Not Detected	3100		10
206-44-0	Fluoranthene	3600	1300	*	10
86-73-7	Fluorene	Not Detected	1300		10
118-74-1	Hexachlorobenzene	Not Detected	2500		10
87-68-3	Hexachlorobutadiene	Not Detected	1300	Z	10
77-47-4	Hexachlorocyclopentadiene	Not Detected	13000	5Z	10
67-72-1	Hexachloroethane	Not Detected	1300		10
193-39-5	Indeno(1,2,3-c,d)pyrene	3300	2500		10
78-59-1	Isophorone	Not Detected	1300		10
91-20-3	Naphthalene	Not Detected	1300		10
98-95-3	Nitrobenzene	Not Detected	2500		10
67-75-9	N-Nitrosodimethylamine	Not Detected	3100		10
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2500		10
86-30-6	N-Nitrosodiphenylamine	Not Detected	2500		10
87-86-5	Pentachlorophenol	Not Detected	21000	Z=800	10
85-01-8	Phenanthrene	4700	1300	*	10
108-95-2	Phenol	Not Detected	4100		10
129-00-0	Pyrene	7700	1300		10

RLs raised due to matrix interference.
Probable petroleum product(s) present.
* Result is estimated due to high internal standard response.

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
	##Weight of sample(grams)	9.11			
SURROGATE	#Bromofluorobenzene#	111			

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94462 IWMGP-S04-SED04-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
SURROGATE	#Dibromofluoromethane#	115			
SURROGATE	#Toluene-d8#	112			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	81		50
71-55-6	1,1,1-Trichloroethane	Not Detected	81		50
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	81		50
79-00-5	1,1,2-Trichloroethane	Not Detected	81		50
75-34-3	1,1-Dichloroethane	Not Detected	81		50
75-35-4	1,1-Dichloroethylene	Not Detected	81		50
87-61-6	1,2,3-Trichlorobenzene	Not Detected	410		50
96-18-4	1,2,3-Trichloropropane	Not Detected	81		50
526-73-8	1,2,3-Trimethylbenzene	Not Detected	81		50
120-82-1	1,2,4-Trichlorobenzene	Not Detected	410		50
95-63-6	1,2,4-Trimethylbenzene	Not Detected	81		50
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	410		50
106-93-4	1,2-Dibromoethane	Not Detected	81	Z	50
95-50-1	1,2-Dichlorobenzene	Not Detected	81		50
107-06-2	1,2-Dichloroethane	Not Detected	81		50
78-87-5	1,2-Dichloropropane	Not Detected	81		50
108-67-8	1,3,5-Trimethylbenzene	Not Detected	81		50
541-73-1	1,3-Dichlorobenzene	Not Detected	81		50
106-46-7	1,4-Dichlorobenzene	Not Detected	81		50
78-93-3	2-Butanone (MEK)	Not Detected	410		50
591-78-6	2-Hexanone	Not Detected	410		50
91-57-6	2-Methylnaphthalene	Not Detected	410	X	50
67-64-1	2-Propanone (acetone)	Not Detected	1600	G	50
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	410		50
107-13-1	Acrylonitrile	Not Detected	410	Z	50
71-43-2	Benzene	Not Detected	81		50
108-86-1	Bromobenzene	Not Detected	81		50
74-97-5	Bromochloromethane	Not Detected	81		50
75-27-4	Bromodichloromethane	Not Detected	81		50
75-25-2	Bromoform	Not Detected	81		50
74-83-9	Bromomethane	Not Detected	330		50
75-15-0	Carbon disulfide	Not Detected	81		50
56-23-5	Carbon tetrachloride	Not Detected	81		50
108-90-7	Chlorobenzene	Not Detected	81		50
75-00-3	Chloroethane	Not Detected	410		50
67-66-3	Chloroform	Not Detected	81		50
74-87-3	Chloromethane	Not Detected	410		50
156-59-2	cis-1,2-Dichloroethylene	Not Detected	81		50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94462 IWMGP-S04-SED04-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	81		50
110-82-7	Cyclohexane	Not Detected	410		50
124-48-1	Dibromochloromethane	Not Detected	81		50
74-95-3	Dibromomethane	Not Detected	81		50
75-71-8	Dichlorodifluoromethane	Not Detected	410		50
60-29-7	Diethyl ether	Not Detected	330		50
108-20-3	Diisopropyl Ether	Not Detected	410		50
100-41-4	Ethylbenzene	Not Detected	81		50
637-92-3	Ethyltertiarybutylether	Not Detected	410		50
67-72-1	Hexachloroethane	Not Detected	410		50
98-82-8	Isopropylbenzene	Not Detected	81		50
108383,106423	m & p - Xylene	Not Detected	160		50
74-88-4	Methyl iodide	Not Detected	81		50
75-09-2	Methylene chloride	Not Detected	160		50
1634-04-4	Methyltertiarybutylether	Not Detected	81		50
91-20-3	Naphthalene	Not Detected	410	X	50
104-51-8	n-Butylbenzene	Not Detected	81		50
103-65-1	n-Propylbenzene	Not Detected	81		50
95-47-6	o-Xylene	Not Detected	81		50
99-87-6	p-Isopropyl toluene	Not Detected	81		50
135-98-8	sec-Butylbenzene	Not Detected	81		50
100-42-5	Styrene	Not Detected	81		50
98-06-6	tert-Butylbenzene	Not Detected	81		50
75-65-0	tertiary Butyl Alcohol	Not Detected	4100		50
994-05-8	tertiaryAmylmethylether	Not Detected	410		50
127-18-4	Tetrachloroethylene	Not Detected	81		50
109-99-9	Tetrahydrofuran	Not Detected	410		50
108-88-3	Toluene	Not Detected	81		50
156-60-5	trans-1,2-Dichloroethylene	Not Detected	81		50
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	81		50
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	410	7Z	50
79-01-6	Trichloroethylene	Not Detected	81		50
75-69-4	Trichlorofluoromethane	Not Detected	81		50
75-01-4	Vinyl chloride	Not Detected	81	Z	50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94462 IWMGP-S04-SED04-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_ AVAL	Cyanide - Available	ND	mg/Kg	0.10		04/19/2012	ASTM D 688	MB
57-12-5	Cyanide - Sediment	0.2	mg/Kg dry	0.1		04/19/2012	9010	MB
	Cyanide-Available Extraction	Completed				04/17/2012	9013	MB
	Cyanide-Extraction	Completed				04/17/2012	9013	MB
	Digest Mercury - Sediment	Completed				04/25/2012	7471	TB
7439-97-6	Mercury - Sediment	.30	mg/Kg dry	0.05	N,4	04/26/2012	7471	TS
7440-70-2	Calcium - Sediment	5500	mg/Kg dry	50		04/27/2012	6010	WN
7439-95-4	Magnesium - Sediment	8000	mg/Kg dry	500	D	04/27/2012	6010	WN
7440-09-7	Potassium - Sediment	260	mg/Kg dry	5		04/27/2012	6010	WN
7440-23-5	Sodium - Sediment	160	mg/Kg dry	50		04/27/2012	6010	WN
7429-90-5	Aluminum - Sediment	9500	mg/Kg dry	1		04/27/2012	6020	TK
7440-36-0	Antimony - Sediment	ND	mg/Kg dry	0.3	3	04/27/2012	6020	TK
7440-38-2	Arsenic - Sediment	1.3	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-39-3	Barium - Sediment	25	mg/Kg dry	1		04/27/2012	6020	TK
7440-41-7	Beryllium - Sediment	0.33	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-43-9	Cadmium - Sediment	ND	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-47-3	Chromium - Sediment	16	mg/Kg dry	2		04/27/2012	6020	TK
7440-48-4	Cobalt - Sediment	11	mg/Kg dry	.5		04/27/2012	6020	TK
7440-50-8	Copper - Sediment	21	mg/Kg dry	1		04/27/2012	6020	TK
	Digest Antimony - Sediment	Completed				04/23/2012	3050	TB
	Digest Metals - Sediment	Completed				04/26/2012	3050	TB
7439-89-6	Iron - Sediment	23000	mg/Kg dry	50	D	04/27/2012	6010	WN
7439-92-1	Lead - Sediment	15	mg/Kg dry	1		04/27/2012	6020	TK
7439-96-5	Manganese - Sediment	490	mg/Kg dry	1		04/27/2012	6020	TK
7439-98-7	Molybdenum - Sediment	ND	mg/Kg dry	1		04/27/2012	6020	TK
7440-02-0	Nickel - Sediment	21	mg/Kg dry	1		04/27/2012	6020	TK
7782-49-2	Selenium - Sediment	ND	mg/Kg dry	0.2		04/27/2012	6020	TK
7440-22-4	Silver - Sediment	ND	mg/Kg dry	0.1		04/27/2012	6020	TK
7440-28-0	Thallium - Sediment	ND	mg/Kg dry	0.5		04/27/2012	6020	TK
7440-62-2	Vanadium - Sediment	37	mg/Kg dry	1		04/27/2012	6020	TK
7440-66-6	Zinc - Sediment	71	mg/Kg dry	1		04/27/2012	6020	TK
	% Total Solids	79.8	%	0.1		04/18/2012	2540B SM	JW
	Drying and Grinding - Sediment	COMPLETE				04/18/2012		JW
	Gel Permeation Cleanup-SVOC Analy	Completed				04/24/2012	3640	DT

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94463 IWMGP-TB-5

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
	##Weight of sample(grams)	10.00			
SURROGATE	#Bromofluorobenzene#	98.8			
SURROGATE	#Dibromofluoromethane#	111			
SURROGATE	#Toluene-d8#	104			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	50		50
71-55-6	1,1,1-Trichloroethane	Not Detected	50		50
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	50		50
79-00-5	1,1,2-Trichloroethane	Not Detected	50		50
75-34-3	1,1-Dichloroethane	Not Detected	50		50
75-35-4	1,1-Dichloroethylene	Not Detected	50		50
87-61-6	1,2,3-Trichlorobenzene	Not Detected	250		50
96-18-4	1,2,3-Trichloropropane	Not Detected	50		50
526-73-8	1,2,3-Trimethylbenzene	Not Detected	50		50
120-82-1	1,2,4-Trichlorobenzene	Not Detected	250		50
95-63-6	1,2,4-Trimethylbenzene	Not Detected	50		50
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	250		50
106-93-4	1,2-Dibromoethane	Not Detected	50	Z	50
95-50-1	1,2-Dichlorobenzene	Not Detected	50		50
107-06-2	1,2-Dichloroethane	Not Detected	50		50
78-87-5	1,2-Dichloropropane	Not Detected	50		50
108-67-8	1,3,5-Trimethylbenzene	Not Detected	50		50
541-73-1	1,3-Dichlorobenzene	Not Detected	50		50
106-46-7	1,4-Dichlorobenzene	Not Detected	50		50
78-93-3	2-Butanone (MEK)	Not Detected	250		50
591-78-6	2-Hexanone	Not Detected	250		50
91-57-6	2-Methylnaphthalene	Not Detected	250	X	50
67-64-1	2-Propanone (acetone)	Not Detected	1000	G	50
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	250		50
107-13-1	Acrylonitrile	Not Detected	250	Z	50
71-43-2	Benzene	Not Detected	50		50
108-86-1	Bromobenzene	Not Detected	50		50
74-97-5	Bromochloromethane	Not Detected	50		50
75-27-4	Bromodichloromethane	Not Detected	50		50
75-25-2	Bromoform	Not Detected	50		50
74-83-9	Bromomethane	Not Detected	200		50
75-15-0	Carbon disulfide	Not Detected	50		50
56-23-5	Carbon tetrachloride	Not Detected	50		50
108-90-7	Chlorobenzene	Not Detected	50		50
75-00-3	Chloroethane	Not Detected	250		50
67-66-3	Chloroform	Not Detected	50		50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94463 IWMGP-TB-5

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/20/2012 **Analyst:** RD
Extraction Method: 5035 **Extraction Date:** 04/17/2012 **Qualifier:**

CAS #	Compound	Result ug/Kg dry	RL	Qualifier	Dilution Factor
74-87-3	Chloromethane	Not Detected	250		50
156-59-2	cis-1,2-Dichloroethylene	Not Detected	50		50
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	50		50
110-82-7	Cyclohexane	Not Detected	250		50
124-48-1	Dibromochloromethane	Not Detected	50		50
74-95-3	Dibromomethane	Not Detected	50		50
75-71-8	Dichlorodifluoromethane	Not Detected	250		50
60-29-7	Diethyl ether	Not Detected	200		50
108-20-3	Diisopropyl Ether	Not Detected	250		50
100-41-4	Ethylbenzene	Not Detected	50		50
637-92-3	Ethyltertiarybutylether	Not Detected	250		50
67-72-1	Hexachloroethane	Not Detected	250		50
98-82-8	Isopropylbenzene	Not Detected	50		50
108383,106423	m & p - Xylene	Not Detected	100		50
74-88-4	Methyl iodide	Not Detected	50		50
75-09-2	Methylene chloride	Not Detected	100		50
1634-04-4	Methyltertiarybutylether	Not Detected	50		50
91-20-3	Naphthalene	Not Detected	250	X	50
104-51-8	n-Butylbenzene	Not Detected	50		50
103-65-1	n-Propylbenzene	Not Detected	50		50
95-47-6	o-Xylene	Not Detected	50		50
99-87-6	p-Isopropyl toluene	Not Detected	50		50
135-98-8	sec-Butylbenzene	Not Detected	50		50
100-42-5	Styrene	Not Detected	50		50
98-06-6	tert-Butylbenzene	Not Detected	50		50
75-65-0	tertiary Butyl Alcohol	Not Detected	2500		50
994-05-8	tertiaryAmylmethylether	Not Detected	250		50
127-18-4	Tetrachloroethylene	Not Detected	50		50
109-99-9	Tetrahydrofuran	Not Detected	250		50
108-88-3	Toluene	Not Detected	50		50
156-60-5	trans-1,2-Dichloroethylene	Not Detected	50		50
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	50		50
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	250	7Z	50
79-01-6	Trichloroethylene	Not Detected	50		50
75-69-4	Trichlorofluoromethane	Not Detected	50		50
75-01-4	Vinyl chloride	Not Detected	50	Z	50

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94463 IWMGP-TB-5

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
	% Total Solids	100	%	0.1		04/18/2012	2540B SM	JW

Qualifier Code	Qualifier Description
1	Result(s) and RL(s) are estimated due to low surrogate recovery.
2	Result is estimated due to high surrogate recovery.
3	Result(s) and RL(s) are estimated due to low matrix spike recovery.
4	Result is estimated due to high matrix spike recovery.
5	Result and RL are estimated due to low continuing calibration standard criteria failure.
6	Result is estimated due to high continuing calibration standard criteria failure.
7	Result(s) and RL(s) are estimated due to poor precision.
8	Result(s) and RL(s) are estimated due to low recovery of batch QC.
9	Result outside QC acceptance criteria.
A	Value reported is the mean of two or more determinations.
C	Value calculated from other independent parameters.
D	Analyte value quantified from a dilution(s); reporting limit (RL) raised.
E	Result is estimated due to high recovery of batch QC.
F	Amenable cyanide was not analyzed due to low level of total cyanide.
G	Result and RL are estimated due to initial calibration standard criteria failure.
H	Recommended laboratory holding time was exceeded.
I	Dilution required due to matrix interference; reporting limit (RL) raised.
J	Analyte was positively identified. Value is an estimate.
JA	Result is estimated due to multiple Aroclors present.
JC	Result is estimated since confirmation analysis did not meet acceptance criteria
JD	Due to severe degradation, specific Aroclor identification is difficult and quantitation is estimated.
K	RL(s) raised due to matrix interferences.
KR	RL(s) raised due to low sample volume submitted.
KS	RL(s) raised due to low total solids.
KW	RL(s) raised due to light sample weight.
LB	Reported library search compounds are tentative identifications with estimated concentrations.
M	The level of the method preparation blank (MPB) is reported in the qualifier column.
N	Non-homogeneous sample made analysis of sample questionable.
O	Result and RL estimated due to analysis from an open vial.
P	Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Quantity of sample insufficient to perform analyses requested.
R	Result confirmed by re-extraction and analysis.
S	Supernatant analyzed.
T	Reported value is less than the reporting limit (RL). Result is estimated.
V	Value not available due to dilution.
W	Reported value is less than the method detection limit (MDL).
X	Methods 8260 & 624 are used to analyze volatile organics that have boiling points below 200°C. 2-Methylnaphthalene & naphthalene have boiling points above 200°C and are better suited to analysis by methods 8270 or 625 as semivolatile organics.
Z	Result reported below the RL to meet the TDL in RRD Op Memo 2 (10/22/04) multiplied by applicable dilution factor.

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Division: RD
Report to: STEVE HARRINGTON
MDEQ-RD-UP
UP DISTRICT
420 FIFTH ST, GWINN, MI 49841

Total: $6,143.00

Lab Work Order # : 20400125
Work Site ID : 27000066
Site Name : IRONWOOD MGP SITE
Received: 04/17/2012
Reported: 05/07/2012
Collected By: DAN LIEBAU

Samples Received :

No:	Sample ID	Sample Description	Matrix:	Collection Date
01	AB94464	IWMGP-B02-W01-041312	WATER	04/13/2012
02	AB94465	IWMGP-B04-W01-041312	WATER	04/13/2012
03	AB94466	IWMGP-B03-W01-041312	WATER	04/13/2012
04	AB94467	IWMGP-B05-W01-041212	WATER	04/12/2012
05	AB94468	IWMGP-B01-W01-041312	WATER	04/13/2012
06	AB94469	IWMGP-TB2	WATER	04/04/2012
07	AB94470	IWMGP-S04-W04-041112	WATER	04/11/2012
08	AB94471	IWMGP-S03-W03-041112	WATER	04/11/2012
09	AB94472	IWMGP-S02-W02-041112	WATER	04/11/2012
10	AB94473	IWMGP-S01-W01-041112	WATER	04/11/2012
11	AB94474	IWMGP-TB3	WATER	04/04/2012
12	AB94479	IWMGP-TB4	WATER	04/04/2012

I certify that the analysis performed by the MDEQ Environmental Laboratory are accurate and that the laboratory tests were conducted by methods approved by the U.S. Environmental Protection Agency and other appropriate regulatory agencies.

