Corrective Action Investigation Report
Nortru, LLC
Petro-Chem Processing Group Facility
421 Lycaste Street, Detroit, MI

February 12, 2015

CERTIFICATION STATEMENT

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision according to 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.

John A. Maloy
Director, EH&S Risk Management

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EXECUTIVE SUMMARY

Stericycle Environmental Solutions, Inc. retained Bureau Veritas North America, Inc. (Bureau Veritas) to conduct a Corrective Action Investigation (CAI) to determine the nature and extent of contamination in soils and shallow groundwater at the Petro-Chem Processing Group Facility (Facility) located at 421 Lycaste Street in Detroit, Michigan.

On December 18, 2012, the MDEQ issued a new Operating License for the Facility (Michigan Facility ID No. MID 980 615 298). As part of this Operating License, the Facility is required to conduct a Corrective Action Investigation (CAI) to determine if a release has occurred from Waste Management Unit (WMU) Number 15 (Former Container Processing System), area of concern (AOC) Number 1 (Soil Volatilization to Indoor Air Exceedances), AOC Number 2 (Soil Volatilization to Ambient Air Exceedances), and AOC Number 3 (MTBE Release to Site Wide Groundwater).

This CAI Report provides the data and summary of the investigation that was conducted in accordance with the approved CAIWP. The CAIWP specified that soil and groundwater samples were to be collected and analyzed in locations approved by the MDEQ to address the nature and extent of contamination of VOCs at the Facility. Semi-annual groundwater sampling events were completed, as specified in the Facility Operating License, and incorporated into the data set utilized to evaluate the nature and extent of contamination addressed in this CAI.

A pathway analysis was completed to determine relevant nonresidential cleanup criteria. There is a very low permeability confining clay layer associated with regional lacustrine deposits at the Facilily. There is a low flow rate in the uppermost water bearing zone associated with moist peat at the Facility at depths of seven to twelve feet below ground surface (bgs). There is no known regional groundwater aquifer in the area of the Facility. Volatilization to Indoor Air Inhalation criteria (VIIC) and Volatilization to Ambient Air Inhalation criteria (VAIC) are the relevant contaminant pathways to consider for future use of the Facility, and provide the relevant cleanup criteria for nonresidential use.

Primary contaminants of concern (COCs) were established for the Facility. Methyl-tert-Butyl Ether (MtBE), tetrachloroethene (PCE) and xylenes do not appear to be readily associated with releases from WMU-15 and COCs are not present in concentrations exceeding relevant nonresidential cleanup criteria in soils or groundwater near or immediately downgradient of WMU-15.

In addressing AOCs 1 and 2, VOCs are present in upper soils materials and in the shallow perched water bearing zone at the Facility at depths of approximately seven to twelve feet bgs. Consistently, VOC concentrations within fill material, moist peat, and silty sand lenses at the Facility do not exceed applicable VIIC or VIAC.

In addressing AOC 3, MtBE concentrations are observed in fill soils and in the shallow water bearing zone within the property boundary. The presence of MtBE is not ubiquitous. Concentrations of MtBE in soils and within the uppermost water bearing zone do not exceed relevant nonresidential cleanup criteria. Groundwater monitoring data collected at the Facility on a semi-annual basis indicate that MtBE is present within three well locations (MW-4 [upgradient], MW-6 and MW-9), but not in all groundwater monitoring wells at the Facility. MtBE concentrations in groundwater do not exceed groundwater

volatilization to indoor air inhalation criteria (GVIIC) or groundwater volatilization to ambient air inhalation criteria (GVAIC).

Near the western property boundary, in the vicinity of the SBS Solids Building, several VOCs were identified in the shallow water bearing zone and in the soils above the confining impermeable clay barrier. COCs do not exceed relevant cleanup criteria in soils or shallow perched groundwater horizontally or vertically at the Facility.

Groundwater monitoring should proceed in accordance with the Facility Operating License at established compliance points. Decreasing trends in concentrations of VOCs have been noted in semi-annual groundwater sampling events since 2009. Current concentrations of VOCs in groundwater continue to demonstrate that relevant nonresidential clean up criteria (GVIIC and GVAIC) have not been exceeded at the Facility. GVIIC and GVAIC are the relevant nonresidential cleanup criteria for the Facility.

1.0 INTRODUCTION

On June 16, 1999, the Michigan Department of Environmental Quality (MDEQ) issued a Hazardous Waste Treatment and Storage Facility Operating License (Operating License) for the Petro-Chem facility (Facility), Michigan Facility ID No. MID 980 615 298. Petro-Chem is permitted to receive a wide range of waste codes that include halogenated and non-halogenated volatile organic compounds (VOCs). Depending on the characteristics of the wastes received, the wastes may be processed on- or off-site. Environmental studies in soils and groundwater have been conducted at the Facility since 1982.

Waste identification, characterization, operations, management and containment system requirements are documented in the operating permit and are conducted at the Facility. Petro-Chem began "detection" semi-annual groundwater monitoring in September 1999 in compliance with specifications of the Operating License. Based on results of the groundwater monitoring and soil boring sampling, the Facility is required to conduct corrective action for releases of a contaminant from a Waste Management Unit (WMU) to protect human health and the environment in accordance with R 299.9629. Should contamination be found beyond the facility boundary, corrective action will be conducted in accordance with R 299.9629(2).

A RCRA Facility Investigation (RFI) was conducted at the Facility in October 2010 and the RFI report was submitted to the Michigan Department of Environmental Quality (MDEQ) on February 16, 2011. The purpose of the RFI was to conduct further evaluation of the horizontal extent of soil and groundwater impact at the Facility. The potential for off-site migration of contaminants was evaluated by collecting soil and groundwater samples from locations in the adjacent right-of-ways. On September 28, 2012, the MDEQ approved the RFI Report pursuant to Part 111, Hazardous Waste Management, of the Naturals Resources and Environment Protection Act, 1994 PA 451 (amended). In the RFI Report approval letter, the MDEQ indicated that because contamination was found at the property boundary, a Corrective Measures Study and a Corrective Measures Implementation work plan were recommended, pursuant to the current hazardous waste management facility Operating License.

On December 18, 2012, the MDEQ issued a new Operating License for the Facility (Michigan Facility ID No. MID 980 615 298). As part of this Operating License, Petro-Chem is required to conduct a Corrective Action Investigation (CAI) to determine if a release has occurred from Waste Management Unit (WMU) Number 15 (Former Container Processing System), area of concern (AOC) Number 1 (Soil Volatilization to Indoor Air Exceedances), AOC Number 2 (Soil Volatilization to Ambient Air Exceedances), and AOC Number 3 (MtBE Release to Site Wide Groundwater).

The Facility prepared a Corrective Action Investigation Work Plan (CAIWP) as part of RCRA Corrective Action proceedings and submitted it to the Michigan Department of Environmental Quality (MDEQ) in February 2013. MDEQ approved the final CAIWP in May 2013. From August 2013 to September 2014, the work described in the approved CAIWP, including the drilling of 28 soil borings, was conducted at both onsite and offsite locations. The primary objective of the CAIWP was to evaluate potential sources of contamination and, if found, to delineate soil and groundwater contamination with respect to MDEQ Generic Nonresidential Cleanup Criteria.

The CAIWP specified that soil and groundwater samples were to be collected and analyzed in locations approved by the MDEQ to address the nature and extent of contamination. Semi-annual groundwater

sampling events were completed, as specified in the Facility Operating License, and incorporated into the data set utilized to evaluate the nature and extent of contamination addressed in this CAI.

An extension of the CAI Report deadline was requested on October 23, 2014, because of delays in obtaining access agreements for some off-site sampling locations, as well as, to conduct additional sampling onsite. An extension was granted by MDEQ personnel on October 31, 2014. An addendum to the CAIWP was submitted to the MDEQ on November 6, 2014, and approved by MDEQ personnel on November 18, 2014.

This CAI Report includes a summary of the investigation that was conducted in accordance with the approved CAIWP and addendum. The report is submitted on behalf of the Facility in accordance with rules for hazardous waste management facilities as identified in Michigan Department of Environmental Quality Act 451 Part 111 and promulgated under R299.9629.

The Facility location is depicted in Figure 1. Soil boring and groundwater sampling locations discussed in this CAI report are shown in Figure 2.

2.0 ENVIRONMENTAL SETTING

2.1 HYDROLOGY AND CLIMATE

The Facility is located within one-half mile to the north of the Detroit River. The Detroit River flows south and west between the United States and Canadian border. It flows from the St. Clair River and Lake St. Clair, and empties into the west end of Lake Erie. The land is nearly flat, rising gently north-westward from the waterways. Upland terrain is gently rolling, typical of glaciated outwash plain geomorphology.

The climate in the Detroit area is influenced by its location near the Great Lakes and its position in a major storm track. Climatic variations arise from the urban heat island, the effect becoming most apparent at night, when temperatures in urban downtown remain significantly higher than those in suburban locations. There are four distinct seasons. Average daily temperatures in winter are 28.1° F and in summer, 72.3° F, with an annual average of 48.6° F. Winters are generally long and cold, and storms can bring combinations of rain, snow, freezing rain, and sleet with heavy snowfall possible at times. Annual snowfalls average around 45 inches. During the summer, storms pass to the north, allowing for intervals of warm, humid weather with occasional thunderstorms that are followed by days of mild, dry weather. Air pollution emanating from heavy industry in the area has been minimized since the 1970s with industry air pollution control efforts (City Data, 2014).

The Facility is located at 421 Lycaste Street, Wayne County, Detroit, Michigan at the northwestern corner of Lycaste Street and Freud Street at latitude 42° 22' 1" and longitude 82° 57' 55". The average elevation at the site is 580 feet above mean sea level, as documented in the Facility Operating License.

2.2 AREA REDEVELOPMENT

Through the Department of Economic Redevelopment, developers have purchased vacant lands and are in the process of building high density residential units on properties that border the Detroit River. A large marina complex is located southwest of the Facility. Within the past 10 years, a residential community has been developed on the property directly south of the Facility where the former Laro Coal property was located. The residential community is hydraulically upgradient of the Facility.

2.3 HISTORIC UPGRADIENT AND ADJACENT PROPERTY INFORMATION

Baseline Environmental Assessments (BEAs) were conducted in 2002, 2004 and 2005 at the former Laro Coal property prior to its redevelopment. The former Laro Coal property is located south of and hydraulically upgradient of the Facility. Historic use of the upgradient property includes the Former City of Detroit Auto Pound storage lot to the southwest, the Monroe Waste Paper Company to the southeast and the Apex Foundry to the south. Additionally, railroad lines were present south of the Facility. When the historic businesses were abandoned, the properties were reportedly used for illegal dumping. It was also noted that the Monroe Waste Paper Company operated underground storage tanks at their facility.

Soil and groundwater samples were collected on the former Laro Coal property upgradient of the subject Facility prior to the BEAs being conducted. BEA reports indicated that site stratigraphy consists of fill (industrial materials interspersed with disturbed natural glacial deposits) with layers of sandy silt or clay to a depth of 15 feet below ground surface (bgs). Below the sand/silt layers, the deposits consist of silty

clay and clay to a depth of 30 feet bgs. The uppermost water bearing zone was encountered from 6 to 15 feet bgs. On the southern two-thirds of the property site, the shallow water bearing zone flows toward the Detroit River. On the northern one-third of the property, the shallow water bearing zone flows northwestward.