George L. Krisztian,
Laboratory Director

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94464 IWMGP-B02-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	104			
SURROGATE	#Dibromofluoromethane#	96.6			
SURROGATE	#Toluene-d8#	102			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X 5	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94464 IWMGP-B02-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0	5	1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94464 IWMGP-B02-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 980

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	45.4			
SURROGATE	#2,4,6-Tribromophenol#	70.2			
SURROGATE	#2-Fluorophenol#	20.2			
SURROGATE	#Nitrobenzene - D5#	46.8			
SURROGATE	#Phenol - D6#	22.3			
SURROGATE	#p-Terphenyl-D14#	99.2			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.1		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.1		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.1		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	26		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.1		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.1		1.0
95-51-2	2-Chloroaniline	Not Detected	5.1		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.1		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.1		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.1		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	26	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.1		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94464 IWMGP-B02-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 980

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	51		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.1		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.1		1.0
86-74-8	Carbazole	Not Detected	5.1		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.1		1.0
84-66-2	Diethylphthalate	Not Detected	5.1		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.1		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.1		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.1		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.1		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.1		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.1		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94464 IWMGP-B02-W01-041312

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	1700	µg/L	50	D	04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	1.3	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	59	µg/L	5		04/20/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	2.8	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	ND	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	3.2	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	3.1	µg/L	1		04/20/2012	6020/200.8	TK
7439-96-5	Manganese - Total	240	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	4.2	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	6.0	µg/L	2		04/20/2012	6020/200.8	TK
7440-66-6	Zinc - Total	ND	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	120	mg/L	10	D	04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	2200	µg/L	20		04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	12	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	1.6	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	32	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94465 IWMGP-B04-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	104			
SURROGATE	#Dibromofluoromethane#	97.2			
SURROGATE	#Toluene-d8#	100			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X 5	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94465 IWMGP-B04-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0	5	1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94465 IWMGP-B04-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	42.7			
SURROGATE	#2,4,6-Tribromophenol#	52.5			
SURROGATE	#2-Fluorophenol#	11.9			
SURROGATE	#Nitrobenzene - D5#	42.6			
SURROGATE	#Phenol - D6#	19.0			
SURROGATE	#p-Terphenyl-D14#	80.6			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.0		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.0		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.0		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	25		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.0		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.0		1.0
95-51-2	2-Chloroaniline	Not Detected	5.0		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.0		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.0		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	25	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.0		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94465 IWMGP-B04-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	50		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.0		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.0		1.0
86-74-8	Carbazole	Not Detected	5.0		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.0		1.0
84-66-2	Diethylphthalate	Not Detected	5.0		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.0		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.0		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.0		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.0		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.0		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.0		1.0
129-00-0	Pyrene	1.0	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94465 IWMGP-B04-W01-041312

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	250000	µg/L	50	D	04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	1.0	µg/L	1		04/23/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	26	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	510	µg/L	5		04/23/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	2.2	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	0.46	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	83	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	50	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	310	µg/L	1		04/23/2012	6020/200.8	TK
7439-92-1	Lead - Total	67	µg/L	1		04/23/2012	6020/200.8	TK
7439-96-5	Manganese - Total	2100	µg/L	5	D	04/23/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	200	µg/L	2.0		04/23/2012	6020/200.8	TK
7782-49-2	Selenium - Total	2.2	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	0.84	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/23/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	240	µg/L	2		04/24/2012	6020/200.8	TK
7440-66-6	Zinc - Total	510	µg/L	10		04/23/2012	6020/200.8	TK
7440-70-2	Calcium - Total	84	mg/L	1		04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	67000	µg/L	200	D	04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	37	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	5.9	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	9.2	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94466 IWMGP-B03-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	102			
SURROGATE	#Dibromofluoromethane#	96.7			
SURROGATE	#Toluene-d8#	101			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X 5	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94466 IWMGP-B03-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0	5	1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94466 IWMGP-B03-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/25/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 990

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	47.3			
SURROGATE	#2,4,6-Tribromophenol#	47.6			
SURROGATE	#2-Fluorophenol#	14.9			
SURROGATE	#Nitrobenzene - D5#	51.3			
SURROGATE	#Phenol - D6#	20.0			
SURROGATE	#p-Terphenyl-D14#	82.3			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.1		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.0		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.1		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	25		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.1		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.1		1.0
95-51-2	2-Chloroaniline	Not Detected	5.1		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.1		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.1		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.1		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	25	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.0		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94466 IWMGP-B03-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/25/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 990

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	51		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.1		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.1		1.0
86-74-8	Carbazole	Not Detected	5.1		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.0		1.0
84-66-2	Diethylphthalate	Not Detected	5.1		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.1		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.1		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.1		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.1		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.1		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.1		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94466 IWMGP-B03-W01-041312

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94467 IWMGP-B05-W01-041212

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	99.7			
SURROGATE	#Dibromofluoromethane#	95.8			
SURROGATE	#Toluene-d8#	100			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	6.6	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	17	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	6.7	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	160	50	X	10
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94467 IWMGP-B05-W01-041212

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** RD

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0	5	1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	12	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	2.9	1.0		1.0
108383,106423	m & p - Xylene	12	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	290	50	X	10
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	6.2	1.0		1.0
99-87-6	p-Isopropyl toluene	1.8	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94467 IWMGP-B05-W01-041212

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 975

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	42.0			
SURROGATE	#2,4,6-Tribromophenol#	53.0			
SURROGATE	#2-Fluorophenol#	15.4			
SURROGATE	#Nitrobenzene - D5#	38.4			
SURROGATE	#Phenol - D6#	Not Applicable		V	
SURROGATE	#p-Terphenyl-D14#	72.8			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	21		10
95-95-4	2,4,5-Trichlorophenol	Not Detected	51		10
88-06-2	2,4,6-Trichlorophenol	Not Detected	41		10
120-83-2	2,4-Dichlorophenol	Not Detected	100		10
105-67-9	2,4-Dimethylphenol	Not Detected	51		10
51-28-5	2,4-Dinitrophenol	Not Detected	260		10
121-14-2	2,4-Dinitrotoluene	Not Detected	51		10
606-20-2	2,6-Dinitrotoluene	Not Detected	51		10
95-51-2	2-Chloroaniline	Not Detected	51		10
91-58-7	2-Chloronaphthalene	Not Detected	21		10
95-57-8	2-Chlorophenol	Not Detected	100		10
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	210		10
91-57-6	2-Methylnaphthalene	130	51		10
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	100		10
88-74-4	2-Nitroaniline	Not Detected	210		10
88-75-5	2-Nitrophenol	Not Detected	51		10
108394,106445	3 & 4-Methylphenol	Not Detected	210		10
99-09-2	3-Nitroaniline	Not Detected	210		10
101-55-3	4-Bromophenyl phenyl ether	Not Detected	21		10
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	51		10
106-47-8	4-Chloroaniline	Not Detected	100		10
7005-72-3	4-Chlorodiphenylether	Not Detected	10		10
100-01-6	4-Nitroaniline	Not Detected	210		10
100-02-7	4-Nitrophenol	Not Detected	260	5	10
83-32-9	Acenaphthene	110	10		10
208-96-8	Acenaphthylene	13	10		10
62-53-3	Aniline	Not Detected	41		10
120-12-7	Anthracene	78	10		10
103-33-3	Azobenzene	Not Detected	21		10
56-55-3	Benzo[a]anthracene	52	10		10
50-32-8	Benzo[a]pyrene	54	10		10
205-99-2	Benzo[b]fluoranthene	39	10		10
191-24-2	Benzo[g,h,i]perylene	23	10		10
207-08-9	Benzo[k]fluoranthene	16	10		10

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94467 IWMGP-B05-W01-041212

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 975

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	510		10
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	21		10
111-44-4	Bis(2-chloroethyl)ether	Not Detected	10		10
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	10		10
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	51		10
85-68-7	Butyl benzyl phthalate	Not Detected	51		10
86-74-8	Carbazole	Not Detected	51		10
218-01-9	Chrysene	49	10		10
53-70-3	Dibenz[a,h]anthracene	Not Detected	21		10
132-64-9	Dibenzofuran	Not Detected	41		10
84-66-2	Diethylphthalate	Not Detected	51		10
131-11-3	Dimethyl phthalate	Not Detected	51		10
84-74-2	Di-n-butyl phthalate	Not Detected	51		10
117-84-0	Di-n-octyl phthalate	Not Detected	51		10
206-44-0	Fluoranthene	80	10		10
86-73-7	Fluorene	61	10		10
118-74-1	Hexachlorobenzene	Not Detected	10		10
87-68-3	Hexachlorobutadiene	Not Detected	10		10
77-47-4	Hexachlorocyclopentadiene	Not Detected	100	Z	10
67-72-1	Hexachloroethane	Not Detected	10		10
193-39-5	Indeno(1,2,3-c,d)pyrene	22	21		10
78-59-1	Isophorone	Not Detected	10		10
121-69-7	N,N-dimethylaniline	Not Detected	51		10
91-20-3	Naphthalene	160	10		10
98-95-3	Nitrobenzene	Not Detected	21		10
100-61-8	N-methylaniline	Not Detected	10		10
67-75-9	N-Nitrosodimethylamine	Not Detected	51		10
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	21		10
86-30-6	N-Nitrosodiphenylamine	Not Detected	21		10
87-86-5	Pentachlorophenol	Not Detected	210		10
85-01-8	Phenanthrene	180	10		10
108-95-2	Phenol	Not Detected	51		10
129-00-0	Pyrene	180	10		10
110-86-1	Pyridine	Not Detected	210		10
632-22-4	Tetramethylurea	Not Detected	10		10

RLs raised due to matrix interference.
Probable petroleum product(s) present.

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94467 IWMGP-B05-W01-041212

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	2400	µg/L	50	D	04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	2.0	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	71	µg/L	5		04/20/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	5.9	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	ND	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	6.4	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	6.0	µg/L	1		04/20/2012	6020/200.8	TK
7439-96-5	Manganese - Total	950	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	5.7	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	14	µg/L	2		04/24/2012	6020/200.8	TK
7440-66-6	Zinc - Total	13	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	100	mg/L	10	D	04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	11000	µg/L	20		04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	12	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	1.6	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	6.0	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94468 IWMGP-B01-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	97.7			
SURROGATE	#Dibromofluoromethane#	101			
SURROGATE	#Toluene-d8#	91.7			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0	5	1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X G	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20	5	1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	ZG	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94468 IWMGP-B01-W01-041312

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	1.1	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94468 IWMGP-B01-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/25/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 990

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	49.9			
SURROGATE	#2,4,6-Tribromophenol#	67.4			
SURROGATE	#2-Fluorophenol#	20.9			
SURROGATE	#Nitrobenzene - D5#	52.3			
SURROGATE	#Phenol - D6#	22.6			
SURROGATE	#p-Terphenyl-D14#	91.6			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.1		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.0		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.1		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	25		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.1		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.1		1.0
95-51-2	2-Chloroaniline	Not Detected	5.1		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.1		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.1		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.1		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	25	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.0		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94468 IWMGP-B01-W01-041312

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/25/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 990

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	51		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.1		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.1		1.0
86-74-8	Carbazole	Not Detected	5.1		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.0		1.0
84-66-2	Diethylphthalate	Not Detected	5.1		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.1		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.1		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.1		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.1		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.1		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.1		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94468 IWMGP-B01-W01-041312

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	26000	µg/L	50	D	04/23/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/23/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	14	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	260	µg/L	5		04/23/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	0.44	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	39	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	20	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	130	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	64	µg/L	1		04/23/2012	6020/200.8	TK
7439-96-5	Manganese - Total	820	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	54	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	1.0	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	0.21	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/23/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	62	µg/L	2		04/20/2012	6020/200.8	TK
7440-66-6	Zinc - Total	130	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	31	mg/L	1		04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	36000	µg/L	200	D	04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	18	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	3.8	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	21	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94469 IWMGP-TB2

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/18/2012 **Analyst:** KCL

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	101			
SURROGATE	#Dibromofluoromethane#	94.5			
SURROGATE	#Toluene-d8#	96.6			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94469 IWMGP-TB2

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/18/2012 **Analyst:** KCL

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94470 IWMGP-S04-W04-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	98.6			
SURROGATE	#Dibromofluoromethane#	103			
SURROGATE	#Toluene-d8#	91.6			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0	5	1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X G	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20	5	1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	ZG	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94470 IWMGP-S04-W04-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94470 IWMGP-S04-W04-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/25/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	36.1			
SURROGATE	#2,4,6-Tribromophenol#	66.9			
SURROGATE	#2-Fluorophenol#	14.0			
SURROGATE	#Nitrobenzene - D5#	37.0			
SURROGATE	#Phenol - D6#	20.1			
SURROGATE	#p-Terphenyl-D14#	90.4			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.0		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.0		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.0		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	25		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.0		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.0		1.0
95-51-2	2-Chloroaniline	Not Detected	5.0		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.0		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.0		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	25	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.0		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94470 IWMGP-S04-W04-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/25/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	50		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.0		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.0		1.0
86-74-8	Carbazole	Not Detected	5.0		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.0		1.0
84-66-2	Diethylphthalate	Not Detected	5.0		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.0		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.0		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.0		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.0		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.0		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.0		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94470 IWMGP-S04-W04-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	110	µg/L	50		04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	14	µg/L	5		04/20/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	ND	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	1.3	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7439-96-5	Manganese - Total	35	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	ND	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-66-6	Zinc - Total	ND	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	14	mg/L	1		04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	630	µg/L	20		04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	3.8	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	0.76	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	4.2	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94471 IWMGP-S03-W03-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	99.3			
SURROGATE	#Dibromofluoromethane#	104			
SURROGATE	#Toluene-d8#	93.0			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0	5	1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X G	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20	5	1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	ZG	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94471 IWMGP-S03-W03-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94471 IWMGP-S03-W03-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	48.6			
SURROGATE	#2,4,6-Tribromophenol#	58.1			
SURROGATE	#2-Fluorophenol#	18.2			
SURROGATE	#Nitrobenzene - D5#	48.9			
SURROGATE	#Phenol - D6#	21.6			
SURROGATE	#p-Terphenyl-D14#	106			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.0		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.0		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.0		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	25		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.0		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.0		1.0
95-51-2	2-Chloroaniline	Not Detected	5.0		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.0		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.0		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	25	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.0		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94471 IWMGP-S03-W03-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	50		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.0		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.0		1.0
86-74-8	Carbazole	Not Detected	5.0		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.0		1.0
84-66-2	Diethylphthalate	Not Detected	5.0		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.0		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.0		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.0		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.0		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.0		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.0		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94471 IWMGP-S03-W03-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	120	µg/L	50		04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	14	µg/L	5		04/20/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	ND	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	1.3	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7439-96-5	Manganese - Total	37	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	ND	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-66-6	Zinc - Total	ND	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	14	mg/L	1		04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	630	µg/L	20		04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	3.9	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	0.81	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	5.9	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94472 IWMGP-S02-W02-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	98.9			
SURROGATE	#Dibromofluoromethane#	104			
SURROGATE	#Toluene-d8#	95.1			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0	5	1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X G	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20	5	1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	ZG	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94472 IWMGP-S02-W02-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94472 IWMGP-S02-W02-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 980

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	51.4			
SURROGATE	#2,4,6-Tribromophenol#	58.8			
SURROGATE	#2-Fluorophenol#	15.7			
SURROGATE	#Nitrobenzene - D5#	51.2			
SURROGATE	#Phenol - D6#	20.8			
SURROGATE	#p-Terphenyl-D14#	102			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.1		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.1		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.1		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	26		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.1		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.1		1.0
95-51-2	2-Chloroaniline	Not Detected	5.1		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.1		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.1		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.1		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	26	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.1		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94472 IWMGP-S02-W02-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 980

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	51		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.1		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.1		1.0
86-74-8	Carbazole	Not Detected	5.1		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.1		1.0
84-66-2	Diethylphthalate	Not Detected	5.1		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.1		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.1		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.1		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.1		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.1		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.1		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94472 IWMGP-S02-W02-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	120	µg/L	50		04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	13	µg/L	5		04/20/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	ND	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	1.2	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7439-96-5	Manganese - Total	43	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	ND	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-66-6	Zinc - Total	ND	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	13	mg/L	1		04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	650	µg/L	20		04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	3.6	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	0.70	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	3.8	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94473 IWMGP-S01-W01-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	99.0			
SURROGATE	#Dibromofluoromethane#	101			
SURROGATE	#Toluene-d8#	93.9			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0	5	1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X G	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20	5	1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	ZG	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94473 IWMGP-S01-W01-041112

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/21/2012 **Analyst:** JRS

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94473 IWMGP-S01-W01-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#2 - Fluorobiphenyl#	56.1			
SURROGATE	#2,4,6-Tribromophenol#	73.9			
SURROGATE	#2-Fluorophenol#	23.9			
SURROGATE	#Nitrobenzene - D5#	58.0			
SURROGATE	#Phenol - D6#	25.1			
SURROGATE	#p-Terphenyl-D14#	92.3			
120-82-1	1,2,4-Trichlorobenzene	Not Detected	2.0		1.0
95-95-4	2,4,5-Trichlorophenol	Not Detected	5.0		1.0
88-06-2	2,4,6-Trichlorophenol	Not Detected	4.0		1.0
120-83-2	2,4-Dichlorophenol	Not Detected	10		1.0
105-67-9	2,4-Dimethylphenol	Not Detected	5.0		1.0
51-28-5	2,4-Dinitrophenol	Not Detected	25		1.0
121-14-2	2,4-Dinitrotoluene	Not Detected	5.0		1.0
606-20-2	2,6-Dinitrotoluene	Not Detected	5.0		1.0
95-51-2	2-Chloroaniline	Not Detected	5.0		1.0
91-58-7	2-Chloronaphthalene	Not Detected	2.0		1.0
95-57-8	2-Chlorophenol	Not Detected	10		1.0
534-52-1	2-Methyl-4,6-dinitrophenol	Not Detected	20		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0		1.0
95-48-7	2-Methylphenol (o-Cresol)	Not Detected	10		1.0
88-74-4	2-Nitroaniline	Not Detected	20		1.0
88-75-5	2-Nitrophenol	Not Detected	5.0		1.0
108394,106445	3 & 4-Methylphenol	Not Detected	20		1.0
99-09-2	3-Nitroaniline	Not Detected	20		1.0
101-55-3	4-Bromophenyl phenyl ether	Not Detected	2.0		1.0
59-50-7	4-Chloro-3-methyl-phenol	Not Detected	5.0		1.0
106-47-8	4-Chloroaniline	Not Detected	10		1.0
7005-72-3	4-Chlorodiphenylether	Not Detected	1.0		1.0
100-01-6	4-Nitroaniline	Not Detected	20		1.0
100-02-7	4-Nitrophenol	Not Detected	25	5	1.0
83-32-9	Acenaphthene	Not Detected	1.0		1.0
208-96-8	Acenaphthylene	Not Detected	1.0		1.0
62-53-3	Aniline	Not Detected	4.0		1.0
120-12-7	Anthracene	Not Detected	1.0		1.0
103-33-3	Azobenzene	Not Detected	2.0		1.0
56-55-3	Benzo[a]anthracene	Not Detected	1.0		1.0
50-32-8	Benzo[a]pyrene	Not Detected	1.0		1.0
205-99-2	Benzo[b]fluoranthene	Not Detected	1.0		1.0
191-24-2	Benzo[g,h,i]perylene	Not Detected	1.0		1.0
207-08-9	Benzo[k]fluoranthene	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94473 IWMGP-S01-W01-041112

Base Neutral Acid Compounds

Analytical Method: 8270 **Date Tested:** 04/26/2012 **Analyst:** SMH
Extraction Method: 3510 **Extraction Date:** 04/18/2012 **Qualifier:** **Volume:** 1000

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
100-51-6	Benzyl Alcohol	Not Detected	50		1.0
111-91-1	Bis(2-chloroethoxy)methane	Not Detected	2.0		1.0
111-44-4	Bis(2-chloroethyl)ether	Not Detected	1.0		1.0
108-60-1	Bis(2-chloroisopropyl)ether	Not Detected	1.0		1.0
117-81-7	Bis(2-ethylhexyl)phthalate	Not Detected	5.0		1.0
85-68-7	Butyl benzyl phthalate	Not Detected	5.0		1.0
86-74-8	Carbazole	Not Detected	5.0		1.0
218-01-9	Chrysene	Not Detected	1.0		1.0
53-70-3	Dibenz[a,h]anthracene	Not Detected	2.0		1.0
132-64-9	Dibenzofuran	Not Detected	4.0		1.0
84-66-2	Diethylphthalate	Not Detected	5.0		1.0
131-11-3	Dimethyl phthalate	Not Detected	5.0		1.0
84-74-2	Di-n-butyl phthalate	Not Detected	5.0		1.0
117-84-0	Di-n-octyl phthalate	Not Detected	5.0		1.0
206-44-0	Fluoranthene	Not Detected	1.0		1.0
86-73-7	Fluorene	Not Detected	1.0		1.0
118-74-1	Hexachlorobenzene	Not Detected	1.0		1.0
87-68-3	Hexachlorobutadiene	Not Detected	1.0		1.0
77-47-4	Hexachlorocyclopentadiene	Not Detected	10	Z	1.0
67-72-1	Hexachloroethane	Not Detected	1.0		1.0
193-39-5	Indeno(1,2,3-c,d)pyrene	Not Detected	2.0		1.0
78-59-1	Isophorone	Not Detected	1.0		1.0
121-69-7	N,N-dimethylaniline	Not Detected	5.0		1.0
91-20-3	Naphthalene	Not Detected	1.0		1.0
98-95-3	Nitrobenzene	Not Detected	2.0		1.0
100-61-8	N-methylaniline	Not Detected	1.0		1.0
67-75-9	N-Nitrosodimethylamine	Not Detected	5.0		1.0
621-64-7	N-Nitrosodi-n-propylamine	Not Detected	2.0		1.0
86-30-6	N-Nitrosodiphenylamine	Not Detected	2.0		1.0
87-86-5	Pentachlorophenol	Not Detected	20		1.0
85-01-8	Phenanthrene	Not Detected	1.0		1.0
108-95-2	Phenol	Not Detected	5.0		1.0
129-00-0	Pyrene	Not Detected	1.0		1.0
110-86-1	Pyridine	Not Detected	20		1.0
632-22-4	Tetramethylurea	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94473 IWMGP-S01-W01-041112

CAS#	Analyte Name	Result	Unit	RL	Qualifier	Date Tested	Method	Analyst
CN_TOTAL	Cyanide	ND	mg/L	0.005		04/17/2012	ASTM D 751	MB
CN_ AVAL	Cyanide - Available	ND	mg/L	0.002		04/19/2012	ASTM D 688	MB
	Digestion Metals Water	Completed				04/19/2012	3010/200	TB
	Digestion Mercury Water	Completed				05/02/2012	7470/245.1	TB
7439-97-6	Mercury - Total	ND	µg/L	0.2		05/03/2012	7470/245.1	TS
7429-90-5	Aluminium - Total	120	µg/L	50		04/20/2012	6020/200.8	TK
7440-36-0	Antimony - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-38-2	Arsenic - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-39-3	Barium - Total	13	µg/L	5		04/20/2012	6020/200.8	TK
7440-41-7	Beryllium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-43-9	Cadmium - Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-47-3	Chromium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-48-4	Cobalt - Total	ND	µg/L	15		04/20/2012	6020/200.8	TK
7440-50-8	Copper - Total	1.1	µg/L	1		04/20/2012	6020/200.8	TK
7439-92-1	Lead - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7439-96-5	Manganese - Total	41	µg/L	5		04/20/2012	6020/200.8	TK
7439-98-7	Molybdenum - Total	ND	µg/L	25		04/20/2012	6020/200.8	TK
7440-02-0	Nickel - Total	ND	µg/L	2.0		04/20/2012	6020/200.8	TK
7782-49-2	Selenium - Total	ND	µg/L	1		04/20/2012	6020/200.8	TK
7440-22-4	Silver -Total	ND	µg/L	0.2		04/20/2012	6020/200.8	TK
7440-28-0	Thallium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-62-2	Vanadium - Total	ND	µg/L	2		04/20/2012	6020/200.8	TK
7440-66-6	Zinc - Total	ND	µg/L	10		04/20/2012	6020/200.8	TK
7440-70-2	Calcium - Total	13	mg/L	1		04/26/2012	6010/200.7	WN
7439-89-6	Iron - Total	610	µg/L	20		04/26/2012	6010/200.7	WN
7439-95-4	Magnesium - Total	3.6	mg/L	1		04/26/2012	6010/200.7	WN
7440-09-7	Potassium - Total	0.72	mg/L	0.1		04/26/2012	6010/200.7	WN
7440-23-5	Sodium - Total	3.7	mg/L	1		04/26/2012	6010/200.7	WN

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94474 IWMGP-TB3

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/18/2012 **Analyst:** KCL

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	103			
SURROGATE	#Dibromofluoromethane#	93.0			
SURROGATE	#Toluene-d8#	98.4			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94474 IWMGP-TB3

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/18/2012 **Analyst:** KCL

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94479 IWMGP-TB4

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/18/2012 **Analyst:** KCL

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
SURROGATE	#Bromofluorobenzene#	103			
SURROGATE	#Dibromofluoromethane#	95.9			
SURROGATE	#Toluene-d8#	94.3			
630-20-6	1,1,1,2-Tetrachloroethane	Not Detected	1.0		1.0
71-55-6	1,1,1-Trichloroethane	Not Detected	1.0		1.0
79-34-5	1,1,2,2-Tetrachloroethane	Not Detected	1.0		1.0
79-00-5	1,1,2-Trichloroethane	Not Detected	1.0		1.0
75-34-3	1,1-Dichloroethane	Not Detected	1.0		1.0
75-35-4	1,1-Dichloroethylene	Not Detected	1.0		1.0
87-61-6	1,2,3-Trichlorobenzene	Not Detected	5.0		1.0
96-18-4	1,2,3-Trichloropropane	Not Detected	1.0		1.0
526-73-8	1,2,3-Trimethylbenzene	Not Detected	1.0		1.0
120-82-1	1,2,4-Trichlorobenzene	Not Detected	5.0		1.0
95-63-6	1,2,4-Trimethylbenzene	Not Detected	1.0		1.0
96-12-8	1,2-Dibromo-3-chloropropane	Not Detected	5.0		1.0
106-93-4	1,2-Dibromoethane	Not Detected	1.0		1.0
95-50-1	1,2-Dichlorobenzene	Not Detected	1.0		1.0
107-06-2	1,2-Dichloroethane	Not Detected	1.0		1.0
78-87-5	1,2-Dichloropropane	Not Detected	1.0		1.0
108-67-8	1,3,5-Trimethylbenzene	Not Detected	1.0		1.0
541-73-1	1,3-Dichlorobenzene	Not Detected	1.0		1.0
106-46-7	1,4-Dichlorobenzene	Not Detected	1.0		1.0
78-93-3	2-Butanone (MEK)	Not Detected	5.0		1.0
591-78-6	2-Hexanone	Not Detected	5.0		1.0
91-57-6	2-Methylnaphthalene	Not Detected	5.0	X	1.0
67-64-1	2-Propanone (acetone)	Not Detected	20		1.0
108-10-1	4-Methyl-2-pentanone (MIBK)	Not Detected	5.0		1.0
107-13-1	Acrylonitrile	Not Detected	5.0	Z	1.0
71-43-2	Benzene	Not Detected	1.0		1.0
108-86-1	Bromobenzene	Not Detected	1.0		1.0
74-97-5	Bromochloromethane	Not Detected	1.0		1.0
75-27-4	Bromodichloromethane	Not Detected	1.0		1.0
75-25-2	Bromoform	Not Detected	1.0		1.0
74-83-9	Bromomethane	Not Detected	5.0		1.0
75-15-0	Carbon disulfide	Not Detected	1.0		1.0
56-23-5	Carbon tetrachloride	Not Detected	1.0		1.0
108-90-7	Chlorobenzene	Not Detected	1.0		1.0
75-00-3	Chloroethane	Not Detected	5.0		1.0
67-66-3	Chloroform	Not Detected	1.0		1.0
74-87-3	Chloromethane	Not Detected	5.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Sample Number: AB94479 IWMGP-TB4

Volatile Compounds

Analytical Method: 8260 **Date Tested:** 04/18/2012 **Analyst:** KCL

CAS #	Compound	Result ug/L	RL	Qualifier	Dilution Factor
156-59-2	cis-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-01-5	cis-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-82-7	Cyclohexane	Not Detected	5.0		1.0
124-48-1	Dibromochloromethane	Not Detected	1.0		1.0
74-95-3	Dibromomethane	Not Detected	1.0		1.0
75-71-8	Dichlorodifluoromethane	Not Detected	5.0		1.0
60-29-7	Diethyl ether	Not Detected	5.0		1.0
108-20-3	Diisopropyl Ether	Not Detected	5.0		1.0
100-41-4	Ethylbenzene	Not Detected	1.0		1.0
637-92-3	Ethyltertiarybutylether	Not Detected	5.0		1.0
67-72-1	Hexachloroethane	Not Detected	5.0		1.0
98-82-8	Isopropylbenzene	Not Detected	1.0		1.0
108383,106423	m & p - Xylene	Not Detected	2.0		1.0
74-88-4	Methyl iodide	Not Detected	1.0		1.0
75-09-2	Methylene chloride	Not Detected	5.0		1.0
1634-04-4	Methyltertiarybutylether	Not Detected	1.0		1.0
91-20-3	Naphthalene	Not Detected	5.0	X	1.0
104-51-8	n-Butylbenzene	Not Detected	1.0		1.0
103-65-1	n-Propylbenzene	Not Detected	1.0		1.0
95-47-6	o-Xylene	Not Detected	1.0		1.0
99-87-6	p-Isopropyl toluene	Not Detected	1.0		1.0
135-98-8	sec-Butylbenzene	Not Detected	1.0		1.0
100-42-5	Styrene	Not Detected	1.0		1.0
98-06-6	tert-Butylbenzene	Not Detected	1.0		1.0
75-65-0	tertiary Butyl Alcohol	Not Detected	50		1.0
994-05-8	tertiaryAmylmethylether	Not Detected	5.0		1.0
127-18-4	Tetrachloroethylene	Not Detected	1.0		1.0
109-99-9	Tetrahydrofuran	Not Detected	5.0		1.0
108-88-3	Toluene	Not Detected	1.0		1.0
156-60-5	trans-1,2-Dichloroethylene	Not Detected	1.0		1.0
10061-02-6	trans-1,3-Dichloropropylene	Not Detected	1.0		1.0
110-57-6	trans-1,4-Dichloro-2-butene	Not Detected	5.0	Z	1.0
79-01-6	Trichloroethylene	Not Detected	1.0		1.0
75-69-4	Trichlorofluoromethane	Not Detected	1.0		1.0
75-01-4	Vinyl chloride	Not Detected	1.0		1.0

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

MICHIGAN DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
ENVIRONMENTAL LABORATORY
P.O. Box 30270
Lansing, MI 48909
TEL: (517) 335-9800
FAX: (517) 335-9600

Qualifier Code	Qualifier Description
1	Result(s) and RL(s) are estimated due to low surrogate recovery.
2	Result is estimated due to high surrogate recovery.
3	Result(s) and RL(s) are estimated due to low matrix spike recovery.
4	Result is estimated due to high matrix spike recovery.
5	Result and RL are estimated due to low continuing calibration standard criteria failure.
6	Result is estimated due to high continuing calibration standard criteria failure.
7	Result(s) and RL(s) are estimated due to poor precision.
8	Result(s) and RL(s) are estimated due to low recovery of batch QC.
9	Result outside QC acceptance criteria.
A	Value reported is the mean of two or more determinations.
C	Value calculated from other independent parameters.
D	Analyte value quantified from a dilution(s); reporting limit (RL) raised.
E	Result is estimated due to high recovery of batch QC.
F	Amenable cyanide was not analyzed due to low level of total cyanide.
G	Result and RL are estimated due to initial calibration standard criteria failure.
H	Recommended laboratory holding time was exceeded.
I	Dilution required due to matrix interference; reporting limit (RL) raised.
J	Analyte was positively identified. Value is an estimate.
JA	Result is estimated due to multiple Aroclors present.
JC	Result is estimated since confirmation analysis did not meet acceptance criteria
JD	Due to severe degradation, specific Aroclor identification is difficult and quantitation is estimated.
K	RL(s) raised due to matrix interferences.
KR	RL(s) raised due to low sample volume submitted.
KS	RL(s) raised due to low total solids.
KW	RL(s) raised due to light sample weight.
LB	Reported library search compounds are tentative identifications with estimated concentrations.
M	The level of the method preparation blank (MPB) is reported in the qualifier column.
N	Non-homogeneous sample made analysis of sample questionable.
O	Result and RL estimated due to analysis from an open vial.
P	Recommended sample collection/preservation technique not used; reported result(s) is an estimate.
PI	Possible interference may have affected the accuracy of the laboratory result
Q	Quantity of sample insufficient to perform analyses requested.
R	Result confirmed by re-extraction and analysis.
S	Supernatant analyzed.
T	Reported value is less than the reporting limit (RL). Result is estimated.
V	Value not available due to dilution.
W	Reported value is less than the method detection limit (MDL).
X	Methods 8260 & 624 are used to analyze volatile organics that have boiling points below 200°C. 2-Methylnaphthalene & naphthalene have boiling points above 200°C and are better suited to analysis by methods 8270 or 625 as semivolatile organics.
Z	Result reported below the RL to meet the TDL in RRD Op Memo 2 (10/22/04) multiplied by applicable dilution factor.