Findings from soil and groundwater samples collected during the BEAs indicated that VOC concentrations in groundwater exceeded groundwater contact criteria and residential, commercial and industrial volatilization to indoor air (VIA) criteria (AES, 2005).

An industrial dry cleaning operation was known to have existed on the western adjacent property, on the northwest corner of St. Jean Avenue and Freud Street, west of the Facility, from circa 1968 through 2002. Tetracholorethene is associated with historic dry cleaning operations.

Findings from the BEAs indicate that upgradient and off-site VOC contamination may contribute to soil and groundwater contamination at the Facility.

2.4 GEOLOGY

The Facility is located on lowland lacustrine terrace deposits of the late Wisconsinan glacial timeframe (approximately 12,400 years before present). Detroit is underlain by a sequence of sediments up to 150 meters thick that lie unconformably on Devonian sedimentary rocks of the Michigan basin (Howard, 2013). Geology at the site and at off-site perimeter locations was determined through soil borings and groundwater monitoring well logs from the CAI, as well as, from past soil and groundwater investigations conducted at the Facility. Well logs and soil boring logs used in compiling this report are provided in Appendix A.

Stratigraphy at the Facility consists of fill with layers of sandy silt and silty sand with some clay to a depth that ranges from one to 13 feet bgs. The sandy silt, silty sand and clay are typical of glacial outwash deposits. In some areas, the fill material may not be disturbed, but in other locations, shards of glass and brick fragments were noted at depth within the sandy silt fill material as identified in the boring logs. A layer of peat underlies the fill and silty sand layer across the site. The thickness of the peat ranges from inches on the northwest property boundary to four feet along the southern property boundary. In some locations, the peat is underlain by a thin silty sand lens. The peat and/or the silty sand lies directly above a dry, persistent, silty clay. The peat and/or silty sand lens are moist to wet and contain the uppermost water bearing zone at the Facility. During the CAI, soil samples were collected from above the water table in Soil Boring BSB-37 and analyzed for grain size, density and porosity. The grain size analysis indicated that the soil from a depth of 4 to 6 feet bgs is a fine- to medium-grained sand with silt and trace limestone, with a USCS designation of SP (i.e., poorly graded sand). The density ranged from 92.6 to 99.1 pounds per cubic foot, while the porosity had a range of 40.79 to 45.00 percent.

A dry, thick unit of silty clay uniformly underlies the peat and silty sand across the site. Thickness of the silty clay at the site is undetermined, but it is present at depths of 30 feet bgs and more. It was identified in an onsite deep boring (DB-1A) drilled on February 4, 1991 from a depth of 8.4 feet to 30 feet bgs (WWE, 1991 with revisions, 1993). It is present in perimeter soil borings at depths up to 30 feet bgs in the BEAs conducted in upgradient properties to the south of the site (AES, 2005). Regionally, soil boring logs from the North Jefferson Chysler plant depict a uniform clay layer from 10 to 103 feet bgs (WWE, 1991 with revisions, 1993).

Data compiled from the on-site monitoring well network and recent soil boring logs from this CAI were used to create detailed geologic cross-sections. Locations of the cross-sections are shown in Figure 3. The site stratigraphy is depicted in cross-sections shown in Figures 4 and 5.

2.5 HYDROGEOLOGY

Groundwater from onsite monitoring wells and groundwater samples collected from temporary wells installed in soil borings during the CAI were collected from the shallow water bearing zone that is contained within the peat and/or underlying silty sand layer, where it exists. The moist or damp layer is present at depths ranging from approximately 7 to 12 feet bgs.

In January 1991, a bail-down slug test was performed at MW-7. The transmissivity was calculated to be $5.97x10^{-3}$ cm^2/sec and assuming a porosity of 0.4 for the peat layer where the well screen is placed, the groundwater flow rate was calculated to be $2x10^{-2}$ cm/sec. Additionally, a three-inch Shelby tube sample was collected from the homogeneous clay layer at 13 to 15 feet bgs in the deep boring DB-1A. Permeability of the sample was tested using the triaxial cell method and was found to be $8.5X10^{-9}$ cm/sec, indicating a very tight dense lean clay (WWE, 1991 with revisions in 1993). The location of DB-1A is shown in Figure 6.

The ubiquitous silty clay acts as an impermeable barrier to infiltrating surface water. All surface water that infiltrates the fill or peat is contained in a thin perched water bearing zone associated with the peat or underlying silty sand. Hydrogeologic information obtained from the CAI is identified on the geologic cross-sections depicted in Figures 4 and 5. Water levels from monitoring wells and soil borings are shown on the cross-sections. A regional aquifer is not delineated at the Facility or in neighboring upgradient soil boring logs. The uniform, thick, dry, silty clay forms an impermeable barrier to downward migration of the uppermost water bearing zone. The impermeable clay barrier is present at depths of 30 feet or more on site and in locations adjacent to the Facility (AES, 2005). Regionally, it is present at depths up to 105 feet bgs, substantiating evidence that there is no regional aquifer from which groundwater is pumped for residential or industrial use.

Groundwater Level Data and Flow Direction

Groundwater level data and flow maps have been compiled for the Facility during semi-annual compliance monitoring. Semi-annual reports have been submitted to the MDEQ prior to and throughout the term of this CAI. For the purposes of this report, groundwater flow data from the June 2014 sampling event is highlighted in cross-sections (Figures 4 and 5) and in a map showing typical groundwater flow direction (Figure 7). Groundwater flow maps from semi-annual sampling in 2013 and 2014 (through the duration of this CAI) have been submitted previously to MDEQ in a series of semi-annual reports in compliance with conditions of the Facility Operating Permit.

Groundwater level data indicates that there is an arch in the groundwater flow direction that trends northward. The higher groundwater elevations are near the current Container Management Building, in the location of the former Container Processing System (WMU-15). From the arch, groundwater flow in the perched water bearing zone trends westward, slightly northward, and eastward. This flow direction and pattern are consistent throughout groundwater monitoring events as reported for the Facility since at least 1982 (WWE, 1991 with revisions in 1993).

3.0 POTENTIAL RECEPTORS AND PATHWAY ANALYSIS

Media with potential migration pathways and known impacts were selected for sampling and include soil and groundwater. The CAI was designed to investigate the nature and extent of volatile organic carbon (VOC) contamination associated with off-site migration at levels exceeding nonresidential cleanup criteria in soil and groundwater in accordance with the Generic Cleanup Criteria Requirements of Response Activity (R299.49).

MDEQ Part 201 Rules provide generic cleanup criteria for residential and nonresidential possible land uses and vapor intrusion exposure pathways. Rule 714 outlines Groundwater Volatilization Indoor Air Inhalation Criteria (GVIIC) and Rule 724 outlines Soil Volatilization Indoor Air Inhalation Criteria (SVIIC) through ambient or indoor air volatilization (effective date, December 30, 2013). The purpose of this section is to evaluate exposure risk by assessing viable routes of migration and potential receptors to known contamination from constituents of concern (COCs) identified at the Facility.

Each possible exposure pathway in soils is summarized and evaluated in Table 1.

Table 1
Summary of Relevant Exposure Pathways in Soils

Exposure Pathway	Description	Considered	Relevant
Soil			
Drinking Water Protection	This pathway involves contaminants that may leach to groundwater in an aquifer, or groundwater that is not in an aquifer but that may transport contaminants into an aquifer. The drinking water exposure pathway does not appear to be relevant because the shallow perched water bearing zone at the Facility is present in granular fill and peat across the site in a lens that is less than or equal to five feet thick at depths of 7 to 12 feet bgs. The uppermost water bearing zone is directly underlain by a persistent, dry, silty clay that is present to a minimum depth of 30 feet bgs. Regional soil boring data suggests that the homogeneous clay with a permeability of 8.5x10-9 cm/sec exists at depths up to 105 feet bgs. Regionally, lacustrine deposits are known to be present at depths up to 150 meters bgs. Drinking water in the Detroit metro area is provided by the regional publicly operated treatment works, the Detroit Water and Sewerage Department (DWSD). The DWSD obtains water from the Great Lakes and their connecting waters, not from groundwater. The main pumping station for the DWSD is located northwest and upstream of the Facility.	**YES**	**NO**
Groundwater /Surface Water Interface (GSI) Protection	This pathway involves contaminants that may leach to groundwater that is hydraulically connected to a surface water body. This pathway is not relevant because there are no surface water bodies in the direction of groundwater flow and the onsite storm sewers discharge to the municipal wastewater treatment plant, the DWSD. There is no known direct pathway from the perched uppermost water bearing zone at the facility to the Detroit River, which is the nearest receiving surface water body. The Detroit River is located southeast of and not directly downgradient from the Facility. Groundwater flow velocity at the Facility is very slow at 1.6x10-6 cm/sec.	**YES**	**NO**
Direct Contact	This pathway involves long-term ingestion and dermal exposure to contaminated soil and is relevant for this property. It should be noted that the majority of the property is covered with pavement; therefore, minimizing dermal exposure to contamination.	**YES**	**YES**
Soil Volatilization to Indoor Air Inhalation Criteria (SVIIC)	This pathway involves potential exposure to volatile indoor air contaminants from vapor intrusion resulting from soil contamination.	**YES**	**YES**
Soil Volatilization to Ambient Air Inhalation Criteria (SVAIC)	This pathway involves potential exposure to volatile outdoor air contaminants from vapor intrusion resulting from soil contamination.	**YES**	**YES**

Each possible exposure pathway in groundwater is summarized and evaluated in Table 2.

Table 2
Summary of Relevant Exposure Pathways in Groundwater

Exposure Pathway	Description	Considered	Relevant
Groundwater			
Drinking Water	This pathway involves contaminants that may leach to groundwater in an aquifer, or groundwater that is not in an aquifer but that may transport contaminants into an aquifer. The drinking water exposure pathway does not appear to be relevant because the shallow perched water bearing zone at the Facility is present in granular fill and peat across the site in a lens that is less than or equal to five feet thick at depths of 7 to 12 feet bgs. The uppermost water bearing zone is directly underlain by a persistent, dry, silty clay that is present to a minimum depth of 30 feet bgs. Regional soil boring data suggests that the homogeneous clay with a permeability of 8.5x10-9 cm/sec exists at depths up to 105 feet bgs. Regionally, lacustrine deposits are known to be present at depths up to 150 meters bgs. Drinking water in the Detroit metro area is provided by the regional publicly operated treatment works, the Detroit Water and Sewerage Department (DWSD). The DWSD obtains water from the Great Lakes and their connecting waters, not from groundwater. The main pumping station for the DWSD is located northwest and upstream of the Facility.	**YES**	**NO**
GSI	This pathway involves contaminants that may leach to groundwater that is hydraulically connected to a surface water body. This pathway is not relevant because there are no surface water bodies in the direction of groundwater flow and the onsite storm sewers discharge to the municipal wastewater treatment plant, the DWSD. There is no known direct pathway from the perched uppermost water bearing zone at the facility to the Detroit River, which is the nearest receiving surface water body. The Detroit River is located southeast of and not directly downgradient from the Facility. Groundwater flow velocity at the Facility is very slow at 1.6x10-6 cm/sec.	**YES**	**NO**
Groundwater Volatilization to Indoor Air Inhalation Criteria (GVIIC)	This pathway is relevant for volatile contaminants in groundwater if and when a habitable structure overlies the contaminated area and vapor intrusion issues are encountered from the uppermost water bearing zone at the Facility.	**YES**	**YES**
Groundwater Volatilization to Ambient Air Inhalation Criteria (GVAIC)	This pathway is relevant for volatile contaminants in groundwater if and when vapor intrusion issues are encountered from the uppermost water bearing zone at the Facility.	**YES**	**YES**

For purposes of this investigation all nonresidential pathways are considered and highlighted in the discussion of the nature and extent of contamination in this CAI Report. Relevant nonresidential cleanup criteria are presented in the results section of the CAI Report.

4.0 INVESTIGATION AND SAMPLING

Bureau Veritas conducted this CAI at the Petro-Chem Processing Group of Nortru, LLC (Petro-Chem) facility located at 421 Lycaste Street in Detroit, Michigan, in accordance with the CAIWP, dated February 15, 2013, and approved in a letter from MDEQ received in May 2013. The CAIWP was prepared pursuant to Part VI.D of the facility Operating License and was designed to define the source, nature and extent of VOC contamination at the facility.

From August 2013 to September 2014, the work described in the approved CAIWP, including the drilling of 28 soil borings, was conducted at both onsite and offsite locations. The primary objective of the CAIWP was to delineate soil and groundwater contamination relative to MDEQ generic nonresidential cleanup criteria, and to evaluate potential sources of contamination at the Facility. Soil and groundwater samples were collected in accordance with the CAIWP.

An Addendum to the CAIWP was submitted to the MDEQ (BVNA, 2014) on November 6, 2014. The objective of the CAIWP Addendum was to evaluate the nature and extent of contamination beneath the SBS Solids Building. Data collected during the CAI identified elevated concentrations of VOCs near the SBS Solids Building, most notably in borings BSB-12, BSB-13 and BSB -18. To further evaluate the nature and extent of contamination in this area, soil borings were completed directly beneath the SBS Solids Building in December 2014 in locations BSB-37, BSB-38 and BSB-39.

4.1 SAMPLE LOCATIONS

Soil and groundwater samples were collected during the CAI in locations shown on Figure 2. Sampling points were chosen based on the geographic area to be sampled, the size of the area, media of concern, and other physical constraints that affect the distribution of contamination at the facility. Other physical constraints that may influence the distribution of potential contaminants include buried utilities and differing soil types.

During this investigation, Bureau Veritas collected 58 soil samples and 25 groundwater samples from the uppermost water bearing zone and designated them for analysis of VOCs in accordance with the approved Sampling Plan that was included in the CAIWP (BVNA, 2013) and Addendum (BVNA, 2014). A portion of the soil samples was collected to evaluate impact of the vadose zone above the capillary fringe.

Data sets collected during this CAI can be compared to each other because the data were generated by the same consultant over time utilizing the same outside laboratory. Compound nomenclature and reporting units conformed with SW846 methodology. All soil sample analytical results were reported in dry weight in units of micrograms per kilogram (µg/kg). Units of micrograms per liter (µg/L) were used for all aqueous sample results. Use of standard methodologies ensure data comparability. Bureau Veritas Standard Operating Procedures (SOPs) provided in the CAI Work Plan were used to standardize field procedures and data recording.

Detailed information on the sampling locations for each selected medium is shown on the sample location map (Figure 2). Sampling locations, depths of samples within each soil boring, and date of sample collection are provided in the compiled soil data table (Table 4). Four events of soil and groundwater

sample collections were conducted in 2013 and 2014 at locations both onsite and offsite to evaluate the nature and extent of VOC impacts.

Grab soil samples allow for a greater resolution of spatial distribution of data than composite samples. Therefore, grab soil and groundwater samples were collected to evaluate the nature and extent of impact.

The purpose of this investigation was to evaluate the nature and extent of the impact; therefore, temporary wells were installed during this investigation and groundwater data collected from the temporary wells were utilized for delineation purposes only. Permanent monitoring wells are present at the facility (MW-1 through MW-10) and are known to be impacted with VOCs. Semi-annual groundwater monitoring is conducted at the facility in accordance with the Operating License, and data collected during the course of this investigation during the semi-annual monitoring events supplement groundwater contamination delineation efforts. Based on water level data submitted during semi-annual compliance monitoring, Monitoring Well MW-4 is considered an upgradient well with the remaining wells being compliance wells.

4.2 SOIL SAMPLING PROTOCOLS

The data collection quality assurance project plan (QAPP) was developed to document monitoring procedures (sampling, field measurements, and sample analysis performed during the investigation) to characterize the environmental setting, source, and contamination, and to ensure that all information, data, and resulting decisions are technically sound, statistically valid, and properly documented. Soil samples were collected in accordance with the QAPP, developed for the CAIWP. In short, soil samples were collected using the following measures:

- All boring locations were identified prior to the start of field activities.
- Continuous soil samples were collected until the water table was encountered or the maximum proposed depth was achieved.
- A minimum of two soil samples per boring, including the soil sample exhibiting the highest PID reading above the water table and the soil sample from just above the water table were collected and analyzed for volatile organic compounds (VOCs) in accordance with RRD Operational Memorandum No. 2, Attachments 4 (Sample Preservation, Sample Handling, and Holding Time Specifications) and 6 (Sampling Methods for Volatile Organic Compounds).
- A boring log was completed for each location by the site geologist and included relevant information necessary to the assessment of the subsurface geology.
- Soil collected in each 5-foot acetate liner was field screened using a hand-held PID at each 2-foot interval. Soil collected by hand auger was field screened using a hand-held PID at each 1-foot interval.
- One sample was submitted as a MS/MSD for every ten samples collected for each media.

- Soil samples intended for VOC analysis were collected and submitted to the laboratory in accordance RRD Operational Memorandum No. 2, Attachment 6 (Sampling Methods for Volatile Organic Compounds), dated October 22, 2004, using USEPA Method 5035.

- Samples were stored in the field on ice. Appropriate COC documentation was maintained for the samples. COC documentation includes the sample number, date and time of collection, depth, location, number of containers, requested analyses, and sample handling sequence. A trip blank was prepared and transported with the samples for appropriate QA/QC documentation.

- Samples were packed on ice and transferred to Fibertec Environmental Service's laboratory in Holt, Michigan for analysis.

- Soil samples were analyzed in accordance with the protocols in the document EPA SW-846 - Test Methods for Evaluating Solid Waste and in accordance with Table 1 of Operational Memo GEN-8, Revision 8. Soil samples submitted for VOC analysis were analyzed using USEPA Method 5035/8260B.

- Appropriate QA/QC documentation was provided with each batch of samples. Quality control replicates, laboratory spikes, and control blanks were analyzed according to standard protocols.

4.3 GROUNDWATER SAMPLING PROTOCOLS

Groundwater samples were collected throughout the CAI process. Groundwater is being monitored separately on a semi-annual basis with an existing series of monitoring wells. A thin, water-bearing zone, ranging from one to five feet in thickness above the uniform confining silty clay is found across the site. Sandy soils and/or peat are sporadically moist and wet. Although vertical aquifer profiling was proposed in the CAIWP, it was not conducted during this CAI due to the thin water column present at the Facility. In general, groundwater samples were collected by installing temporary monitoring wells during soil boring drilling procedures. Sample collection was conducted in accordance with the CAIWP. In short, procedures are highlighted below:

- Groundwater samples were collected using a Geoprobe screen point 16 groundwater sampler or a temporary monitoring well.

- Groundwater samples were collected using a peristaltic pump and placed in appropriate containers. Groundwater samples, and 1 duplicate, 1 field blank, 1 equipment blank and 1 trip blank (per cooler) sample were collected and analyzed for VOCs in accordance with RRD Operational Memorandum No. 2, Attachments 4 (Sample Preservation, Sample Handling, and Holding Time Specifications) and 6 (Sampling Methods for Volatile Organic Compounds). One sample was submitted as a MS/MSD for every ten samples collected for each media.

- Groundwater samples intended for VOCs analysis were placed into 40-mL glass containers pre-preserved with hydrochloric acid.

- Samples collected for analysis were stored in the field on ice. Appropriate COC documentation was maintained for all samples. COC documentation included the sample number, date and time

of collection, depth, location, number of containers, requested analyses, and sample handling sequence. Trip blanks were prepared and followed the samples for appropriate QA/QC documentation.

- Groundwater samples were packed on ice and transferred to Fibertec Environmental Service's laboratory in Holt, Michigan laboratory for analysis.

- Groundwater samples were analyzed in accordance with the protocols set forth in the USEPA document EPA SW-846 - Test Methods for Evaluating Solid Waste and in accordance with Table 1 of Operational Memo GEN-8, Revision 8. Groundwater samples submitted for VOC analysis were analyzed using USEPA Method 5035/8260B.

- Appropriate QA/QC documentation was provided with each batch of samples. Quality control replicates, laboratory spikes, and control blanks were inserted according to standard State Laboratory protocols.

4.4 QAPP PROTOCOLS

Sampling, analytical and laboratory protocols specified in the approved QAPP, submitted in the CAIWP, were followed throughout the CAI.

4.5 DATA MANAGEMENT PLAN

The Data Management Plan was developed for this CAI and was used to document and track investigation data and results. The Data Management Plan is incorporated in the CAIWP.

Sampling locations, contaminant concentrations, extent of contamination, as well as, figures to aid in the presentation of data obtained during the subsurface investigation are discussed in the following section of the CAI report.

5.0 NATURE AND EXTENT OF CONTAMINATION

5.1 MEDIA AND CONSTITUENTS OF CONCERN

Based on previous investigations at the Facility, it is known that soil and the uppermost water bearing zone have been impacted by VOC constituents. This CAI focused on finding the nature and extent of VOC concentrations in the shallow soils and uppermost water bearing zone at the Facility.

The COCs for this investigation are limited to VOCs. The nature and extent of COCs are discussed relative to MDEQ nonresidential cleanup criteria. Criteria considered include protection of drinking water (DW), protection of the interface between groundwater and surface water (GSI), direct contact, volatilization to indoor air inhalation criteria (VIIC), and volatilization to ambient air inhalation criteria (VAIC).

To better understand the distribution of constituents at the facility, there are a few sitewide COCs that are discussed in detail. Focusing on a few COCs allows for understandable discussion of patterns of contamination at the Facility.

5.2 PRIMARY VOCS

Methyl tert-butyl ether (MtBE) is a gasoline additive that is widely found in contaminated groundwater associated with facilities that process, store or manage large quantities of gasoline. MtBE is also used as a solvent, but not to the extent that it is used as an additive.

Tetrachloroethene (PCE), a chlorinated solvent, is used in the dry cleaning industry, as a metal parts degreaser in the automotive industry, and to some extent as a paint stripper. It is contained within some of the waste streams that are managed at the Facility.

Xylenes are a component of gasoline derivatives and petroleum products that are managed at the Facility. Xylenes are more prevalent than benzene, ethylbenzene and toluene in the soils at the Facility. For this reason, xylenes are discussed in detail for the purposes of demonstrating nature and extent of contamination from gasoline derivatives at the Facility.