CAS# : Chemical Abstract Service Registry Number
RL : Reporting Limit
ND : Not Detected

ug / L : microgram / liter (ppb)
mg / L : milligram / liter (ppm)
ug / Kg : microgram / kilogram (ppb)
mg / Kg : milligram / kilogram (ppm)

Laboratory Contacts
Inorganic Unit Mgr: Kirby Shane
Organic Unit Mgr: Carol Smith
Systems Mgmt Unit: George Krisztian

AMBIENT TOXICITY TEST REPORT FORM

GENERAL INFORMATION

PROJECT NAME:	**Ironwood MGP Ambients**	LABORATORY NAME:	Wisconsin State Laboratory of Hygiene
		REPORT NUMBER:	FW000396-399

SAMPLE INFORMATION

SAMPLE NO.	LAB NO.	FIELD NO.	SITE DESCRIPTION	STATION NO. (SWIMS, STORET or LAT/LONG)
1	FW000396	IWMGP-S04-W04-041112		
2	FW000397	IWMGP-S03-W03-041112		
3	FW000398	IWMGP-S02-W02-041112		
4	FW000399	IWMGP-S01-W01-041112		

SAMPLE NO.	SAMPLE COLLECTION			SAMPLE TEMP. °C		pH at LAB	HAND DELIVER? (If Yes, ≤ 4 hr?)	HOLD TIME ≤ 36 HR?	SAMPLE ACCEP-TABLE?
	SAMPLE TYPE	SAMPLING DATE	DATE at LAB	COLLECTION	AT LAB				
1	GRAB	4/11/2012	4/13/2012	NR	NR	NR	☐ Yes ☑ No	☐ Yes ☑ No	☑ Yes ☐ No
2	GRAB	4/11/2012	4/13/2012	NR	NR	NR	☐ Yes ☑ No	☐ Yes ☑ No	☑ Yes ☐ No
3	GRAB	4/11/2012	4/13/2012	NR	NR	NR	☐ Yes ☑ No	☐ Yes ☑ No	☑ Yes ☐ No
4	GRAB	4/11/2012	4/13/2012	NR	NR	NR	☐ Yes ☑ No	☐ Yes ☑ No	☑ Yes ☐ No
							☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No
							☐ Yes ☐ No	☐ Yes ☐ No	☐ Yes ☐ No

Describe any unusual conditions during sampling that may influence test results. (see Part 6.1.2 of the Methods Manual for examples.)

COMMENTS: **NR= not recorded**

TEST INFORMATION

	CHRONIC	
Date Test Initiated:	**4/16/2012**	

QA/QC CONDITIONS

	CHRONIC	
Temperatures maintained during test? (20 ± 1°C or 25 ± 1°C)	☑ Yes ☐ No	
Dissolved oxygen ≥ 4.0 mg/l throughout test?	☑ Yes ☐ No	
pH maintained within 6.0 - 9.0 s.u. throughout test?	☑ Yes ☐ No	
Concurrent or monthly reference tests within acceptable limits?	☑ Yes ☐ No	
Tests conducted in a carbon dioxide atmosphere throughout test?	☐ Yes ☑ No	
Light intensity for *Selenastrum* maintained throughout test? (4,300 ± 430 lux)	☑ Yes ☐ No	
Were samples modified prior to testing? (ex. filtration, aeration, chem addition)	☐ Yes ☑ No	

COMMENTS:

WATER CHEMISTRY

(All values reported in mg/L, except pH and Conductivity)

SAMPLE TYPE	SAMPLE NO.	HARDNESS	ALKALINITY	TOTAL AMMONIA	DISSOLVED OXYGEN	pH (s.u.) After Warming	Conductivity (µS)
SITES	1	68	40		8.8	8.05	111
	2	88	40		9.0	7.99	123
	3	52	35		8.8	8.03	105
	4	60	35		8.8	7.92	101
LAB WATER	KEG	244	175	NA	8.4	8.64	550
	DC	212	330	NA	8.4	8.45	696

COMMENTS: **KEG = Lake Kegonsa Water was used as the lab control water for the *Ceriodaphnia dubia* test.**
DC = Dechlorinated Madison tap water is used as the lab control for the fathead minnow test.
For ammonia analysis, limit of detection (LOD) = 0.015 mg/L, limit of quantification (LOQ) = 0.048 mg/L
NA = Not applicable

CHRONIC TEST CONTROL PERFORMANCE

LAB WATER CONTROLS	
Fathead Minnow	***Ceriodaphnia dubia***
Survival > 80% ☑ Yes ☐ No	Survival > 80% ☑ Yes ☐ No
	> 15 neonates/female ☑ Yes ☐ No
> 0.25 mg/fish ☑ Yes ☐ No	Reproduction CV < 40% ☑ Yes ☐ No
Survival Weight CV < 40% ☑ Yes ☐ No	Reproduction %CV= 21
	> 80% 3rd brood ☑ Yes ☐ No
Survival Weight % CV = 11	< 20% males ☑ Yes ☐ No

COMMENTS:

CHRONIC TEST DATA

SPECIES	SITE DESCRIPTION		MEAN % SURVIVAL	MEAN DRY BIOMASS PER REPLICATE PAIR (mg) 1	2	3	4	5	MEAN BIOMASS (mg)	Statistical Significance*
Fathead Minnow Growth & Survival Test	LC	LW Control	100	0.405	0.383	0.475	0.358	0.400	0.404	A
		LW Survival Weight		*0.405*	*0.383*	*0.475*	*0.358*	*0.400*		
	1	IWMGP-S04-W04-041112	100	0.428	0.340	0.373	0.420	0.403	0.393	A
	2	IWMGP-S03-W03-041112	100	0.408	0.293	0.383	0.363	0.280	0.345	A
	3	IWMGP-S02-W02-041112	100	0.388	0.318	0.323	0.393	0.348	0.354	A
	4	IWMGP-S01-W01-041112	90	0.330	0.320	0.390	0.230	0.343	0.323	A

Please describe any unusual behavior and/or appearance of organisms.(see Part 6.1.2 of the Methods Manual for ex.)

COMMENTS: *** Samples with the same letter are not statistically different from each other.**

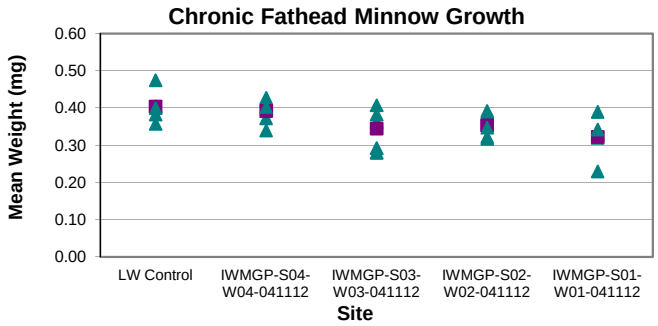
SPECIES	SITE	NEONATE PRODUCTION BY REPLICATE 1	2	3	4	5	6	7	8	9	10	MEAN NEONATES	% ADULT SURVIVAL	Statistical Significance*
C. dubia Reproduction & Survival Test	LC	38	18	32	26	37	39	43	36	38	36	34	100	A
	1	33	18	35	34	31	38	36	34	43	34	34	100	A
	2	35	22	33	29	36	35	40		0	41	30	100	A
	3	17	15	34	23	28	27		33	35	28	27	90	A
	4	34	19	34	22	36	31	32	37	39	31	32	100	A

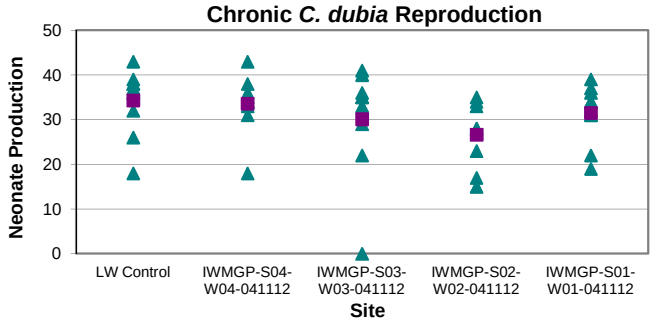
Male Production ≤ 20% Over All Treatments? ☑ Yes ☐ No

Please describe any unusual behavior and/or appearance of organisms.(see Part 6.1.2 of the Methods Manual for ex.)

COMMENTS: *** Samples with the same letter are not statistically different from each other.**
Reps 2-8 and 3-7 are lab accidents.

▲ **= Individual Data** ■ **= Mean**





Project Name : Ironwood MGP Ambients
Report # : FW000396-399
Chronic Test Date : 4/16/2012

CHRONIC TEST CONTROL PERFORMANCE

LAB WATER CONTROLS
Selenastrum
≥ $1x10^6$ cells/ml ☑ Yes ☐ No
CV ≤ 20% ☑ Yes ☐ No
%CV = 2

GROWTH MEASUREMENT PER REPLICATE

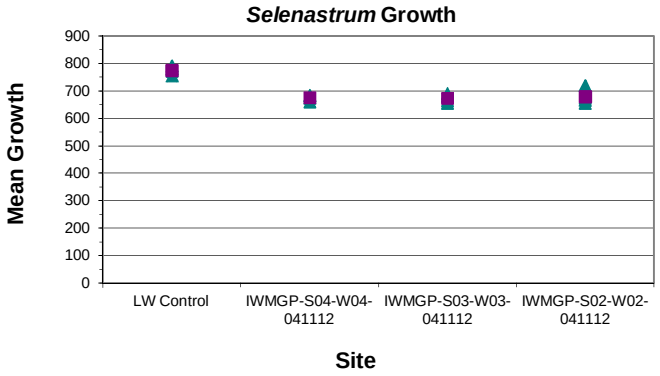
SPECIES	SITE DESCRIPTION		1 Initial	2 Initial	3 Initial	4 Initial	MEAN GROWTH	%CV	Statistical Significance*
Selenastrum capricornutum GROWTH TEST	LC	LW Control	754.48	780.23	772.57	790.76	775	2	A
	1	IWMGP-S04-W04-041112	683.31	673.92	660.77	683.82	675	2	B
	2	IWMGP-S03-W03-041112	655.66	664.92	680.73	690.96	673	2	B
	3	IWMGP-S02-W02-041112	674.55	655.29	666.25	720.15	679	4	B
	4	IWMGP-S01-W01-041112	659.59	677.54	688.43	682.82	677	2	B

Test Type: ☐ flask ☑ microplate **Endpoint:** ☐ count ☐ spec. ☑ fluor.

Please describe any unusual appearance of organisms.(see Part 6.1.2 of the Methods Manual for ex.)

COMMENTS: *** Samples with the same letter are not statistically different from each other.**

▲ **= Individual Data** ■ **= Mean**



Project Name : Ironwood MGP Ambients
Report # : FW000396-399
Chronic Test Date : 4/16/2012

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I also certify that these results relate only to these samples.

LAB REPRESENTATIVE:	Mallory Berrey		SIGNATURE:	Mallory Berrey	
DATE:	5/31/2012				
PHONE:	(608) 224-6230	WDNR LAB CERT #:	113133790		
LAB ADDRESS:	Wisconsin State Laboratory of Hygiene, 2601 Agriculture Drive, Madison, WI 53718				
REVIEWED BY:	Steve Geis		DATE:	6/1/2012	
PERMITTEE			SIGNATURE:		
PHONE:			DATE:		

Project Name : Ironwood MGP Ambients
Report # : FW000396-399
Test Date : 4/16/2012

SEDIMENT TOXICITY TESTS

Ironwood MGP Project

Tested April-May 2012

By the Wisconsin State Laboratory of Hygiene

Environmental Toxicology Section

Laboratory Report Number FW000400-403

Report Date: June 1, 2012

Reviewed by: Steve Geis Date: 6/1/2012

INTRODUCTION

Weston Solutions staff collected four sediment samples for the Ironwood MGP project April 11, 2012 and delivered them to the Wisconsin State Laboratory of Hygiene (WSLH). WSLH tested the sediments for toxicity along with formulated sediment as a laboratory control. Solid phase sediment toxicity tests were performed using the amphipod, *Hyalella azteca*, and the larval stage of the midge, *Chironomus tentans*. These two organisms, which burrow and come into direct contact with the sediments, are recommended for use in sediment toxicity testing (USEPA, 2000).

TEST METHODS

Sediments were received in 1 gallon high density polyethylene jars on April 12, 2012 and stored in the dark at 4°C. On April 27, each sediment sample and the synthetic laboratory control sediment were thoroughly homogenized by mixing the sample in a five gallon bucket using a large stainless steel spoon. Homogenized sediment was placed in test beakers and stored at 4°C until April 29. On April 29, dechlorinated tap water was added to each test beaker at a ratio of 1:1.75, sediment to overlying water and the test beakers were randomly placed into a walk-in environmental chamber at 23± 1°C with a 16 hour: 8 hour light:dark cycle. After allowing the sediments to settle overnight, organisms were randomly added to the test beakers on April 30, 2012. Test conditions are summarized in Table 1 (USEPA, 2000).

Chironomus tentans

Chironomus tentans egg masses were purchased from Aquatic Biosystems, Fort Collins, CO and hatched in the Environmental Toxicology section of WSLH. Larval *C. tentans* were 10-11 days old on the day the test was initiated. Ten individuals were randomly placed in each test beaker with eight replicates per sediment site and lab control. Overlying water was replaced twice daily and organisms were fed 1.5 ml Tetramin® flake fish food mixture daily (1.5 ml contained 6.0 mg of dry solids). Dissolved oxygen, pH, and temperature of the overlying water were recorded daily. Hardness, alkalinity, ammonia and conductivity were measured at the beginning and at the end of the test (day 0 and day 10, respectively). On day 10, the organisms were recovered from the sediment to determine the number of survivors. Surviving organisms were subsequently

dried overnight at 100°C and weighed to determine dry weight. The organisms were then ashed at 550°C for a minimum of 2 hours and weighed to determine ash-free dry weight (USEPA, 2000).

Hyalella azteca
Juvenile *H. azteca*, cultured in the Environmental Toxicology Section of WSLH, were 10-11 days old on the day of test initiation. Ten individuals were randomly placed in each test beaker with eight replicates per sediment site and lab control. Overlying water was replaced twice daily and organisms were fed 1.0 ml YFC (yeast/fish food/cereal leaves). Dissolved oxygen, pH, and temperature of the overlying water were recorded daily. Hardness, alkalinity, ammonia and conductivity were measured at the beginning and at the end of the test (day 0 and day 10, respectively). On day 10 the organisms were recovered from the sediment to determine the number of survivors in each replicate. Survivors were subsequently dried overnight at 100°C and weighed to determine dry weight (USEPA, 2000).

Statistical analyses
Statistical analyses were conducted using a PC-version of SAS® (SAS Institute, Cary, NC). One-way analysis of variance (ANOVA) followed by a multiple comparison test (Student-Newman-Keuls) was used to identify differences among treatments in survival and weight of survivors of *Chironomus tentans* and *Hyalella azteca.* Results with $p < 0.05$ were considered significant.

SUMMARY OF RESULTS

Tests for both species met the minimum requirements for test acceptability (see Table 1). *C. tentans* survival was 91% in the control sediment and the average weight per individual was greater than 0.48 mg (at 1.3 mg). *H.azteca* survival in the control sediment was 97.5% and the average weight increased from 0.042 mg/individual to 0.068 mg/individual.

Overlying water chemical parameters
Dissolved oxygen (DO) and temperature values in overlying water were within acceptable limits for both tests according to USEPA, 2000 (see Table 1 and Figures 3, 5, 9, and 11). DO should remain above 2.5 mg/L, which was the case

throughout the test as DO never dropped below 3.8 mg/L. There are no criteria set for pH values but results are summarized in Figures 4 and 10. Results of conductivity, hardness, alkalinity and ammonia analyses from samples collected on the first and last days of the tests are summarized in Figures 6 and 12. According to USEPA (2000), values for hardness, alkalinity and ammonia should not vary by more than 50% during the test. This was the case for hardness and alkalinity in both tests. However ammonia values did vary by greater than 50% in many of the sites for both species. Overall, the levels of ammonia in overlying water were low ($\leq$ 1.0 mg/L) and not at levels that have been associated with toxicity in sediment tests in the past (20 -310 mg/L, USEPA, 2000). There are no criteria set for conductivity measurements.

Survival and Growth

Statistical analyses indicated significant differences in survival and growth of *C. tentans* and *H. azteca* among sites ($p < 0.05$).

Chironomus tentans

Survival of *C. tentans* was only affected at site IWMGP-S02-SED02-041112. At this site, no C. tentans survived (Figure 1). Survival was not significantly different among any of the other sites and the lab control.

Chironomus tentans ash-free dry weight (AFDW) was significantly lower than the lab control at three sites (IWMGP-S02-SED02-041112, IWMGP-S03-SED03-041112, IWMGP-S04-SED04-041112). The reduction was 39% and 16% for sites IWMGP-S04-SED04-041112 and IWMGP-S03-SED03-041112 respectively, relative to the lab control. At the site with no survival, AFDW was zero. AFDW from *C. tentans* was significantly increased (by 28%) at site IWMGP-S01-SED01-041112 compared with the lab control (Figure 2).

Hyalella azteca

Survival of *H.azteca* was only affected at site IWMGP-S02-SED02-041112, with 10% survival at this site (Figure 7). Survival was not significantly different among any of the other sites and the lab control.

There were no significant differences in *H.azteca* dry weight between the lab control and the test sites with the exception of IWMGP-S02-SED02-041112. A 40% decrease in dry weight for *H. azteca* that survived exposure to IWMGP-S02-SED02-041112 sediment was found, relative to the lab control (Figure 8).

CONCLUSIONS

The reduction of survival and growth of the tested sediment organisms was most profound at site IWMGP-S02-SED02-041112. This sediment was noted to have an apparent gasoline smell and oily appearance during the homogenization before setting the test. Although the *C. tentans* were completely unable to survive in this sediment, a few *H. azteca* did survive in three of the eight replicates. The surviving *H. azteca* apparently did not sustain growth, as the average dry weight upon setting the organisms was 0.042 mg/individual and following the 10 day exposure to IWMGP-S02-SED02-041112, weights were 0.41 mg/individual.

Although survival was not significantly affected at any of the other sites, reduction in weight was found at site IWMGP-S04-SED04-041112 for both organisms, although it was only significantly lower for *C. tentans*. A significant reduction in AFDW was also found for C. tentans at site IWMGP-S03-SED03-041112. Thus, these two sites may alter the ability of sediment organisms to thrive, although not to the extent of site IWMGP-S02-SED02-041112.