5.2.1 Soils

Soil samples were collected from 27 soil borings during the course of the CAI in locations shown on Figure 2. Analytical data from soil samples, two samples per boring, are provided in Table 3. It was determined that MtBE is not widely distributed in soils across the Facility. Distribution of PCE and xylenes found in soils at concentrations exceeding MDEQ nonresidential cleanup criteria are shown in Figures 8 and 9, respectively. Cross-sections showing primary VOC distribution are included as Figures 13 through 18. COCs in concentrations above cleanup criteria, as shown on the figures, do not appear to be migrating off-site and are contained near impacted areas within the property boundary.

5.2.1.1 Results

WMU-15

To address WMU-15, soil borings were conducted in upgradient and downgradient locations and soil and groundwater samples were collected. Upgradient soil borings locations, relative to WMU-15, are BSB-20 and BSB-25. PCE and trichloroethene were detected at concentrations exceeding nonresidential DW protection cleanup criteria in the shallow interval, from 3 to 5 feet bgs in Soil Boring BSB-20. VOCs were not present at concentrations exceeding nonresidential cleanup criteria in the deeper sample from Soil Boring BSB-20, at 5 to 7 feet bgs. Benzene was detected in the upgradient, and off-site, location of BSB-25 at a concentration which exceeded the DW protection criteria in the shallow interval sample, but was not detected above laboratory detection limits in the deeper sample from the same location.

In soil boring locations downgradient of WMU-15 (i.e., BSB-16, BSB-19, BSB-21, BSB-22, and BSB-23), VOC concentrations exceeding nonresidential cleanup criteria were only reported in Soil Boring BSB-19, within the shallow interval of 3 to 5 feet bgs. Ethylbenzene and xylenes exceed DW protection and GSI protection criteria; PCE exceeds GSI protection; and 1,2,4-trimethylbenzene exceeds DW protection.

PCE is present in two shallow sampling locations upgradient and downgradient of WMU-15, but it should be noted that the concentration of PCE is higher in the upgradient location (BSB-20) than in the downgradient location (BSB-19).

VOC concentrations in soils do not persist at deeper depths in any of the soil borings near WMU-15. The distribution of constituents and their concentrations do not indicate that the contamination emanates from WMU-15. 2008 data shows Release from WMU-15 at surface Thrush. Indicates Release.

AOC-1/AOC-2

To address AOC-1 and AOC-2, soil borings were conducted in the area (i.e., adjacent to WMU-15) where concentrations of contaminants were previously identified which exceeded the soil volatilization to indoor air inhalation criterion (SVIIC) and/or soil volatilization to ambient air inhalation criterion (SVAIC). VIIC Concentrations of contaminants in the area of WMU-15 did not exceed the SVIIC or SVAIC, thereby indicating the lack of an area-wide concern.

AOC-3

To address AOC-3, soil borings were conducted across the entire Facility, as well as, on adjacent properties. Results from the soil borings collected did not indicate the site wide presence of MtBE in soils at concentrations exceeding nonresidential cleanup criteria. In fact, MtBE was only detected in Soil Boring BSB-12, on the west edge of the Facility, at concentrations exceeding nonresidential cleanup criteria.

Additionally, a sample of the silty clay unit was collected from Soil Boring BSB-36 to address the potential for contamination to be migrating into the clay unit. Concentrations of contaminants were not detected in the sample of the silty clay, while MtBE was detected in the soil sample collected from the peat located directly above the silty clay.

It should be noted that during the CAI, various contaminants were detected in shallow soil samples collected at off-site locations. Based on historical use information presented in Section 2.3 of this report,

it is most likely that this contamination is attributable to impacts from neighboring properties and not the Facility.

VOC contaminants in soil sporadically appear in shallow soil samples at concentrations exceeding DW protection and GSI protection criteria. The distribution of primary COCs in the soils are shown in the cross-sections, Figures 13 through 18. The site stratigraphy controls distribution of COCs. COCs are associated with the peat and/or the underlying silty sand layer, where it is present. Concentrations of COCs and their vertical extent are depicted and show that COC concentrations appear to be localized. Generally, MtBE, PCE and xylenes concentrations exceed DW and/or GSI cleanup criteria in locations upgradient of WMU-15 (i.e., BSB-19 and BSB-20) and in the area of the SBS Solids Building (i.e., BSB-12 and BSB-13). MtBE and PCE concentrations in soils exceed nonresidential cleanup for DW in soils at location BSB-24, but the peat layer is thinner northwest of the Facility. As shown in the groundwater results (refer to Figure 18), MtBE and PCE concentrations were not present (or at levels below cleanup criteria) in the groundwater collected from the BSB-24 location.

In general, the distribution of primary COCs in soils as shown in stratigraphic cross-sections are not migrating downward through the soils in the vadose zone or into the impermeable clay confining layer, which underlies the shallow water bearing zone. At depth, primary COCs are contained in localized areas and are not migrating across the Facility to off-site, downgradient locations.

Based on evaluation of the data collected during the CAI, the highest levels of VOC contamination in soil are present in the western portion of the Facility, including the area around the SBS Solids Building. Concentrations of VOCS in soil exceed MDEQ generic nonresidential cleanup criteria in patterns that are not consistent with one source identification or one particular medium. The patterns of contamination in the upper fill and soils at the Facility indicate small impacted areas of contamination, not sitewide areas of concern.

5.2.2 Groundwater

Groundwater samples were collected from temporary wells in 25 of the 27 soil borings drilled during the course of the CAI in locations shown in Figure 2. Analytical data from groundwater samples are provided in Table 4. Distribution of MtBE, PCE, and xylenes found at concentrations exceeding MDEQ nonresidential cleanup criteria are shown in Figures 10, 11, and 12, respectively. Cross-sections showing primary VOC distribution are included as Figures 19 through 24. In addition, groundwater samples are collected at the Facility on a biannual basis from the onsite permanent monitoring wells as a condition of the Facility Operating License.

MtBE, PCE and xylenes concentration trends in the existing permanent monitoring wells collected since June 2009, are shown in Tables 5, 6 and 7, respectively. Each of the primary COC concentrations generally decrease over time in each well within the groundwater monitoring network. The groundwater samples collected from the groundwater monitoring wells are more representative of actual groundwater characteristics than are those collected from temporary wells, as temporary wells are not able to be replicated. Temporal trends from groundwater collected from the soil boring locations are not able to be identified.

5.2.2.1 Results

WMU-15

To address the Former Container Processing System as a source of contamination at the Facility, groundwater samples were collected from locations upgradient and downgradient of WMU-15. Samples collected from MW-2D, MW-4 and BSB-20 are upgradient of WMU-15, while samples collected from MW-1, MW-3, BSB-16, BSB-19, BSB-21, BSB-22, and BSB-23 represent locations downgradient of WMU-15.

MtBE was detected at concentrations exceeding the nonresidential cleanup criteria for DW at upgradient well MW-4 and downgradient boring BSB-23. The concentrations of MtBE in the upgradient location, MW-4, exceeded that detected in the downgradient location. MtBE did not exceed cleanup criteria in other locations upgradient or downgradient of WMU-15. Benzene and PCE were also detected at concentrations exceeding the DW criteria in upgradient well MW-2D, but the concentrations do not exceed cleanup criteria in other locations surrounding WMU-15. Diethyl ether and diisopropyl ether exceeded the DW criteria at BSB-16, which is downgradient of WMU-15, but these VOCs were not consistently present in the locations surrounding WMU-15.

The distribution of VOCs in groundwater near WMU-15 indicate that WMU-15 is not a source area for sitewide VOC contamination.

AOC-1/AOC-2

Groundwater samples were collected from temporary monitoring wells and permanent monitoring wells across the Facility during the CAI. Concentrations of contaminants detected did not indicate the presence of contamination at concentrations exceeding GVIIC or GVAIC.

AOC-3

To address AOC-3, soil borings were conducted across the entire Facility, as well as, on adjacent properties. Groundwater was collected from temporary monitoring wells, when sufficient groundwater was present for sampling. In general, MtBE was detected above laboratory detection limits across the Facility. Concentrations ranged from slightly above the detection limit of 1.0 micrograms per liter (µg/L) to 27,000 µg/L. The highest concentrations of MtBE were encountered in the western portion of the Facility, in the vicinity of the SBS Solids Building, and exceeded the nonresidential DW and GSI criteria. Additionally, MtBE was detected at a concentration exceeding nonresidential cleanup criteria in one offsite boring location, BSB-3. However, this soil boring is located in an upgradient location in relation to the Facility; therefore, it is likely that it is not attributable to the Facility. MtBE was not detected at any other offsite location. Based on the results of the sampling, it appears that MtBE has been delineated on the Facility property.

Concentrations of COCs reported from recent sampling events that exceed MDEQ generic nonresidential cleanup criteria are depicted on cross-sections in Figures 19 through 24. The cross-sections depict the extent of vertical contamination of primary COCs at the Facility. The zones of elevated concentrations of primary COCs relative to nonresidential cleanup criteria in groundwater appear to be confined within the Facility boundary. The site stratigraphy and hydrogeologic setting controls the distribution of primary COCs in groundwater.

Concentrations of MtBE in soils reported in location BSB-24 exceeded nonresidential DW cleanup criteria; however, MtBE in the groundwater sampled from a temporary well within the same soil boring did not contain MtBE. Concentrations of VOCs across the Facility are not uniform or persistent. Distribution patterns of primary COCs in soils and groundwater as depicted in Figures 13 through 24, show that primary COCs are not migrating downward or laterally from localized areas. Analytical data collected during the CAI are provided in Appendix B.

Based on the evaluation of the data collected during the CAI, the highest levels of VOC concentrations in groundwater at the Facility are present in the western portion of the property, including the area surrounding the SBS Solids Building. Concentrations of VOCs in groundwater exceed MDEQ nonresidential cleanup criteria for DW and GSI in patterns that are not consistent with one source identification. The distribution patterns of contamination in the shallow water bearing zone at the Facility indicate small impacted areas of original contamination confined to the Facility boundary.

6.0 CONCLUSIONS

As part of this Operating License, Petro-Chem was required to conduct a Corrective Action Investigation (CAI) to determine if a release has occurred from the following:

WMU-15 (Former Container Processing System)

AOC-1 (Soil Volatilization to Indoor Air Exceedances)

AOC-2 (Soil Volatilization to Ambient Air Exceedances)

AOC-3 (MTBE Release to Site Wide Groundwater)

As discussed in Section 3.0 of this report, the drinking water criteria do not apply to groundwater at this Facility because the groundwater is perched in an uppermost water bearing zone above a persistent, dry, silty clay layer that is not associated with nor hydraulically connected to a regional drinking water aquifer. Permeability of the uniform clay confining layer is 8.5×10^{-9} cm/sec. Lacustrine deposits are known to be nearly 150 meters thick in the area of the Detroit River and are not used for groundwater supply. Groundwater flow in the peat and associated silty sand zones of the uppermost water bearing zone flows very slowly at 2×10^{-2} cm/sec. It is not expected that contaminants associated with the moist layer will impact off-site properties. Water supply is obtained from the Detroit River and Great Lakes basin and is provided to regional users by the DWSD. There is no known regional groundwater aquifer in the area surrounding the Facility.

Additionally, the GSI pathway is not relevant because there are no surface water bodies in the direction of groundwater flow and the onsite storm sewers discharge to the municipal wastewater treatment plant, the DWSD. There is no known direct pathway from the perched uppermost water bearing zone at the facility to the Detroit River, which is the nearest receiving surface water body. The Detroit River is located southeast of and not directly downgradient from the Facility.

Since the DW and GSI pathways are not relevant, direct contact, VIIC and VAIC are the pathways that are most likely to cause concern in a future use scenario of the Facility. They provide the relevant cleanup criteria for nonresidential use.

Primary COCs (MtBE, PCE and xylenes) do not appear to be readily associated with WMU-15. Primary COCs are not present in concentrations exceeding applicable nonresidential cleanup criteria in soils or groundwater near or immediately downgradient of WMU-15. The distribution of COCs and their concentrations do not indicate that the contamination emanates from WMU-15.

In addressing AOCs 1 and 2, VOCs are present in upper soil materials and in the shallow perched water bearing zone at the Facility at depths of approximately 7 to 12 feet bgs. Consistently, VOC concentrations within fill material and moist peat and silty sand lenses at the Facility do not exceed applicable VIIC or VAIC.

In addressing AOC-3, MtBE concentrations are observed in fill soils and in the shallow water bearing zone within the property boundary. The presence of MtBE is not ubiquitous. Concentrations of MtBE in soils and within the uppermost water bearing zone do not exceed applicable nonresidential cleanup criteria (i.e., VIIC and VAIC). Groundwater monitoring data collected at the Facility on a semi-annual

basis indicate that MtBE is present within three well locations (MW-4 [upgradient], MW-6 and MW-9); however, MtBE concentrations in groundwater do not exceed GVIIC or GVAIC.

Near the western property boundary, in the vicinity of the SBS Solids Building, several VOCs were identified in the shallow water bearing zone and in the soils above the confining clay barrier at concentrations higher than in other areas across the Facility. These VOC concentrations do not exceed direct contact, VIIC, or VAIC.

Should contaminants continue to impact the shallow water bearing zone and soils above the impermeable clay layer at the Facility to the point at which direct contact, VIIC, or VAIC nonresidential cleanup criteria are exceeded, it may be necessary for soils or perched groundwater to be removed or treated. If new sources of contamination are determined, corrective measures may be implemented to improve source control.

Groundwater monitoring should proceed in accordance with the Facility Operating License at established compliance points. Current downward trends in concentrations of VOCs have been noted in semi-annual groundwater sampling events since 2009. Current concentration trends in groundwater detection will demonstrate that applicable nonresidential clean up criteria (direct contract, VIIC, and VAIC) have not been exceeded at the Facility.

Based on the pathway evaluation conducted as part of this CAI, direct contract, VIIC, and VAIC are the nonresidential cleanup criteria appropriate for evaluating the necessity for Corrective Measures, environmental media removal or treatment.

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TABLES

Table 3
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Soil

Petro-Chem Processing Group Facility - Detroit, Michigan

Sample Identification	MDEQ TDL 10/2006	BSB-11		BSB-12			BSB-13		BSB-14		DUP-01	BSB-15		MDEQ Nonresidential Cleanup Criteria**				
(sample interval - feet)		(3-5)	(5-7)	(8-10)	(10-12)	(18-20)	(3-5)	(5-7)	(3-5)	(5-7)		(3-5)	(5-7)					
Collection Date		8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/23/2013	8/23/2013					
Analysis Date		8/28/2013	8/28/2013	8/28/2013 8/30/2013	8/27/2013 8/28/2013	8/27/2013 8/28/2013	8/27/2013	8/27/2013 8/28/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	Drinking Water Protection	Groundwater Surface Water Interface Protection	Volatilization to Ambient/Indoor Air	Direct Contact	Soil Saturation Concentration Screening Levels
Collection Method		Grab																
VOCs																		
Acetone	1,000	<1,000 J,V-	<1,000 J,V-	<1,000 J,V-	1,516	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	42,000	34,000	160,000,000 C	73,000,000	110,000,000
Benzene	50	<50	<50	**270 J,J-**	**750**	<50	<50	**110**	<50	<50	<50	<50	<50	100	4,000 X	8,400	840,000 C	400,000
2-Butanone	250	<631	<608	<808 J,J-	2,900 J,E1	<583	<588	<613	<609	<592	<644	<685	<693	760,000	44,000	35,000,000	700,000,000 C, DD	27,000,000
n-Butylbenzene	50	<50	<50	<50 J,J-	160	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	880,000,000	8,000,000	10,000,000
sec-Butylbenzene	50	<63	<60	<80 J,J-	170	<58	<58	<61	<60	<59	<64	<68	<69	4,600	ID	180,000,000	8,000,000	10,000,000
tert-Butylbenzene	50	<50	<50	<50 J,J-	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	290,000,000	8,000,000	10,000,000
Carbon tetrachloride	50	<63	<60	**390 J,J-**	<71	<58	<58	<61	<60	<59	<64	<68	<69	100	900 X	990	440,000 C	390,000
Chloroethane	250	<315	<304	1,000 J,J-	<359	<291	385	<306	<304	<296	<322	<342	<346	34,000	22,000 X	5,300,000 C	12,000,000 C	950,000
Cyclohexane	250	330	<304	<404 J,J-	1,300	<291	<294	<306	<304	<296	<322	<342	<346	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	50	<50	<50	<50 J,J-	**3,800**	<50	<50	**610**	<50	<50	<50	<50	<50	14,000	280	20,000,000 C	63,000,000 C	210,000
1,1-Dichloroethane	50	<63	<60	6,700 J,J-	580	<58	510	530	<60	<59	<64	<68	<69	50,000	15,000	430,000	87,000,000 C	890,000
1,2-Dichloroethane	50	<63	<60	82 J,J-	<71	<58	<58	<61	<60	<59	<64	<68	<69	100	7,200 X	11,000	420,000	1,200,000
1,1-Dichloroethene	50	<63	<60	**200 J,J-**	<71	<58	<58	<61	<60	<59	<64	<68	<69	140	2,600	330	660,000 C	570,000
cis-1,2-Dichloroethene	50	<50	<50	1,100 J,J-	1,400	<50	210	290	<50	<50	<50	<50	<50	1,400	12,000	41,000	8,000,000 C	640,000
trans-1,2-Dichloroethene	50	<50	<50	140 J,J-	<63	<50	<50	<50	<50	<50	<50	<50	<50	2,000	30,000 X	43,000	12,000,000 C	1,400,000
Ethylbenzene	50	69	<60	**11,000 J,J-**	**180,000**	210	**2,500**	**15,000**	<60	<59	<64	<68	<69	1,500	360	460,000 C	71,000,000 C	140,000
Isopropylbenzene	50	<320	<300	<400 J,J-	2,800	<290	<290	330	<300	<300	<320	<340	<350	260,000	3,200	730,000 C	80,000,000 C	390,000
4-Isopropyltoluene	50	<130	<120	<160 J,J-	410	<120	<120	<120	<120	<120	<130	<140	<140	NA	NA	NA	NA	NA
Methylene Chloride	100	<100	<100	**15,000 J,J-**	**2,000**	<100	**468**	**1,100**	<100	<100	<100	<100	<100	100	30,000 X	240,000	5,800,000 C	2,300,000
2-Methylnaphthalene	250	678	<304	1,300 J,J-	2,700	<291	<294	591	<304	<296	<322	<342	<346	170,000	4,200	1,800,000	26,000,000	NA
4-Methyl-2-Pentanone (MIBK)	250	<315	<304	5,400 J,J-	8,200	<291	<294	1,300	<304	<296	<322	<342	<346	100,000	ID	53,000,000	18,000,000 C	2,700,000
Methyl *tert*-butyl ether (MtBE)	50	<320	<300	**1,800 J,J-**	**4,700**	<290	<290	320	<300	<300	<320	<340	<350	800	140,000 X	18,000,000 C	7,100,000 C	5,900,000
Naphthalene	250	459	<304	**1,900 J,J-**	**4,700**	<291	<294	569	<304	<296	<322	<342	<346	100,000	730	350,000	52,000,000	NA
n-Propylbenzene	50	<63	<60	330 J,J-	**5,100**	<58	<58	570	<60	<59	<64	<68	<69	4,600	ID	590,000,000	8,000,000	10,000,000
Tetrachloroethene	50	<63	<60	**2,900 J,J-**	**250**	<58	**210**	**130**	**760**	91	<64	<68	<69	100	1,200 X	21,000	930,000 C	88,000
Tetrahydrofuran	250	<315	<304	1,200 J,J-	4,900	<291	364	1,200	<304	<296	<322	<342	<346	5,400	220,000 X	2,400,000	9,500,000	120,000,000
Toluene	50	310	<50	**14,000 J,J-**	**350,000**	280	1,900	**8,500**	<50	<50	<50	<50	70	16,000	5,400	610,000 C	16,000,000 C	250,000
1,2,4-Trichlorobenzene	250	<315	<304	<404 J,J-	<359	<291	<294	<306	<304	<296	<322	<342	<346	4,200	5,900 X	18,000,000 C	5,800,000 C,DD	1,100,000
1,1,1-Trichloroethane	50	<63	<60	**2,300 J,J-**	<86	<58	250	160	<60	<59	<64	<68	<69	4,000	1,800	460,000	1,000,000,000 C, D	460,000
Trichloroethene	50	<63	<60	**2,200 J,J-**	**140**	<58	<58	63	<60	<59	<64	<68	<69	100	4,000 X	1,900	660,000 C,DD	500,000
1,2,3-Trimethylbenzene	50	<130	<120	<160 J,J-	2,100	<120	<120	190	<120	<120	<130	<140	<140	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	50	200	<120	**710 J,J-**	**14,000**	<120	<120	**1,300**	<120	<120	<130	<140	<140	2,100	570	8,000,000 C	100,000,000 C	110,000
1,3,5-Trimethylbenzene	50	<130	<120	490 J,J-	**6,200**	<120	<120	590	<120	<120	<130	<140	<140	1,800	1,100	4,800,000 C	100,000,000 C	94,000
Vinyl Chloride	50	<50	<50	<50 J,J-	**320**	<50	<50	<50	<50	<50	<50	<50	<50	40	260 X	2,800	34,000	490,000
Xylenes	100	723	<182	**39,000**	**750,000**	**913**	**7,800**	**62,000**	<182	<177	<193	<205	<207	5,600	820	12,000,000 C	1,000,000,000 C, D	150,000
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary	Vary	Vary

All soil sample results in micrograms per kilogram (µg/kg) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
< = limit of detection for sample
E1 = the reported value is estimated due to the presence of interference
J = the concentration is an estimated value
J- = the result is an estimated quantity, but the result may be biased low
V- = recovery in the assocated continuing calibration verification sample (CCV) exceeds the lower control limit. Results may be biased low.
Reporting limits for some analytes may vReporting limits for some analytes may vary depending on the percent moisture content of the sample.
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
NA = criterion is not available
ND = non-detect
ID = insufficient data to develop criterion
C = the criterion developed exceeds the chemical-specific soil saturation screening level (Csat)
D = calculated criterion exceeds 100 percent, hence it is reducted to 100 percent or 1.0E+9 parts per billion (ppb)
DD = hazardous substance ceuses developmental effects
X = the GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source