Overall, *C. tentans* appear more susceptible to differences in sediment quality than does *H. azteca*. This may be because *C. tentans* larvae burrow into the sediment and actually ingest the sediment to some degree while *H. azteca* reside in the pore water at the sediment/water interface and do not ingest the sediment. The relatively decreased association of the *H. azteca* to the sediments may account for the reduced toxicity for *H. azteca* relative to *C. tentans*.

REFERENCES

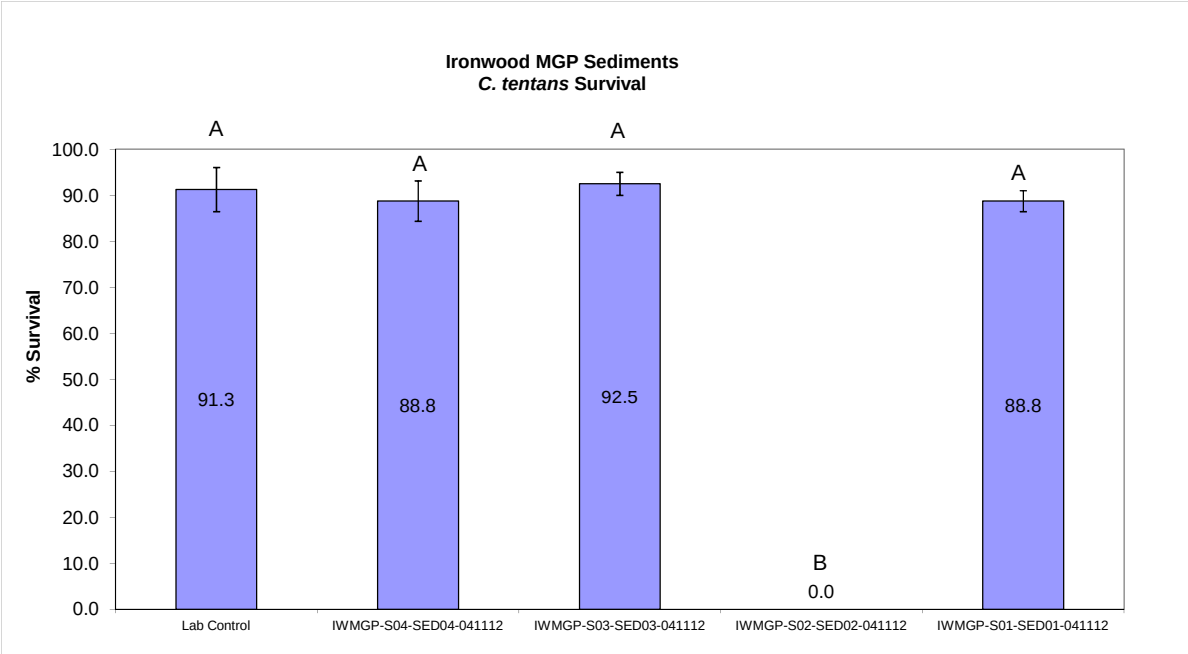
United States Environmental Protection Agency (USEPA). Methods for measuring the toxicity and bioaccumulation of sediment-associated contaminants with freshwater invertebrates. Second Edition. 2000. EPA/600/R-99/064. Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C.

Table 1. Summary of Test Conditions for Conducting Sediment Toxicity Tests

Parameter		**Conditions**
1.	Test Type	Whole sediment toxicity test with renewal of overlying water
2.	Temperature	23 ± 1°C
3.	Light Quality	Wide-spectrum fluorescent lights
4.	Illuminance:	About 100 to 1000 lux
5.	Photoperiod	16L:8D
6.	Test Chamber	470 ml polypropylene Beaker (*C. tentans* and *H. azteca*)
7.	Sediment Volume	100 ml (*C. tentans* and *H. azteca)*
8.	Overlying Water Volume	175 ml (*C. tentans* and *H. azteca)*
9.	Renewal of Overlying Water	2 volume additions/d (*C. tentans* and *H. azteca*)
10.	Age of Organisms	Second to third instar larvae (*C. tentans*) 7- to 14-d old, within a 1 to 2 day range (*H. azteca)*
11.	Number of organisms/chamber	10 (*C. tentans* and *H. azteca)*
12.	Number of replicates/treatment	8 (*C. tentans* and *H. azteca)*
13.	Feeding	1.0 ml YFC (1800 mg/l stock) daily to each test chamber (*H. azteca*) 1.5 ml Tetramin flake fish food mixture (1.5ml contains 6.0 mg of dry solids) to each test chamber (*C. tentans*)
14.	Aeration	None, unless dissolved oxygen in overlying water drops below 2.5 mg/L
15.	Overlying water	dechlorinated tap water
16.	Test chamber cleaning	If screens become clogged during a test; gently brush the outside of the screen
17.	Overlying water quality	Hardness, alkalinity, ammonia, DO, pH, and conductivity at the beginning and end of a test. Temperature, pH and dissolved oxygen daily.
18.	Test duration	10 d (*H. azteca* and *C. tentans*)
19.	Endpoints	Survival and growth (dry weight) (*H. azteca*) Survival and growth (ash free dry weight) (*C. tentans*)
20.	Test acceptability	Minimum mean control survival of 70%, minimum mean weight per surviving control organism of 0.48 mg ash free dry weight (*C. tentans)* Minimum mean control survival of 80% and measurable growth of test organisms in the control sediment (*H. azteca*)

Figure 1
Ironwood MGP Sediments
***Chironomus tentans* Survival**
Sediment collected: April 11, 2012
Test Date: April 30, 2012

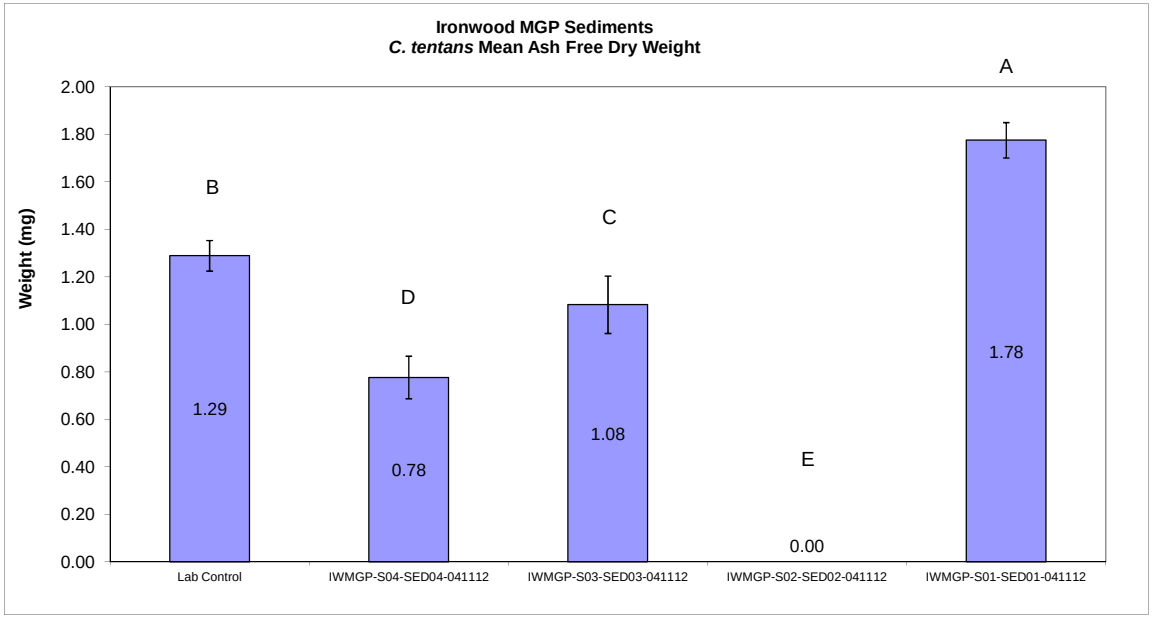
			Percent survival by replicate									
Lab Number	Site Name	Description	Rep 1	2	3	4	5	6	7	8	Mean	SE
LC	Lab Control	synthetic sediment	90	100	100	100	90	100	60	90	91.3	4.8
FW000400	IWMGP-S04-SED04-041112	sample	90	90	100	60	90	100	90	90	88.8	4.4
FW000401	IWMGP-S03-SED03-041112	sample	90	80	90	90	100	100	100	90	92.5	2.5
FW000402	IWMGP-S02-SED02-041112	sample	0	0	0	0	0	0	0	0	0.0	0.0
FW000403	IWMGP-S01-SED01-041112	sample	90	90	80	80	90	100	90	90	88.8	2.3



Bars with the same letter are not statistically different

Figure 2
Ironwood MGP Sediments
***Chironomus tentans* Ash Free Dry Weight (AFDW)**
Sediment collected: April 11, 2012
Test Date: April 30, 2012

			mg/survivng individual									
Lab Number	Site Name	Description	Rep 1	2	3	4	5	6	7	8	Mean	SE
LC	Lab Control	synthetic sediment	1.23	1.16	1.46	1.16	1.55	1.01	1.43	1.31	1.29	0.06
FW000400	IWMGP-S04-SED04-041112	sample	0.93	0.37	0.93	1.13	0.95	0.69	0.69	0.52	0.78	0.09
FW000401	IWMGP-S03-SED03-041112	sample	1.11	1.76	0.66	1.18	0.82	1.06	1.26	0.81	1.08	0.12
FW000402	IWMGP-S02-SED02-041112	sample	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW000403	IWMGP-S01-SED01-041112	sample	2.09	1.90	1.91	1.56	1.74	1.60	1.91	1.49	1.78	0.07



Bars with the same letter are not statistically different

Figure 3
Ironwood MGP Sediments
Chironomus tentans
Dissolved Oxygen (mg/L)

Lab Number	Site Name	Description	Initial	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Mean	sd
LC	Lab Control	synthetic sediment	8.17	6.91	5.80	6.03	5.54	6.77	6.15	6.08	5.94	7.14	6.68	6.30	0.76
FW000400	IWMGP-S04-SED04-041112	sample	8.27	6.92	5.66	5.51	4.91	6.29	5.31	5.69	5.44	6.78	5.71	5.82	0.96
FW000401	IWMGP-S03-SED03-041112	sample	8.41	6.92	5.75	6.25	5.01	6.31	6.69	7.09	6.82	7.47	7.06	6.54	0.89
FW000402	IWMGP-S02-SED02-041112	sample	8.02	5.91	4.62	5.07	4.69	6.28	5.59	6.22	5.69	6.91	5.90	5.69	0.98
FW000403	IWMGP-S01-SED01-041112	sample	8.28	5.57	4.21	5.34	3.81	5.93	4.85	5.55	4.81	6.67	4.65	5.14	1.24

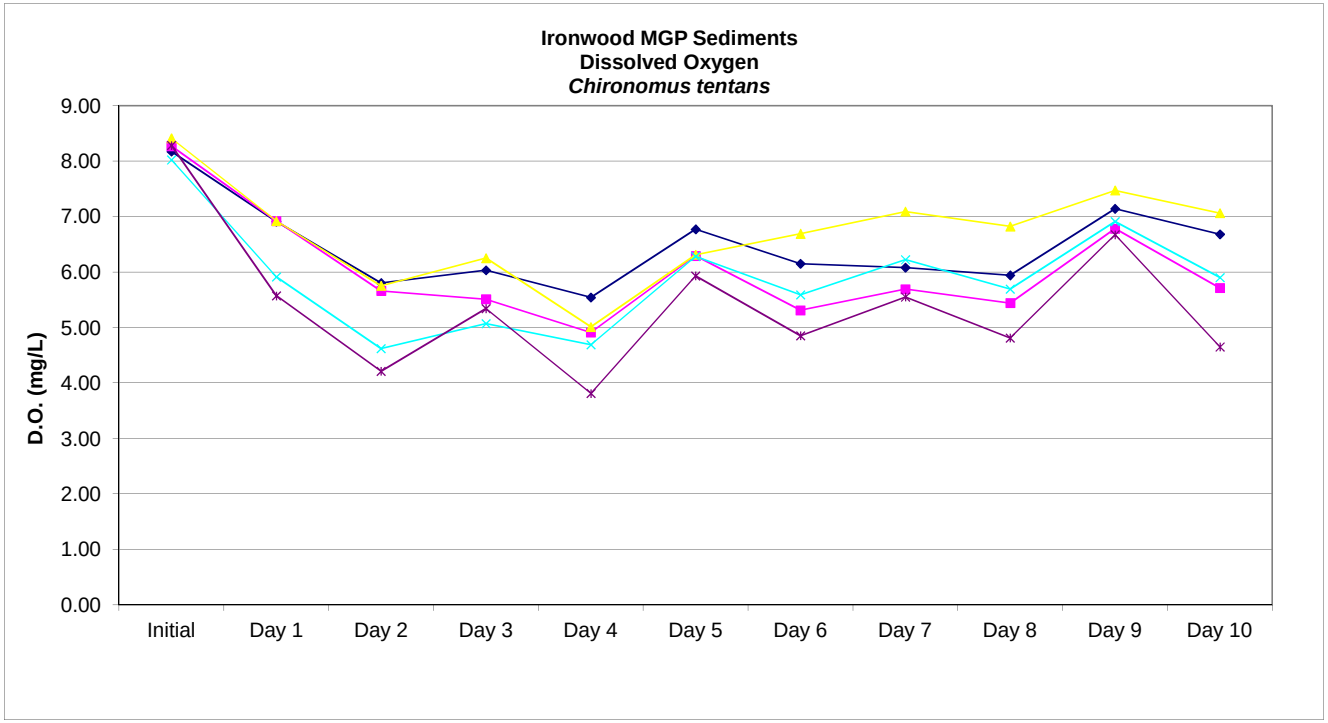


Figure 4
Ironwood MGP Sediments
Chironomus tentans
pH

Lab Number	Site Name	Description	Initial	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Mean	sd
LC	Lab Control	synthetic sediment	8.27	8.31	8.34	8.43	8.28	8.32	8.33	8.42	8.19	8.40	8.29	8.33	0.07
FW000400	IWMGP-S04-SED04-041112	sample	8.23	8.27	8.31	8.34	8.32	8.25	8.23	8.28	8.21	8.38	8.15	8.27	0.07
FW000401	IWMGP-S03-SED03-041112	sample	8.34	8.27	8.34	8.47	8.31	8.23	8.31	8.42	8.27	8.44	8.40	8.35	0.08
FW000402	IWMGP-S02-SED02-041112	sample	8.10	7.97	8.07	8.16	8.12	8.13	8.08	8.25	8.06	8.26	8.12	8.12	0.08
FW000403	IWMGP-S01-SED01-041112	sample	8.26	8.01	8.08	8.25	8.10	8.16	8.11	8.28	8.05	8.31	8.05	8.14	0.11

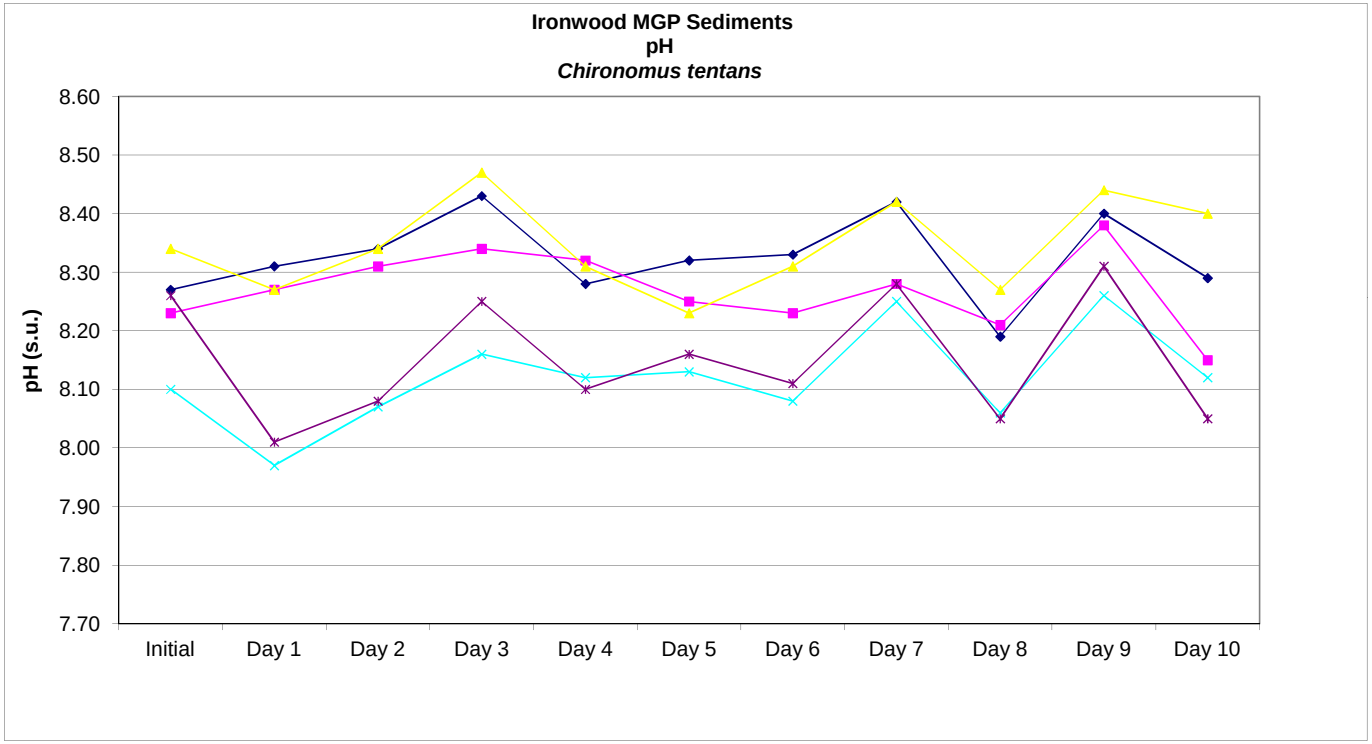


Figure 5
Ironwood MGP Sediments
Chironomus tentans
Temperatures (ºC)