Table 3 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Soil

Petro-Chem Processing Group Facility - Detroit, Michigan

Sample Identification	MDEQ TDL 10/2006	BSB-16		BSB-17		BSB-18		DUP-03	BSB-19		BSB-20		BSB-21		MDEQ Nonresidential Cleanup Criteria**				
(sample interval - feet)		(3-5)	(5-7)	(3-5)	(5-7)	(3-5)	(5-7)		(3-5)	(5-7)	(3-5)	(5-7)	(3-5)	(5-7)					
Collection Date		8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/26/2013	8/26/2013	8/26/2013	8/26/2013	8/26/2013	8/26/2013					
Analysis Date		8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013 8/28/2013	8/28/2013	8/27/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013					
Collection Method		Grab													Drinking Water Protection	Groundwater Surface Water Interface Protection	Volatilization to Ambient/Indoor Air	Direct Contact	Soil Saturation Concentration Screening Levels
VOCs																			
Acetone	1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<3,602	<1,000	<1,000	<1,000	<1,000	<1,000	42,000	34,000	160,000,000 C	73,000,000	110,000,000
Benzene	50	<50	<50	<50	<50	**450**	**350**	<50	<290	<50	<50	84	<50	<50	100	4,000 X	8,400	840,000 C	400,000
2-Butanone (MEK)	250	<573	<562	<655	<636	<630	<603	<653	<2,900	<306	<414	<323	<334	<335	760,000	44,000	35,000,000	700,000,000 C, DD	27,000,000
n-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<290	<50	<50	<50	<50	<50	4,600	ID	880,000,000	8,000,000	10,000,000
sec-Butylbenzene	50	<57	<56	<65	<63	<63	<60	<65	<290	<50	<50	<50	<50	<50	4,600	ID	180,000,000	8,000,000	10,000,000
tert-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<290	<50	<50	<50	<50	<50	4,600	ID	290,000,000	8,000,000	10,000,000
Carbon tetrachloride	50	<57	<56	<65	<63	<63	<60	<65	<570	<61	<82	<64	<66	<67	100	900 X	990	440,000 C	390,000
Chloroethane	250	<286	<281	<327	<318	449	514	<326	<2,900	<306	<414	<323	<334	<335	34,000	22,000 X	5,300,000 C	12,000,000 C	950,000
Cyclohexane	250	<286	<281	<327	<318	535	<301	<326	<571	<250	<250	<250	<250	<250	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	50	<50	<50	<50	<50	<50	<50	<50	<290	<50	<50	<50	<50	<50	14,000	280	20,000,000 C	63,000,000 C	210,000
1,1-Dichloroethane	50	<57	<56	<65	<63	<63	<60	<65	<570	<61	<82	<64	<66	<67	50,000	15,000	430,000	87,000,000 C	890,000
1,2-Dichloroethane	50	<57	<56	<65	<63	<63	<60	<65	<570	<61	<82	<64	<66	<67	100	7,200 X	11,000	420,000	1,200,000
1,1-Dichloroethene	50	<57	<56	<65	<63	<63	<60	<65	<290	<50	<50	<50	<50	<50	140	2,600	330	660,000 C	570,000
cis-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<290	<50	<50	<50	<50	<50	1,400	12,000	41,000	8,000,000 C	640,000
trans-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<290	<50	<50	<50	<50	<50	2,000	30,000 X	43,000	12,000,000 C	1,400,000
Ethylbenzene	50	<57	<56	<65	<63	**22,000**	**16,000**	<65	**790**	74	<50	200	<50	<50	1,500	360	460,000 C	71,000,000 C	140,000
Isopropylbenzene	50	<290	<280	<330	<320	330	<300	<330	<290	<50	<50	<50	<50	<62	260,000	3,200	730,000 C	80,000,000 C	390,000
4-Isopropyltoluene	50	<110	<110	<130	<130	<130	<120	<130	<290	<50	<50	<58	<50	<50	NA	NA	NA	NA	NA
Methylene Chloride	100	<100	<100	<100	<100	<100	<100	<100	<285	<100	<100	<100	<100	<100	100	30,000 X	240,000	5,800,000 C	2,300,000
2-Methylnaphthalene	250	<286	<281	<327	<318	<315	<301	<326	<285	<250	<250	<250	<250	<250	170,000	4,200	1,800,000	26,000,000	NA
4-Methyl-2-Pentanone	250	<286	<281	<327	<318	<315	<301	<326	<5,700	<613	<828	<647	<668	<670	100,000	ID	53,000,000	18,000,000 C	2,700,000
Methyl *tert*-butyl ether (MtBE)	50	<290	<280	<330	<320	800	780	<330	<570	<61	<82	<64	<66	<67	800	140,000 X	18,000,000 C	7,100,000 C	5,900,000
Naphthalene	250	<286	<281	<327	<318	<315	<301	<326	<285	<250	<250	<250	<250	<250	100,000	730	350,000	52,000,000	NA
n-Propylbenzene	50	<57	<56	<65	<63	240	230	<65	<290	<50	<50	<50	<50	<50	4,600	ID	590,000,000	8,000,000	10,000,000
Tetrachloroethene	50	<57	<56	<65	<63	<63	<60	<65	**520**	<50	**940**	<50	<50	<50	100	1,200 X	21,000	930,000 C	88,000
Tetrahydrofuran	250	<286	<281	<327	<318	<315	<301	<326	<2,900	615	<414	<323	<334	<335	5,400	220,000 X	2,400,000	9,500,000	120,000,000
Toluene	50	<50	<50	<50	<50	170	300	<50	820	110	340	360	<50	240	16,000	5,400	610,000 C	16,000,000 C	250,000
1,2,4-Trichlorobenzene	250	<286	<281	<327	<318	<315	<301	<326	863	<250	<250	<250	<250	<250	4,200	5,900 X	18,000,000 C	5,800,000 C,DD	1,100,000
1,1,1-Trichloroethane	50	<57	<56	<65	<63	<63	<60	<65	<570	<61	<82	<64	<66	<67	4,000	1,800	460,000	1,000,000,000 C, D	460,000
Trichloroethene	50	<57	<56	<65	<63	<63	<60	<65	<570	<61	**130**	<64	<66	<67	100	4,000 X	1,900	660,000 C,DD	500,000
1,2,3-Trimethylbenzene	50	<110	<110	<130	<130	<130	<120	<130	350	<50	<50	<50	<50	<50	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	50	<110	<110	<130	<130	220	270	<130	**1,000**	<89	<50	<50	<50	<50	2,100	570	8,000,000 C	100,000,000 C	110,000
1,3,5-Trimethylbenzene	50	<110	<110	<130	<130	270	260	<130	450	<50	<50	<50	<50	<50	1,800	1,100	4,800,000 C	100,000,000 C	94,000
Vinyl Chloride	50	<50	<50	<50	<50	<50	<50	<50	<290	<50	<50	<50	<50	<50	40	260 X	2,800	34,000	490,000
Xylenes	100	<172	<168	<196	<191	**44,000**	**37,000**	<195	**4,400**	625	<150	545	<150	<150	5,600	820	12,000,000 C	1,000,000,000 C, D	150,000
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary	Vary	Vary

All soil sample results in micrograms per kilogram (µg/kg) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
< = limit of detection for sample
NA = criterion is not available
Reporting limits for some analytes may vary depending on the percent moisture content of the sample.
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
NA = criterion is not available
ND = non-detect
ID = insufficient data to develop criterion
C = the criterion developed exceeds the chemical-specific soil saturation screening level (Csat)
D = calculated criterion exceeds 100 percent, hence it is reducted to 100 percent or 1.0E+9 parts per billion (ppb)
DD = hazardous substance causes developmental effects
X = the GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source