Lab Number	Site Name	Description	Initial	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Mean	sd
LC	Lab Control	synthetic sediment	22.0	22.4	23.1	23.0	22.5	22.8	22.8	23.1	22.7	23.1	22.9	22.8	0.3
FW000400	IWMGP-S04-SED04-041112	sample	22.7	22.9	23.6	23.6	23.4	23.4	23.7	23.6	23.4	23.5	23.4	23.5	0.3
FW000401	IWMGP-S03-SED03-041112	sample	22.3	22.7	23.4	23.2	23.1	23.3	23.4	23.4	23.1	23.4	23.3	23.2	0.4
FW000402	IWMGP-S02-SED02-041112	sample	22.3	22.9	23.5	23.3	23.2	23.2	23.3	23.3	23.2	23.1	23.3	23.2	0.3
FW000403	IWMGP-S01-SED01-041112	sample	21.8	22.5	23.2	22.8	22.4	22.7	22.7	23.0	22.7	23.0	22.7	22.8	0.4

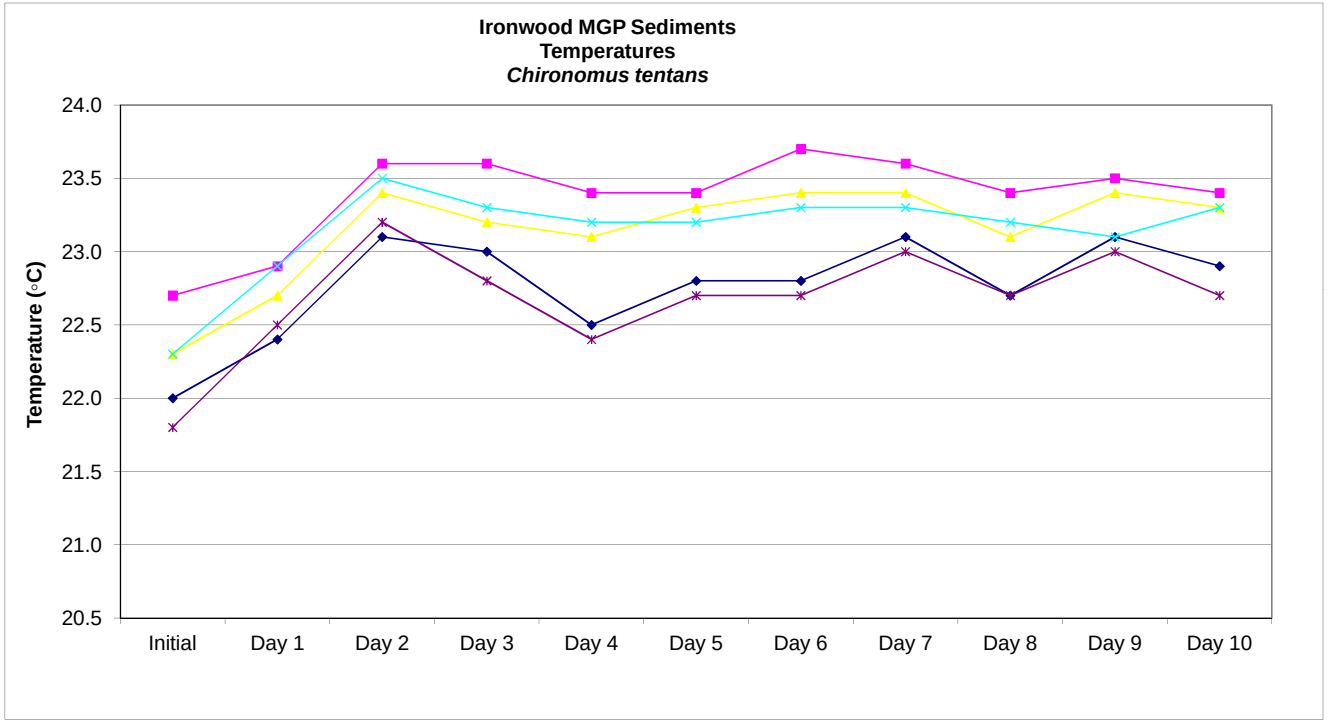
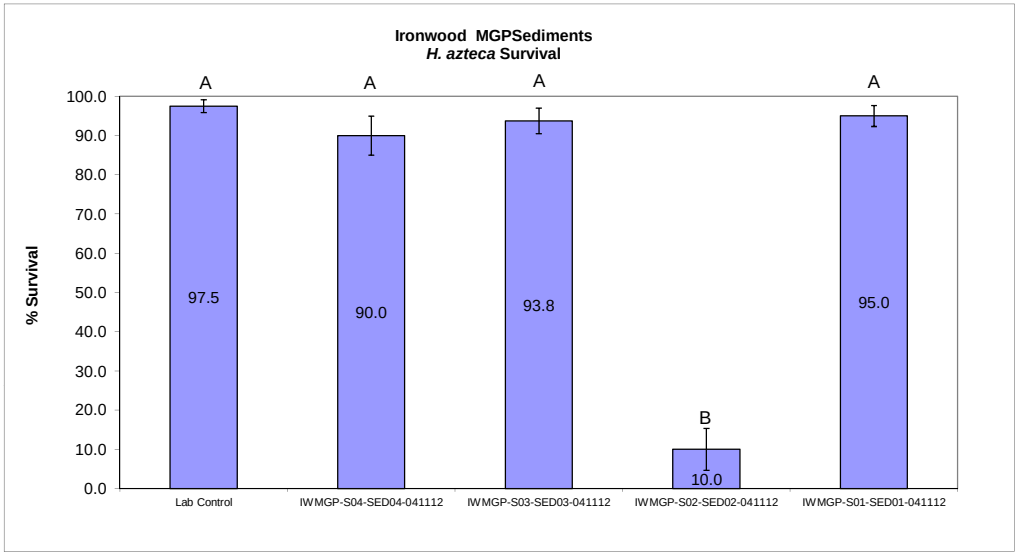


Figure 6
Ironwood MGP Sediments
Chironomus tentans
Conductivity, Hardness, Alkalinity and Ammonia

			Conductivity (µS)		Hardness (mg/L)		Alkalinity (mg/L)		Ammonia (mg/L)	
Lab Number	Site Name	Description	Initial (day 0)	Final (day 10)	Initial (day 0)	Final (day 10)	Initial (day 0)	Final (day 10)	Initial (day 0)	Final (day 10)
LC	Lab Control	synthetic sediment	766	716	232	204	335	310	0.081	0.891
FW000400	IWMGP-S04-SED04-041112	sample	690	710	220	192	305	300	0.064	0.813
FW000401	IWMGP-S03-SED03-041112	sample	677	705	212	184	310	285	0.150	0.131
FW000402	IWMGP-S02-SED02-041112	sample	653	722	204	196	280	300	0.037	0.796
FW000403	IWMGP-S01-SED01-041112	sample	734	720	216	204	305	300	0.095	1.00

Figure 7
Ironwood MGP Sediments
***Hyallela azteca* Survival**
Sediment collected: April 11, 2012
Test Date: April 30, 2012

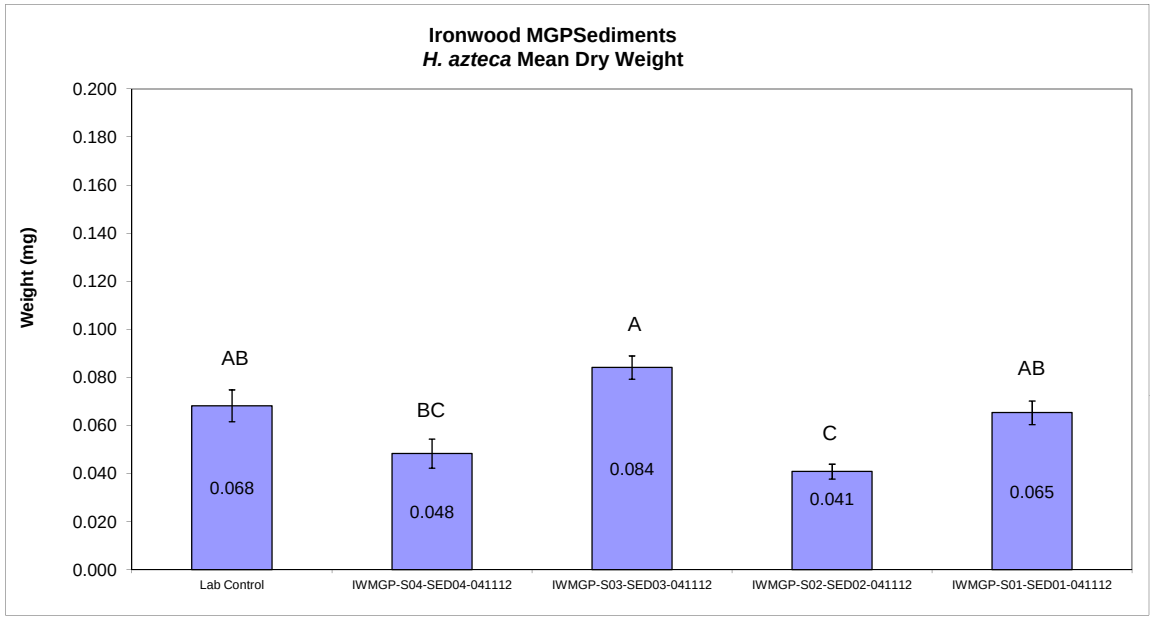
			Percent survival by replicate									
Lab Number	Site Name	Description	Rep 1	2	3	4	5	6	7	8	Mean	SE
LC	Lab Control	synthetic sediment	90	100	100	100	100	100	90	100	97.5	1.6
FW000400	IWMGP-S04-SED04-041112	sample	70	100	70	80	100	100	100	100	90.0	5.0
FW000401	IWMGP-S03-SED03-041112	sample	80	100	100	100	80	90	100	100	93.8	3.2
FW000402	IWMGP-S02-SED02-041112	sample	0	0	0	40	20	0	0	20	10.0	5.3
FW000403	IWMGP-S01-SED01-041112	sample	80	90	100	100	100	100	90	100	95.0	2.7



Bars with the same letter are not statistically different

Figure 8
Ironwood MGP Sediments
***Hyalella azteca* Dry Weight/Surviving Individual (mg)**
Sediment collected: April 11, 2012
Test Date: April 30, 2012

			mg/survivng individual									
Lab Number	Site Name	Description	Rep 1	2	3	4	5	6	7	8	Mean	SE
LC	Lab Control	synthetic sediment	0.048	0.069	0.061	0.052	0.096	0.049	0.087	0.084	0.068	0.01
FW000400	IWMGP-S04-SED04-041112	sample	0.024	0.059	0.029	0.071	0.056	0.047	0.064	0.036	0.048	0.01
FW000401	IWMGP-S03-SED03-041112	sample	0.070	0.095	0.071	0.092	0.100	0.069	0.099	0.077	0.084	0.00
FW000402	IWMGP-S02-SED02-041112	sample				0.033	0.050			0.040	0.041	0.00
FW000403	IWMGP-S01-SED01-041112	sample	0.054	0.076	0.057	0.066	0.085	0.045	0.080	0.060	0.065	0.00



Bars with the same letter are not statistically different

Figure 9
Ironwood MGP Sediments
Hyalella azteca
Dissolved Oxygen (mg/L)

Lab Number	Site Name	Description	Initial	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Mean	sd
LC	Lab Control	synthetic sediment	7.70	7.62	6.89	6.97	7.21	7.88	7.82	7.70	7.47	7.89	7.45	7.49	0.35
FW000400	IWMGP-S04-SED04-041112	sample	7.73	7.65	6.90	7.09	7.02	7.83	7.82	7.70	7.49	7.86	7.56	7.49	0.35
FW000401	IWMGP-S03-SED03-041112	sample	7.95	7.83	7.14	7.30	7.22	7.97	8.08	7.97	7.69	8.10	7.65	7.70	0.35
FW000402	IWMGP-S02-SED02-041112	sample	6.04	6.37	5.04	5.09	5.08	6.68	6.23	6.22	6.24	6.93	6.53	6.04	0.67
FW000403	IWMGP-S01-SED01-041112	sample	7.64	7.66	6.91	7.06	7.12	8.08	8.11	8.13	7.80	8.00	7.43	7.63	0.45

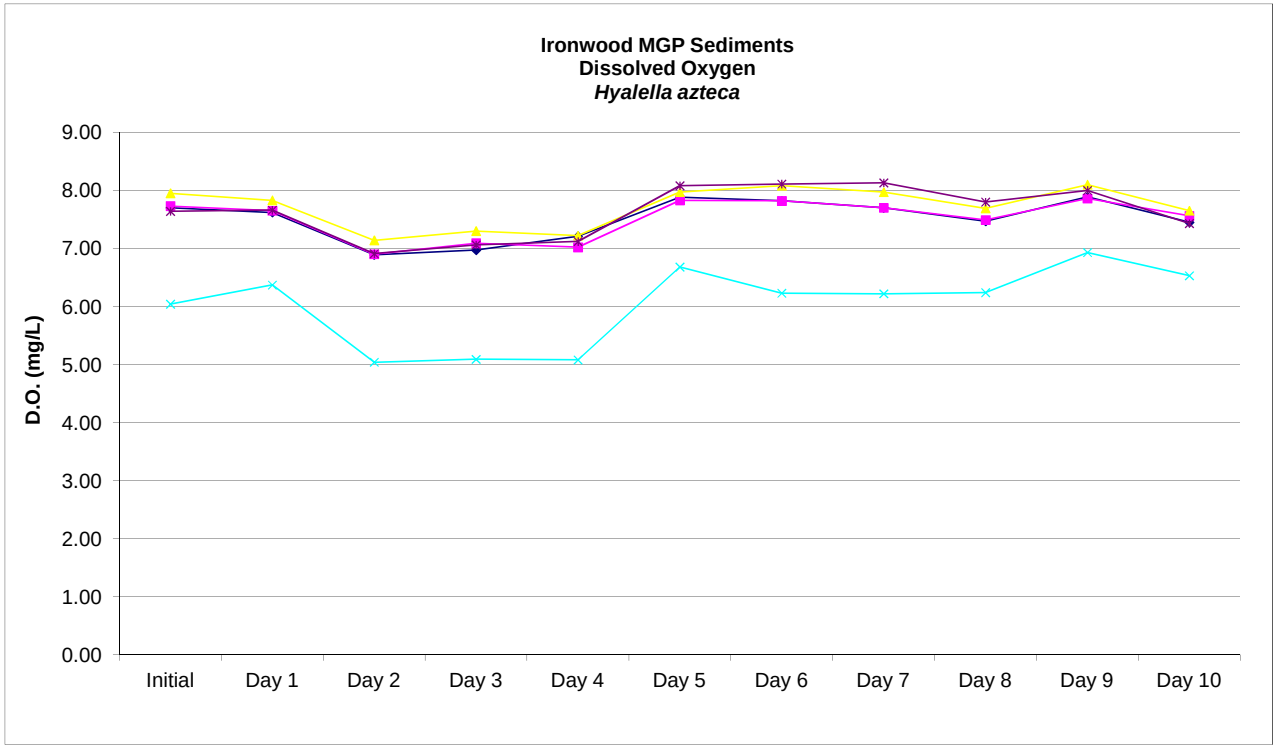


Figure 10
Ironwood MGP Sediments
Hyalella azteca
pH

Lab Number	Site Name	Description	Initial	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Mean	sd
LC	Lab Control	synthetic sediment	8.47	8.51	8.61	8.50	8.58	8.55	8.36	8.44	8.57	8.45	8.50	8.51	0.07
FW000400	IWMGP-S04-SED04-041112	sample	8.27	8.42	8.57	8.53	8.58	8.56	8.47	8.49	8.54	8.45	8.51	8.51	0.09
FW000401	IWMGP-S03-SED03-041112	sample	8.25	8.46	8.67	8.61	8.62	8.60	8.53	8.58	8.59	8.59	8.57	8.58	0.11
FW000402	IWMGP-S02-SED02-041112	sample	7.69	7.99	8.11	8.16	8.16	8.17	8.06	8.13	8.21	8.16	8.15	8.13	0.15
FW000403	IWMGP-S01-SED01-041112	sample	8.23	8.34	8.58	8.57	8.63	8.60	8.57	8.64	8.52	8.61	8.46	8.55	0.13