Table 3 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Soil

Petro-Chem Processing Group Facility - Detroit, Michigan

Sample Identification	MDEQ TDL 10/2006	BSB-22		BSB-23		BSB-24		BSB-25		BSB-26		BSB-27		DUP-06	MDEQ Nonresidential Cleanup Criteria**				
(sample interval - feet)		(3-5)	(9-10)	(3-5)	(9-10)	(3-5)	(7.5-8.5)	(3-5)	(5-7)	(3-5)	(5-7)	(3-5)	(5-7)						
Collection Date		8/26/2013	8/26/2013	8/26/2013	8/26/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013	8/27/2013					
Analysis Date		8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/29/2013	8/29/2013	8/29/2013	8/29/2013	8/29/2013 8/30/2013	8/30/2013					
Collection Method		Grab																	
VOCs																			
Acetone	1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<21,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<21,000	42,000	34,000	160,000,000 C	73,000,000	110,000,000
Benzene	50	<50	<50	<50	<50	<50	<1,100	**120**	<50	<50	<50	<50	<64	<1,100	100	4,000 X	8,400	840,000 C	400,000
2-Butanone	250	<394	<281	<287	<295	<582	<21,000	<559	<607	<552	<258	<552	<687	<21,000	760,000	44,000	35,000,000	700,000,000 C, DD	27,000,000
n-Butylbenzene	50	<50	<50	<50	<50	<50	**69,000**	<50	<50	<50	<50	<50	<50	**57,000**	4,600	ID	880,000,000	8,000,000	10,000,000
sec-Butylbenzene	50	<50	<50	<50	<50	<58	**28,000**	<55	<60	<55	<50	<55	<68	**24,000**	4,600	ID	180,000,000	8,000,000	10,000,000
tert-Butylbenzene	50	<50	<50	<50	<50	<50	3,500	<50	<50	<50	<50	<50	<50	3,000	4,600	ID	290,000,000	8,000,000	10,000,000
Carbon tetrachloride	50	<78	<56	<57	<59	<58	<2,100	<55	<60	<55	<51	<55	<68	<2,100	100	900 X	990	440,000 C	390,000
Chloroethane	250	<394	<281	<287	<295	<291	<11,000	<279	<303	<276	<258	<276	<343	<11,000	34,000	22,000 X	5,300,000 C	12,000,000 C	950,000
Cyclohexane	250	<250	<250	<250	<250	<291	<11,000	<279	<303	<276	<250	<276	<343	<11,000	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	50	<50	<50	<50	<50	<50	<1,100	<50	<50	<50	<50	<50	<50	<1,100	14,000	280	20,000,000 C	63,000,000 C	210,000
1,1-Dichloroethane	50	<78	<56	<57	<59	<58	<2,100	<55	<60	<55	<51	<55	<68	<2,100	50,000	15,000	430,000	87,000,000 C	890,000
1,2-Dichloroethane	50	<78	<56	<57	<59	<58	<2,100	<55	<60	<55	<51	<55	<68	<2,100	100	7,200 X	11,000	420,000	1,200,000
1,1-Dichloroethene	50	<50	<50	<50	<50	<58	<2,100	<55	<60	<55	<50	<55	<68	<2,100	140	2,600	330	660,000 C	570,000
cis-1,2-Dichloroethene	50	<50	<50	<50	110	<50	<1,100	<50	<50	<50	<50	<50	<50	<1,100	1,400	12,000	41,000	8,000,000 C	640,000
trans-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<1,100	<50	<50	<50	<50	<50	<50	<1,100	2,000	30,000 X	43,000	12,000,000 C	1,400,000
Ethylbenzene	50	<50	<50	<50	<50	<58	<2,100	<55	<60	<55	70	<55	250	<2,100	1,500	360	460,000 C	71,000,000 C	140,000
Isopropylbenzene	50	<50	<50	<50	<50	<290	<11,000	<280	<300	<280	<66	<280	<340	<11,000	260,000	3,200	730,000 C	80,000,000 C	390,000
4-Isopropyltoluene	50	<50	<50	<50	<50	<120	36,000	<110	<120	<110	<50	<110	<140	32,000	NA	NA	NA	NA	NA
Methylene Chloride	100	<100	<100	<100	<100	<100	<2,100	<100	<100	<100	<100	<100	<100	<2,100	100	30,000 X	240,000	5,800,000 C	2,300,000
2-Methylnaphthalene	250	<250	<250	<250	<250	<291	**88,000**	<279	<303	<276	<580	<276	1,400	**85,000**	170,000	4,200	1,800,000	26,000,000	NA
4-Methyl-2-Pentanone	250	<789	<562	<574	<591	<291	<11,000	<279	<303	<276	<517	<276	<343	<11,000	100,000	ID	53,000,000	18,000,000 C	2,700,000
Methyl *tert*-butyl ether (MtBE)	50	<78	<56	<57	<59	<290	<11,000	<280	<300	<280	<51	<280	<340	<11,000	800	140,000 X	18,000,000 C	7,100,000 C	5,900,000
Naphthalene	250	<250	<250	<250	<250	<291	**70,000**	<279	<303	<276	<259	<276	**8,600**	**60,000**	100,000	730	350,000	52,000,000	NA
n-Propylbenzene	50	<50	<50	<50	<50	<58	**17,000**	<55	<60	<55	71	<55	<68	**15,000**	4,600	ID	590,000,000	8,000,000	10,000,000
Tetrachloroethene	50	<50	<50	<50	<50	**390**	**8,000**	<55	<60	<55	<50	<55	<68	**7,400**	100	1,200 X	21,000	930,000 C	88,000
Tetrahydrofuran	250	<394	<281	<287	<295	<291	<11,000	<279	<303	<276	<258	<276	<343	<11,000	5,400	220,000 X	2,400,000	9,500,000	120,000,000
Toluene	50	170	<50	64	<50	<50	<1,100	160	<50	<50	190	<50	240	<1,100	16,000	5,400	610,000 C	16,000,000 C	250,000
1,2,4-Trichlorobenzene	250	<250	<250	<250	<250	<291	<11,000	<279	<303	<276	<250	<276	<343	<11,000	4,200	5,900 X	18,000,000 C	5,800,000 C,DD	1,100,000
1,1,1-Trichloroethane	50	<78	<56	<57	<59	<58	<2,100	<55	<60	<55	<51	<55	<68	<2,100	4,000	1,800	460,000	1,000,000,000 C, D	460,000
Trichloroethene	50	<78	<56	93	<59	<58	<2,100	<55	<60	<55	<51	<55	<68	<2,100	100	4,000 X	1,900	660,000 C,DD	500,000
1,2,3-Trimethylbenzene	50	<50	<50	<50	<50	<120	140,000	<110	<120	<110	<58	<110	<140	120,000	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	50	<50	<50	<50	<50	<120	**220,000**	<110	<120	<110	120	<110	230	**190,000**	2,100	570	8,000,000 C	100,000,000 C	110,000
1,3,5-Trimethylbenzene	50	<50	<50	<50	<50	<120	**74,000**	<110	<120	<110	<50	<110	<140	**67,000**	1,800	1,100	4,800,000 C	100,000,000 C	94,000
Vinyl Chloride	50	<50	<50	<50	<50	<50	<1,100	<50	<50	<50	<50	<50	<50	<1,100	40	260 X	2,800	34,000	490,000
Xylenes	100	261	<150	<150	<150	<174	**25,000**	<167	<182	<165	387	<165	761	**23,000**	5,600	820	12,000,000 C	1,000,000,000 C, D	150,000
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary	Vary	Vary

All soil sample results in micrograms per kilogram (µg/kg) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
< = limit of detection for sample
NA = criterion is not available
Reporting limits for some analytes may vary depending on the percent moisture content of the sample.
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
NA = criterion is not available
ND = non-detect
ID = insufficient data to develop criterion
C = the criterion developed exceeds the chemical-specific soil saturation screening level (Csat)
D = calculated criterion exceeds 100 percent, hence it is reducted to 100 percent or 1.0E+9 parts per billion (ppb)
DD = hazardous substance causes developmental effects
X = the GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source

Table 3 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Soil

Petro-Chem Processing Group Facility - Detroit, Michigan

Soil Boring Number	MDEQ TDL 10/2006	BSB-28		BSB-29		BSB-30		BSB-31		DUP-02	MDEQ Nonresidential Cleanup Criteria**				
(sample interval - feet)		(4-5)	(5-6)	(3-4)	(8-9)	(4-5)	(9-10)	(7-8)	(11-12)		Drinking Water Protection	Groundwater Surface Water Interface Protection	Volatilization to Ambient/Indoor Air	Direct Contact	Soil Saturation Concentration Screening Levels
Collection Date		4/17/2014	4/17/2014	4/17/2014	4/17/2014	4/17/2014	4/17/2014	4/17/2014	4/17/2014	4/17/2014					
Analysis Date		4/24/2014	4/24/2014	4/24/2014	4/24/2014	4/24/2014	4/24/2014	4/24/2014	4/24/2014	4/24/2014					
Collection Method		Grab													
VOCs															
Acetone	1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	42,000	34,000	160,000,000 C	73,000,000	110,000,000
Benzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	4,000 X	8,400	840,000 C	400,000
2-Butanone	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	760,000	44,000	35,000,000	700,000,000 C, DD	27,000,000
n-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	880,000,000	8,000,000	10,000,000
sec-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	180,000,000	8,000,000	10,000,000
tert-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	290,000,000	8,000,000	10,000,000
Carbon tetrachloride	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	900 X	990	440,000 C	390,000
Chloroethane	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	34,000	22,000 X	5,300,000 C	12,000,000 C	950,000
Cyclohexane	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	14,000	280	20,000,000 C	63,000,000 C	210,000
1,1-Dichloroethane	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	50,000	15,000	430,000	87,000,000 C	890,000
1,2-Dichloroethane	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	7,200 X	11,000	420,000	1,200,000
1,1-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	140	2,600	330	660,000 C	570,000
cis-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	1,400	12,000	41,000	8,000,000 C	640,000
trans-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	2,000	30,000 X	43,000	12,000,000 C	1,400,000
Ethylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	1,500	360	460,000 C	71,000,000 C	140,000
Isopropylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	260,000	3,200	730,000 C	80,000,000 C	390,000
4-Isopropyltoluene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	NA	NA	NA	NA	NA
Methylene Chloride	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	30,000 X	240,000	5,800,000 C	2,300,000
2-Methylnaphthalene	250	<250	<250	<250	<250	<250	<250	<251	<250	<250	170,000	4,200	1,800,000	26,000,000	NA
4-Methyl-2-Pentanone	250	<328	<308	<299	<312	<283	<313	<339	<301	<250	100,000	ID	53,000,000	18,000,000 C	2,700,000
Methyl *tert*-butyl ether (MtBE)	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	800	140,000 X	18,000,000 C	7,100,000 C	5,900,000
Naphthalene	250	<250	<250	<250	<250	<250	<250	630	<250	<250	100,000	730	350,000	52,000,000	NA
n-Propylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	590,000,000	8,000,000	10,000,000
Tetrachloroethene	50	**2,500**	<50	62	<50	**120**	<50	<50	<50	<50	100	1,200 X	21,000	930,000 C	88,000
Tetrahydrofuran	250	<328	<308	<299	<312	<283	<313	<339	<301	<250	5,400	220,000 X	2,400,000	9,500,000	120,000,000
Toluene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	16,000	5,400	610,000 C	16,000,000 C	250,000
1,2,4-Trichlorobenzene	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	4,200	5,900 X	18,000,000 C	5,800,000 C,DD	1,100,000
1,1,1-Trichloroethane	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,000	1,800	460,000	1,000,000,000 C, D	460,000
Trichloroethene	50	100	<50	<50	<50	<50	<50	<50	<50	<50	100	4,000 X	1,900	660,000 C,DD	500,000
1,2,3-Trimethylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	2,100	570	8,000,000 C	100,000,000 C	110,000
1,3,5-Trimethylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	1,800	1,100	4,800,000 C	100,000,000 C	94,000
Vinyl Chloride	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	40	260 X	2,800	34,000	490,000
Xylenes	100	<150	<150	<150	<150	<150	<150	<150	<150	<150	5,600	820	12,000,000 C	1,000,000,000 C, D	150,000
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary	Vary	Vary

All soil sample results in micrograms per kilogram (µg/kg) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
< = limit of detection for sample
NA = criterion is not available
Reporting limits for some analytes may vary depending on the percent moisture content of the sample.
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
NA = criterion is not available
ND = non-detect
ID = insufficient data to develop criterion
C = the criterion developed exceeds the chemical-specific soil saturation screening level (Csat)
D = calculated criterion exceeds 100 percent, hence it is reducted to 100 percent or 1.0E+9 parts per billion (ppb)
DD = hazardous substance causes developmental effects
X = the GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source