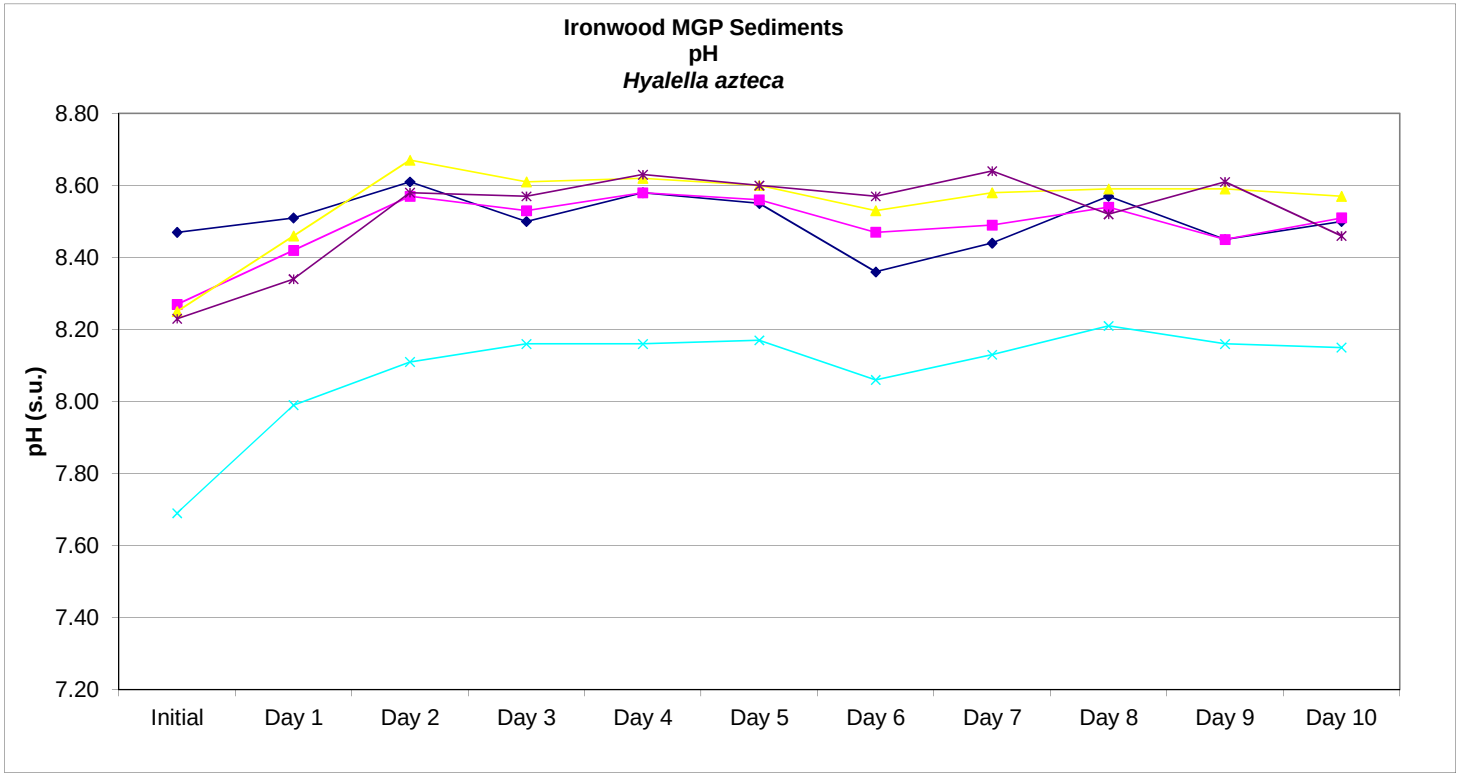


Figure 11
Ironwood MGP Sediments
Hyalella azteca
Temperatures (°C)

Lab Number	Site Name	Description	Initial	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8	Day 9	Day 10	Mean	sd
LC	Lab Control	synthetic sediment	22.1	22.4	23.0	22.7	22.5	22.8	22.9	23.2	22.8	23.1	22.7	22.8	0.3
FW000400	IWMGP-S04-SED04-041112	sample	23.4	23.0	24.0	23.7	23.8	23.5	23.9	23.8	23.3	23.8	23.2	23.6	0.3
FW000401	IWMGP-S03-SED03-041112	sample	22.9	23.0	23.3	23.2	23.1	23.4	23.7	23.7	23.4	23.6	23.3	23.4	0.3
FW000402	IWMGP-S02-SED02-041112	sample	23.0	23.2	23.5	23.1	23.2	23.2	23.2	23.3	23.2	23.2	23.0	23.2	0.1
FW000403	IWMGP-S01-SED01-041112	sample	22.0	22.4	23.2	22.6	22.4	22.7	22.8	23.0	22.7	23.1	22.8	22.8	0.3

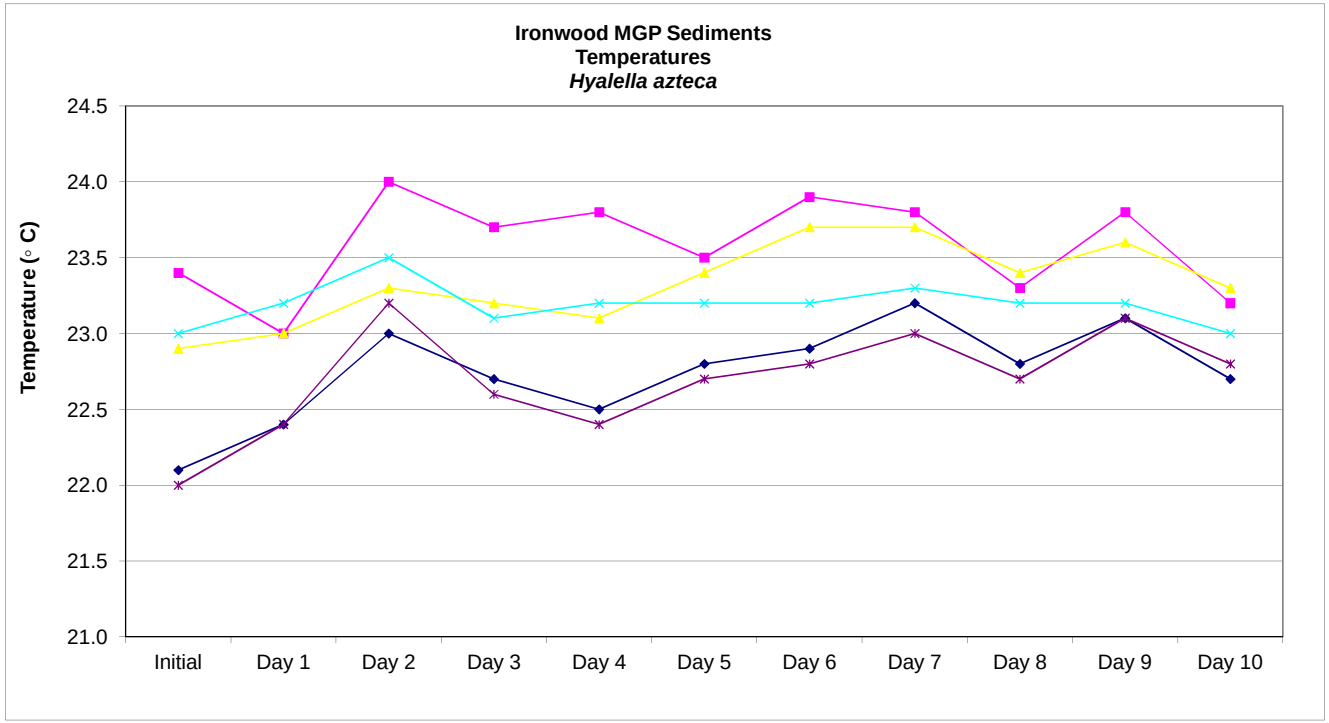


Figure 12
Ironwood MGP Sediments
Hyalella azteca
Conductivity, Hardness, Alkalinity and Ammonia

			Conductivity (µS)		Hardness (mg/L)		Alkalinity (mg/L)		Ammonia (mg/L)	
Lab Number	Site Name	Description	Initial (day 0)	Final (day 10)	Initial (day 0)	Final (day 10)	Initial (day 0)	Final (day 10)	Initial (day 0)	Final (day 10)
LC	Lab Control	synthetic sediment	777	725	232	204	335	310	0.081	0.143
FW000400	IWMGP-S04-SED04-041112	sample	603	712	220	192	305	300	0.064	0.046
FW000401	IWMGP-S03-SED03-041112	sample	651	711	212	184	310	285	0.150	0.051
FW000402	IWMGP-S02-SED02-041112	sample	558	736	204	196	280	300	0.037	0.209
FW000403	IWMGP-S01-SED01-041112	sample	698	705	216	204	305	300	0.095	0.047

ATTACHMENT E
GEOTECHNICAL REPORT

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

May 08, 2012

Mr. Dan Liebau
Weston Solutions, Inc.
600 E Lakeshore Drive #200
Houghton, MI 49931

RE: Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189703

Dear Mr. Liebau:
Enclosed are the analytical results for sample(s) received by the laboratory on April 17, 2012. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carolynne Trout

Carolynne Trout for
Diane J. Anderson
diane.anderson@pacelabs.com
Project Manager

Enclosures

cc: Ms. Lisa Graczyk, Weston Solutions, Inc.

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

SAMPLE SUMMARY

Project: 20405.012.001.1273.00 Ironwood
Pace Project No.: 10189703

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10189703001	**IWMGP-TP09-GEO-041112**	Solid	04/11/12 13:30	04/17/12 09:11

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

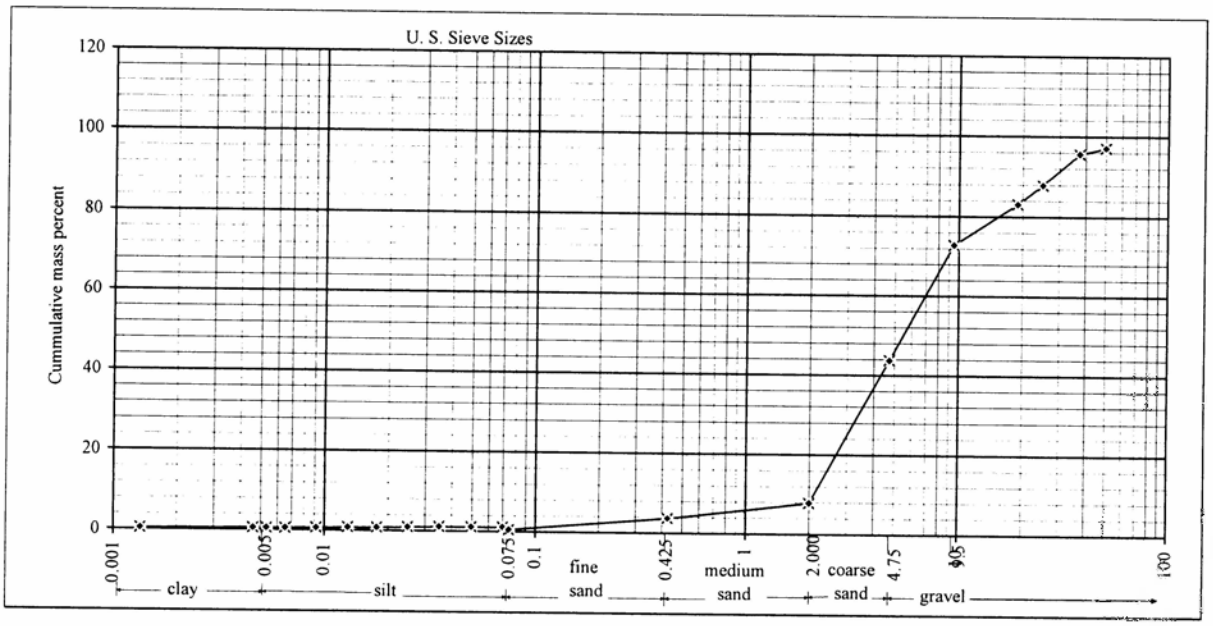
NORTHEAST TECHNICAL SERVICES, INC.
315/526 CHESTNUT STREET * P.O. BOX 1142
VIRGINIA, MINNESOTA 55792
218-741-4290 FAX 218-741-4291
e-mail: nts@netechnical.com

GRAIN SIZE DISTRIBUTION REPORT

ASTM D 422

Project: Pace Ironwood
Sample# 1WMGP-TP09-GEO-041112
Job # 10021
Date Collected: 4/11/2012

Date Reported: 5/3/2012
Lab ID# 545088
COC # 200258



Size	Percentages	Specifications (% passing)	Percent Moisture	LL	PL	PI
Clay	0.5%		-	-	-	
Silt	0.0%			Specifications (LL and PI)		
Fine Sand	3.2%			Specific Gravity = 2.635		
Medium Sand	4.1%					
Coarse Sand	36.0%			USCS Classification		
Gravel	56.2%			(SP) Poorly graded sand with gravel		

NOTE: Atterberg test could not be done due to the sample consiting of mostly sand and gravel.

NORTHEAST TECHNICAL SERVICES

STANDARD PROCTOR REPORT (ASTM D 698)

526 Chestnut Street PO Box 1142
Virginia, MN 55792
(218) 741-4290 FAX (218) 741-4291
E-mail nts@netechnical.com

Project Name: **Pace Ironwood** Date: **08-May-12**

Location: **Ironwood** Contractor:

Project #: **10021** Lab ID#: **545088** COC #: **200258**

1) Intended use of Soil:

Classification of Soil: **(GW-GC)** Source of Material:

Natural Water Content: **10.1** Natural Dry Density: **129..4**

2) Test Procedure Used: **Modified Method C**

3) Test Procedure Results:

Optimum Water Content: **6.4**

Maximum Dry Density: **132.7** PCF (at Wet Density of: **141.2** PCF)

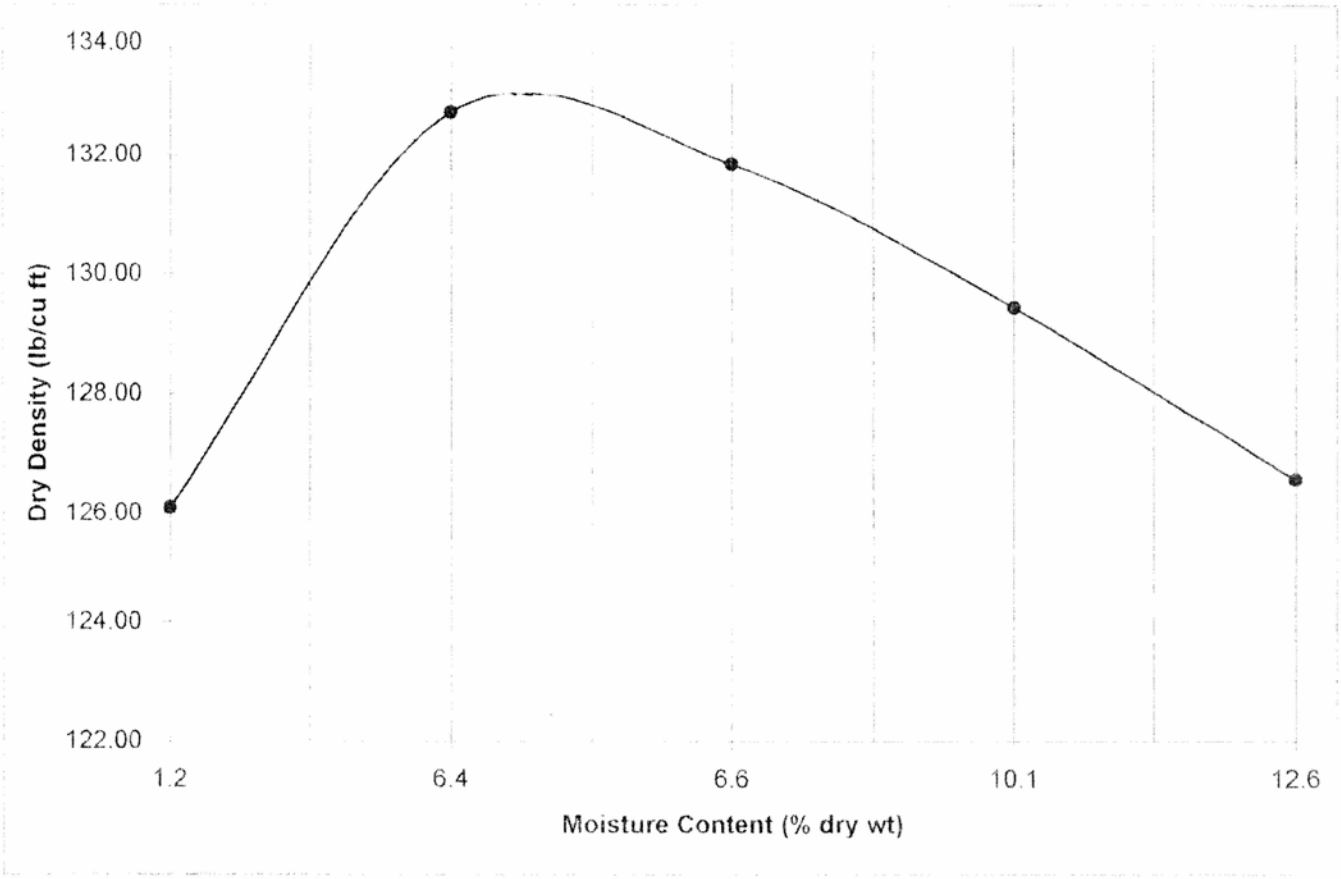
4) Sand to Gravel Ratio:

% Sand: % Gravel: RCF:
(Rock Correction Factor)

5) Atterberg:

Liquid Limit: Plastic Limit:

Plasticity Index:



Chain of Custody

WO#: 126951
PM: GMK Due Date: 05/07/12
CLIENT: 14PACE MPLS

Pace Analytical®
www.pacelabs.com

Workorder: 10189703 **Workorder Name:** 20405.012.001.1273.00 Ironwood **Owner Received Date:** 4/17/2012 **Results Requested By:** 5/1/2012

Diane J. Anderson
Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone (612)607-1700
Fax (612)607-6444

Pace Analytical Virginia MN
315 Chestnut Street
Virginia, MN 55792
Phone (218)742-1042

Item	Sample ID	Sample Type	Collected	Lab ID	Matrix	Other						Atterberg Limits	Spec. Gravity	Grain Size Distrib.	Modified Proctor										LAB USE ONLY
1	IWMGP-TP09-GEO-041112	PS	4/11/2012 13:30	10189703001	Solid	1						X	X	X	X										
2																									
3																									
4																									
5																									

(Lab ~~Advised~~)
→ Advise PM if this can't be met.

Transfers	Released By	Date/Time	Received By	Date/Time
1	Diane Anderson	4/24/12	AKOSKI	4-25-12 17:00
2				
3				

Cooler Temperature on Receipt ____ °C | Custody Seal Y or N | Received on Ice Y or N | Samples Intact Y or N

Pace Analytical®
www.pacelabs.com

On Floor

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10169703

~~10588554~~

KC

Page: 1 of 1

1531990

Section A Required Client Information:

Company: WESTON SOLUTIONS
Address: 600 EAST LAKESHORE, STE 200
HOUGHTON, MI 49931
Email To: daniel-liebau@westonsolutions.com
Phone: (906)482-2361 Fax: (906)482-7145
Requested Due Date/TAT:

Section B Required Project Information:

Report To: DAN LIEBAU
Copy To:
Purchase Order No.:
Project Name: IRONWOOD MGP
Project Number: 20405.012.001.1273.00

Section C Invoice Information:

Attention: SAME
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY: ☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER ☐ UST ☐ RCRA ☐ OTHER

Site Location STATE: MI

6 of 8

Section D Required Client Information

Matrix Codes MATRIX / CODE: Drinking Water DW, Water WT, Waste Water WW, Product P, Soil/Solid SL, Oil OL, Wipe WP, Air AR, Tissue TS, Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N): ATTERBERG LIMITS, SPECIFIC GRAVITY, GRAIN SIZE DIST, MODIFIED PROCTOR

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COMPOSITE START TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	ATTERBERG LIMITS	SPECIFIC GRAVITY	GRAIN SIZE DIST	MODIFIED PROCTOR	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
01	1 IWMGP-TP09-GEO-041112	SL	C	041112	1320	041112	1330											X	X	X	X		1-5 gallon poly A
	2																						
	3																						
	4																						
	5																						
	6																						
	7																						
	8																						
	9																						
	10																						
	11																						
	12																						

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	[signature]	4/13/12	0830	[signature]	4/13/12	0830				
	[signature] EAS	4/13/12	1710	[signature] Pace	4/13/12	1710	~~RO~~ KF 4/17/12	N	N	Y
	[signature] Pace	4/16/12	1730	Waltco						
				EAS pace	4/17/12	0911	11.4	N	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: DANIEL LIEBAU

SIGNATURE of SAMPLER: [signature]

DATE Signed (MM/DD/YY): 04/13/12

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Analytical Services, Inc.
1241 Bellevue Street, Suite 9
Green Bay, WI 54302

Pace Analytical

Sample Condition Upon Receipt

Client Name: Weston Solutions Project # 40588884

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☑ Client ☐ Commercial ☐ Pace Other _____

Tracking #: _____

Custody Seal on Cooler/Box Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Custody Seal on Samples Present: ☐ yes ☑ no Seals intact: ☐ yes ☐ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None Other

Optional
Proj. Due Date:
Proj. Name:

Thermometer Used NA **Type of Ice:** Wet Blue Dry None ☐ Samples on ice, cooling process has begun

Cooler Temperature NA **Biological Tissue is Frozen:** ☐ yes ☐ no

Temp Blank Present: ☐ yes ☑ no

Person examining contents:
Date: 4/13/12
Initials: KC

Temp should be above freezing to 6°C for all sample except Biota.
Biota Samples should be received ≤ 0°C.

		Comments:
Chain of Custody Present:	☑Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☑Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☑No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☑No ☐N/A	7.
Sufficient Volume:	☑Yes ☐No ☐N/A	8.
Correct Containers Used:	☑Yes ☐No ☐N/A	9.
-Pace Containers Used:	☐Yes ☑No ☐N/A	
Containers Intact:	☑Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☑N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: S	☑Yes ☐No ☐N/A	12.
All containers needing preservation have been checked.	☐Yes ☐No ☑N/A	13.
All containers needing preservation are found to be in compliance with EPA recommendation.	☐Yes ☐No ☑N/A	
exceptions: VOA, coliform, TOC, O&G, WI-DRO (water)	☐Yes ☐No	Initial when completed ___ Lot # of added preservative ___
Samples checked for dechlorination:	☐Yes ☐No ☑N/A	14.
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	15.
Trip Blank Present:	☐Yes ☐No ☑N/A	16.
Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A	
Pace Trip Blank Lot # (if purchased): _____		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: _____ Date/Time: _____

Comments/ Resolution: _____

(Rec'd in MN via Pace WI) (Rec'd 4/17)

Project Manager Review: Diane Jenkins **Date:** 4/24/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

F-GB-C-031-Rev.00 (29Sept2011) SCUR Form

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Revised Date: 15Feb2012 Page 1 of 1
	Document Number: **F-MN-L-213-rev.02**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Weston Solutions **Project #** 10189703

Courier: ☐ Fed Ex ☐ UPS ☐ USPS ☐ Client ☒ Commercial ☒ Pace Other C.S.

Tracking #:

Optional: Proj. Due Date: Proj. Name:

Custody Seal on Cooler/Box Present: ☐ yes ☒ no **Seals intact:** ☐ yes ☒ no

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☒ Other foam **Temp Blank:** Yes ____ No ✓

Thermometer Used 80344042 or 80512447 **Type of Ice:** Wet Blue None ☐ Samples on ice, cooling process has begun

Cooler Temperature 11.4 **Biological Tissue is Frozen:** Yes No

Temp should be above freezing to 6°C

Date and Initials of person examining contents: C.S. 4-17-12

Comments:

Chain of Custody Present:	☒Yes ☐No ☐N/A	1.
Chain of Custody Filled Out:	☒Yes ☐No ☐N/A	2.
Chain of Custody Relinquished:	☒Yes ☐No ☐N/A	3.
Sampler Name & Signature on COC:	☒Yes ☐No ☐N/A	4.
Samples Arrived within Hold Time:	☒Yes ☐No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☒No ☐N/A	6.
Rush Turn Around Time Requested:	☐Yes ☒No ☐N/A	7.
Sufficient Volume:	☒Yes ☐No ☐N/A	8.
Correct Containers Used:	☒Yes ☐No ☐N/A	9.
-Pace Containers Used:	C.S. ☒Yes ☒No ☐N/A	
Containers Intact:	☒Yes ☐No ☐N/A	10.
Filtered volume received for Dissolved tests	☐Yes ☐No ☒N/A	11.
Sample Labels match COC: -Includes date/time/ID/Analysis Matrix: S	☒Yes ☐No ☐N/A	12.
All containers needing acid/base preservation have been checked. Noncompliance are noted in 13.	☐Yes ☒No ☐N/A	13. ☐ HNO3 ☐ H2SO4 ☐ NaOH ☐ HCl Samp #
All containers needing preservation are found to be in compliance with EPA recommendation. (HNO3, H2SO4, HCL<2; NaOH >12)	☐Yes ☒No ☐N/A	
Exceptions: VOA,Coliform, TOC, Oil and Grease, WI-DRO (water)	☐Yes ☒No	Initial when completed / Lot # of added preservative
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☒N/A	14.
Trip Blank Present:	☐Yes ☐No ☒N/A	15.
Trip Blank Custody Seals Present	☐Yes ☐No ☒N/A	
Pace Trip Blank Lot # (if purchased):		

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: ____ Date/Time: ____

Comments/ Resolution: ____

Project Manager Review: Diane Anderson **Date:** 4/24/12

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

ATTACHMENT F
RESIDENTIAL WATER WELL RECORDS

Water Well And Pump Record

Completion is required under authority of Part 127 Act 368 PA 1978.
Failure to comply is a misdemeanor.

Wellogic

Import ID:

Tax No: 2703-01-561-800	Permit No: W99-27-044	County: Gogebic		Township: Ironwood
Town/Range: 47N 47W	Section: 16	Well Status: Active	WSSN:	Source ID/Well No:

Well ID: 27000000099

Elevation:

Latitude: 46.47419139

Longitude: -90.17823871

Method of Collection: Interpolation-Map

Distance and Direction from Road Intersection:
ABOUT 1/2 MILE NORTH OF US 2 ON VANDERHAGEN RD. ON WEST

Well Owner: DAVID KANTALA

Well Address:
N10339 VANDERHAGEN RD.
IRONWOOD, MI 49938

Owner Address:
N10339 VANDERHAGEN RD.
IRONWOOD, MI 49938

Drilling Method: Rotary
Well Depth: 220.00 ft. Well Use: Household
Well Type: Replacement Date Completed: 8/14/1999

Casing Type: Steel - black Height: 1.50 ft. above grade
Casing Joint: Welded
Casing Fitting: None

Diameter: 6.00 in. to 26.00 ft. depth

Borehole: 8.88 in. to 26.00 ft. depth
6.00 in. to 220.00 ft. depth

Pump Installed: Yes Pump Installation Only: No
Pump Installation Date: HP: 0.75
Manufacturer: F.E. Myers Pump Type: Submersible
Model Number: J710 Pump Capacity: 10 GPM
Drop Pipe Length: 200.00 ft. Pump Voltage:
Drop Pipe Diameter: Drilling Record ID:
Draw Down Seal Used: No

Pressure Tank Installed: Yes
Pressure Tank Type: Unknown
Manufacturer: Champion
Model Number: CM8003 Tank Capacity: 32.0 Gallons
Pressure Relief Valve Installed: No

Static Water Level: 18.00 ft. Below Grade
Well Yield Test: Yield Test Method: Test pump
Pumping level 200.00 ft. after 2.00 hrs. at 1 GPM

Formation Description	Thickness	Depth to Bottom
Clay Stoney	9.00	9.00
Brown Slate	211.00	220.00

Screen Installed: No Intake: Unscreened Sand/Gravel

Well Grouted: Yes Grouting Method: Unknown

Grouting Material	Bags	Additives	Depth
Bentonite slurry	9.00	None	0.00 ft. to 26.00 ft.

Wellhead Completion: 12 inches above grade

Geology Remarks:

Nearest Source of Possible Contamination:

Type	Distance	Direction
Fuel tank	60 ft.	South
Septic tank	90 ft.	South

Abandoned Well Plugged: Yes

Casing Removed:

Drilling Machine Operator Name: STEVE BINZ
Employment: Employee

Contractor Type: Water Well Drilling Contractor Reg No: 93-2060
Business Name: BINZ BROS
Business Address:

Water Well Contractor's Certification

This well was drilled under my supervision and this report is true to the best of my knowledge and belief.

Signature of Registered Contractor Date

General Remarks: AFTER HYDROFRECKING AS PER PERMIT 1-1/2 GALLONS/MINUTE

Other Remarks:

GEOLOGICAL SURVEY SAMPLE No. [ ]

WATER WELL RECORD

ACT 294 PA 1965

MICHIGAN DEPARTMENT OF PUBLIC HEALTH

1 LOCATION OF WELL

County	Twp.	Fraction	Section No.	Town	Range
Gogebic	47 N Ironwood	SE ¼ NE ¼ NE ¼	16	47 (N/S)	47 (E/W)

Distance And Direction from Road Intersections: 3/4 miles on Hemlock St. Ironwood Mich. North off U.52

Street address & City of Well Location

OWNER No.

3 OWNER OF WELL: John MATTSON.

Address: 122 E. AURORA Ironwood. Mich.

2 FORMATION	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
Top Soil	2	2
Hard Pan	26	28
Slate	57	85

4 WELL DEPTH: (completed) ft. Date of Completion: July 1, 1972

5 ☒ Cable tool ☐ Rotary ☐ Driven ☐ Dug ☐ Hollow rod ☐ Jetted ☐ Bored ☐ ___

6 USE: ☒ Domestic ☐ Public Supply ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☐ ___

7 CASING: Diam. 6 in. to 29 ft. Depth; Threaded ☒ Welded ☐; Height: (Above) Below surface 2 ft.; Weight 19.45 lbs/ft.; Drive Shoe? Yes ☒ No ☐

8 SCREEN: Type: ___ Dia.: ___ Slot/Gauze ___ Length ___ Set between ___ ft. and ___ ft. Fittings:

9 STATIC WATER LEVEL 16 ft. below land surface

10 PUMPING LEVEL below land surface 75 ft. after 4 hrs. pumping 1½ g.p.m.; ___ ft. after ___ hrs. pumping ___ g.p.m.

11 WATER QUALITY in Parts Per Million: Iron (Fe) ___ Chlorides (Cl) ___ Hardness ___

12 WELL HEAD COMPLETION: ☐ In Approved Pit ☐ Pitless Adapter ☒ 12" Above Grade

13 GROUTING: Well Grouted? ☐ Yes ☐ No; Material: ☐ Neat Cement ☐ ___; Depth: From ___ ft. to ___ ft.

14 SANITARY: Nearest Source of possible contamination ___ feet ___ Direction ___ Type ___; Well disinfected upon completion ☒ Yes ☐ No

15 PUMP: Manufacturer's Name ___ Model Number ___ HP ___ Length of Drop Pipe ___ ft. capacity ___ G.P.M. Type: ☐ Submersible ☐ ___ ☐ Jet ☐ Reciprocating

16 Remarks, elevation, source of data, etc.

17 WATER WELL CONTRACTOR'S CERTIFICATION:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

Benetti Well Drilling — REGISTERED BUSINESS NAME; 0876 — REGISTRATION NO.

Address: 209-9th ave N Hurley, Wis.

Signed: Ronald L. Benetti — AUTHORIZED REPRESENTATIVE; Date: July 5, 1972

D67D 100M 6-66

JUL 27 1972

GEOLOGICAL SURVEY COPY

TAX NO: 3705-01-562-700

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
WATER WELL AND PUMP RECORD

PERMIT NO: W98-27-006

1. LOCATION OF WELL

County	Township Name	Fraction	Section No.	Town No.	Range No.
Gogebic	Ironwood	W 1/4 NE 1/4 SE 1/4	16	47N	47W

Distance and Direction from Road Intersection: .11 mile north of US2 on east side of Junct Rd

Street Address & City of Well Location

Locate with 'x' in Section Below

Sketch Map: Junct Rd, .11 mile, US2

2. FORMATION DESCRIPTION

	THICKNESS OF STRATUM	DEPTH TO BOTTOM OF STRATUM
stony clay	27	27
black granite	231	258

USE A 2ND SHEET IF NEEDED

RECEIVED FEB 18 1998

3. OWNER OF WELL Darryl Johnson
Address 213 W Harding Ave Ironwood Mich 49938
Address Same as Well Location ☐ Yes ☒ No

4. WELL DEPTH: 258 ft. Date Completed 1/20/98 ☒ New Well ☐ Replacement Well

5. ☐ Cable Tool ☒ Rotary ☒ Driven ☐ Dug ☐ Hollow Rod ☐ Auger/Bored ☐ Jetted ☐

6. USE: ☒ Household ☐ Type I Public ☐ Type III Public ☐ Irrigation ☐ Type IIa Public ☐ Heat Pump ☐ Test Well ☐ Type IIb Public ☐

7. CASING: ☒ Steel ☐ Threaded ☐ Plastic ☒ Welded ☐ Other
Diameter: 6 in. to 27 ft. depth; in. to ft. depth
Height: Above/Below Surface: 12 ft
Weight: 18.97 lbs./ft.
BORE HOLE: Diameter: 6 in. to 258 ft. depth; in. to ft. depth
☒ Drive Shoe ☐ Shale Packer

8. SCREEN: ☒ Not Installed ☐ Gravel-Packed
Type ____ Diameter ____
Slot/Gauze ____ Length: ____
Set Between ____ ft. and ____ ft.
FITTINGS: ☐ K-Packer ☐ Bremer Check
☐ Blank Above Screen ____ ft. Other ____

9. STATIC WATER LEVEL: 12 ft. Below Land Surface ☐ Flowing

10. PUMPING LEVEL: Below Land Surface 240 ft. After 2 hrs. Pumping at 4½ G.P.M.
☐ Plunger ☐ Bailer ☐ Air ☒ Test Pump

11. WELL HEAD COMPLETION:
☐ Pitless Adapter ☒ 12" Above Grade
☐ Basement Offset ☐ Well House

12. WELL GROUTED? ☐ No ☒ Yes From drill hole to ____ ft.
☐ Neat Cement ☒ Bentonite ☐ Other
No. of Bags ____ Additives 9 Bentonite

13. ABANDONED SOURCE OF POSSIBLE CONTAMINATION:
Type ____ Distance 50 ft. Direction NE
Type ____ Distance ____ ft. Direction ____

14. PUMP: ☐ Not Installed ☐ Pump Installation Only
Manufacturer's Name Myers
Model Number HYS 3ST102-12 HP 1 Volts 230
Length of Drop Pipe 240 ft. Capacity 12 G.P.M.
TYPE: ☒ Submersible ☐ Jet ☐ Other
PRESSURE TANK: not yet installed
Manufacturer's Name ____
Model Number ____ Capacity ____ Gallons ____

15. ABANDONED WELL PLUGGED? ☐ Yes ☐ No
Casing Diameter ____ in. Depth ____ ft.
PLUGGING MATERIAL: ☐ Neat Cement ☐ Bentonite Slurry ☐ Cement/Bentonite Slurry ☐ Concrete Grout ☐ Bentonite Chips
No. of Bags ____ Casing Removed? ☐ Yes ☐ No

dug well to be abandoned the Spring

16. REMARKS: (Elevation, Source of Data, etc.) before hydrofracking the well was not producing after fracking 4½ gal/minute

17. DRILLING MACHINE OPERATOR:
☒ Employee ☐ Subcontractor
Name Jeremy Bihr

18. WATER WELL CONTRACTOR'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.
Bihr Bros — REGISTERED BUSINESS NAME
93-2060 — REGISTRATION NO.
Address Rt 1 Box 335 Hurley Wis 54534
Signed ____ AUTHORIZED REPRESENTATIVE
Date 2/15/98

GW-2-228 9/93

GEOLOGICAL SURVEY COPY

Authority: Act 368 PA 1978 Completion: Required
Penalty: Conviction of a violation of any provision is a misdemeanor.