Table 3 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Soil

Petro-Chem Processing Group Facility - Detroit, Michigan

Soil Boring Number	MDEQ TDL 10/2006	BSB-32		BSB-33		BSB-34		BSB-35		Dup-03	MDEQ Nonresidential Cleanup Criteria**				
(sample interval - feet)		(2-4)	(10-12)	(2-4)	(8-10)	(3-5)	(8-10)	(2-4)	(6-8)		Drinking Water Protection	Groundwater Surface Water Interface Protection	Volatilization to Ambient/Indoor Air	Direct Contact	Soil Saturation Concentration Screening Levels
Collection Date		9/18/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014					
Analysis Date		9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/23/2014 9/24/2014	9/24/2014					
Collection Method		Grab													
VOCs															
Acetone	1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	<1,000	42,000	34,000	160,000,000 C	73,000,000	110,000,000
Benzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	4,000 X	8,400	840,000 C	400,000
2-Butanone	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	760,000	44,000	35,000,000	700,000,000 C, DD	27,000,000
n-Butylbenzene	50	<50	<50	<50	<50	130	<50	<50	<50	170	4,600	ID	880,000,000	8,000,000	10,000,000
sec-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	180,000,000	8,000,000	10,000,000
tert-Butylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,600	ID	290,000,000	8,000,000	10,000,000
Carbon tetrachloride	50	<56	<65	<55	<74	<60	<98	<60	<82	<61	100	900 X	990	440,000 C	390,000
Chloroethane	250	<280	<320	<270	<370	<300	<490	<300	<410	<300	34,000	22,000 X	5,300,000 C	12,000,000 C	950,000
Cyclohexane	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	14,000	280	20,000,000 C	63,000,000 C	210,000
1,1-Dichloroethane	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	50,000	15,000	430,000	87,000,000 C	890,000
1,2-Dichloroethane	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	7,200 X	11,000	420,000	1,200,000
1,1-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	140	2,600	330	660,000 C	570,000
cis-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	1,400	12,000	41,000	8,000,000 C	640,000
trans-1,2-Dichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	2,000	30,000 X	43,000	12,000,000 C	1,400,000
Ethylbenzene	50	<50	<50	<50	<50	60	<50	<50	<50	120	1,500	360	460,000 C	71,000,000 C	140,000
Isopropylbenzene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	260,000	3,200	730,000 C	80,000,000 C	390,000
4-Isopropyltoluene	50	<50	<50	<50	<50	<50	<50	<50	<50	56	NA	NA	NA	NA	NA
Methylene Chloride	100	<100	<100	<100	<100	<100	<100	<100	<100	<100	100	30,000 X	240,000	5,800,000 C	2,300,000
2-Methylnaphthalene	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	170,000	4,200	1,800,000	26,000,000	NA
4-Methyl-2-Pentanone	250	<280	<320	<270	<370	<300	<490	<300	<410	<300	100,000	ID	53,000,000	18,000,000 C	2,700,000
Methyl *tert*-butyl ether (MtBE)	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	800	140,000 X	18,000,000 C	7,100,000 C	5,900,000
Naphthalene	250	<250	<250	<250	<250	410	<250	<250	<250	370	100,000	730	350,000	52,000,000	NA
n-Propylbenzene	50	<50	<50	<50	<50	92	<50	<50	<50	140	4,600	ID	590,000,000	8,000,000	10,000,000
Tetrachloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	1,200 X	21,000	930,000 C	88,000
Tetrahydrofuran	250	<280	<320	<270	<370	<300	<490	<300	<410	<300	5,400	220,000 X	2,400,000	9,500,000	120,000,000
Toluene	50	<50	<50	<50	<50	59	<50	<50	<50	160	16,000	5,400	610,000 C	16,000,000 C	250,000
1,2,4-Trichlorobenzene	250	<250	<250	<250	<250	<250	<250	<250	<250	<250	4,200	5,900 X	18,000,000 C	5,800,000 C,DD	1,100,000
1,1,1-Trichloroethane	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	4,000	1,800	460,000	1,000,000,000 C, D	460,000
Trichloroethene	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	100	4,000 X	1,900	660,000 C,DD	500,000
1,2,3-Trimethylbenzene	50	<50	<50	<50	<50	140	<50	<50	<50	220	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	50	<50	<50	<50	<50	470	<50	<50	<50	**680**	2,100	570	8,000,000 C	100,000,000 C	110,000
1,3,5-Trimethylbenzene	50	<50	<50	<50	<50	86	<50	<50	<50	130	1,800	1,100	4,800,000 C	100,000,000 C	94,000
Vinyl Chloride	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	40	260 X	2,800	34,000	490,000
Xylenes	100	<150	<150	<150	<150	420	<150	<150	<150	790	5,600	820	12,000,000 C	1,000,000,000 C, D	150,000
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary	Vary	Vary

All soil sample results in micrograms per kilogram (µg/kg) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
< = limit of detection for sample
Reporting limits for some analytes may vary depending on the percent moisture content of the sample.
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
NA = criterion is not available
ND = non-detect
ID = insufficient data to develop criterion
C = the criterion developed exceeds the chemical-specific soil saturation screening level (Csat)
D = calculated criterion exceeds 100 percent, hence it is reducted to 100 percent or 1.0E+9 parts per billion (ppb)
DD = hazardous substance causes developmental effects
X = the GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source

Table 3 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Soil

Petro-Chem Processing Group Facility - Detroit, Michigan

Soil Boring Number	MDEQ TDL 10/2006	BSB-36			BSB-38		MDEQ Nonresidential Cleanup Criteria**				
(sample interval - feet)		(0-2)	(8-10)	(12.5-13)	(1.5-2)	(4.5-5)	Drinking Water Protection	Groundwater Surface Water Interface Protection	Volatilization to Ambient/Indoor Air	Direct Contact	Soil Saturation Concentration Screening Levels
Collection Date		12/22/2014	12/22/2014	12/22/2014	12/22/2014	12/22/2014					
Analysis Date		12/27/2014	12/27/2014	12/25/2014	12/25/2014	12/25/2014					
Collection Method		Grab									
VOCs											
Acetone	1,000	<1,000 J,L+	<1,100 J,L+	<1,000	<1,000	<5,300	42,000	34,000	160,000,000 C	73,000,000	110,000,000
Benzene	50	<50	<50	<50	88	<270	100	4,000 X	8,400	840,000 C	400,000
2-Butanone	250	<250 J,L+	<250 J,L+	<250	<250	<1,100	760,000	44,000	35,000,000	700,000,000 C, DD	27,000,000
n-Butylbenzene	50	<50	<50	<50	<50	<270	4,600	ID	880,000,000	8,000,000	10,000,000
sec-Butylbenzene	50	<50	<50	<50	<50	<270	4,600	ID	180,000,000	8,000,000	10,000,000
tert-Butylbenzene	50	<50	<50	<50	<50	<270	4,600	ID	290,000,000	8,000,000	10,000,000
Carbon tetrachloride	50	<50	<56	<58	<62	<530	100	900 X	990	440,000 C	390,000
Chloroethane	250	<260	<560	<250	360	<1,100	34,000	22,000 X	5,300,000 C	12,000,000 C	950,000
Cyclohexane	250	<250	<250	<250	<250	<270	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	50	<50	<50	<50	180	<270	14,000	280	20,000,000 C	63,000,000 C	210,000
1,1-Dichloroethane	50	<50	<50	<50	83	<270	50,000	15,000	430,000	87,000,000 C	890,000
1,2-Dichloroethane	50	<50	<50	<50	<50	<270	100	7,200 X	11,000	420,000	1,200,000
1,1-Dichloroethene	50	<50	<50	<50	<50	<270	140	2,600	330	660,000 C	570,000
cis-1,2-Dichloroethene	50	<50	<50	<50	<50	<270	1,400	12,000	41,000	8,000,000 C	640,000
Diisopropyl ether	250	<250	2,000	<250	<250	<270					
Ethylbenzene	50	<50	<50	<50	**4,000**	<270	1,500	360	460,000 C	71,000,000 C	140,000
Isopropylbenzene	50	<100 J,L+	<230 J,L+	<50	370	<270	260,000	3,200	730,000 C	80,000,000 C	390,000
4-Isopropyltoluene	50	<50	<50	<50	<50	<270	NA	NA	NA	NA	NA
Methylene Chloride	100	<100	<100	<100	<100	<530	100	30,000 X	240,000	5,800,000 C	2,300,000
2-Methylnaphthalene	250	<250	<250	<250	<250	<530	170,000	4,200	1,800,000	26,000,000	NA
4-Methyl-2-Pentanone	250	<510	3,500	<250	<340	<1,100	100,000	ID	53,000,000	18,000,000 C	2,700,000
Methyl *tert*-butyl ether (MtBE)	50	<50	**8,300**	<50	**1,000**	**5,200**	800	140,000 X	18,000,000 C	7,100,000 C	5,900,000
Naphthalene	250	<250	<250	<250	<250	<270	100,000	730	350,000	52,000,000	NA
n-Propylbenzene	50	<50	<50	<50	440	<270	4,600	ID	590,000,000	8,000,000	10,000,000
Styrene	50	<50	<50	<50	280	<270					
Tetrachloroethene	50	**160**	<50	<50	<50	<270	100	1,200 X	21,000	930,000 C	88,000
Tetrahydrofuran	250	<260	4,500	<290	1,600	<2,700	5,400	220,000 X	2,400,000	9,500,000	120,000,000
Toluene	50	<50	130	<50	1,100	<270	16,000	5,400	610,000 C	16,000,000 C	250,000
1,2,4-Trichlorobenzene	250	<250	<250	<250	<250	<270	4,200	5,900 X	18,000,000 C	5,800,000 C,DD	1,100,000
1,1,1-Trichloroethane	50	<50	<50	<50	<50	<270	4,000	1,800	460,000	1,000,000,000 C, D	460,000
Trichloroethene	50	<50	<50	<50	<50	<270	100	4,000 X	1,900	660,000 C,DD	500,000
1,2,3-Trimethylbenzene	50	<50	<50	<50	430	<270	NA	NA	NA	NA	NA
1,2,4-Trimethylbenzene	50	<50	<50	<50	**3,000**	<270	2,100	570	8,000,000 C	100,000,000 C	110,000
1,3,5-Trimethylbenzene	50	<50	<50	<50	1,000	<270	1,800	1,100	4,800,000 C	100,000,000 C	94,000
Vinyl Chloride	50	<50	<50	<50	<50	<270	40	260 X	2,800	34,000	490,000
Xylenes	100	190	<150	<150	**24,000**	<800	5,600	820	12,000,000 C	1,000,000,000 C, D	150,000
Other VOCs	NA	ND	ND	ND	ND	ND	Vary	Vary	Vary	Vary	Vary

All soil sample results in micrograms per kilogram (µg/kg) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
< = limit of detection for sample
Reporting limits for some analytes may vary depending on the percent moisture content of the sample.
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
NA = criterion is not available
ND = non-detect
ID = insufficient data to develop criterion
C = the criterion developed exceeds the chemical-specific soil saturation screening level (Csat)
D = calculated criterion exceeds 100 percent, hence it is reducted to 100 percent or 1.0E+9 parts per billion (ppb)
DD = hazardous substance causes developmental effects
X = the GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source

Table 4
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Groundwater

Petro-Chem Processing Group Facility - Detroit, Michigan

Sample Identification	MDEQ TDL 10/2006	BSB-11	BSB-12	BSB-13	BSB-14	DUP-02	BSB-15	BSB-16	BSB-17	BSB-18	DUP-04	BSB-19	BSB-20	BSB-21	MDEQ Nonresidential Cleanup Criteria**		
(screen depth - feet)		(7-11)	(12-16)	(7-11)	(7-11)		(7-11)	(7-11)	(7-11)	(7-11)		(7-11)	(7-11)	(7-11)			
Collection Date		8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/22/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/23/2013	8/26/2013	8/26/2013	8/26/2013			
Analysis Date		8/30/2013	8/28/2013 8/31/2013	8/30/2013 8/31/2013	8/30/2013	8/30/2013	8/30/2013	8/30/2013	8/28/2013 8/30/2013	8/29/2013 8/30/2013	8/30/2013	8/30/2013 8/31/2013	8/30/2013 8/31/2013	8/30/2013 8/31/2013	Drinking Water	Groundwater Surface Water Interface	Volatilization to Indoor Air
Collection Method		Screen Point 16															
VOCs																	
Acetone	20	<20	**48,000 J,V+**	**160,000**	<20	<20	<50	<20	<200	<1,000	<50	<20	<26	<20	2,100	1,700	1,000,000,000 D,S
Benzene	1.0	<1.0	**130**	<1,000	<1.0	<1.0	**19**	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	5.0 A	200 X	35,000
Bromochloromethane	1.0	<1.0	19	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	NA	NA	NA
tert-Butyl alcohol	50	<50	<10,000	<5,000	<50	<50	750	580	<100	3,600	690	<50	180 J,*	87 J,*	11,000	NA	1,000,000,000 D,S
2-Butanone (MEK)	5.0	<5.0	**18,000**	**32,000**	<5.0	<5.0	<25	<5.0	<100	<500	<25	<5.0	9.5	<5.0	38,000	2,200	240,000,000 S
n-Butylbenzene	1.0	<1.0	1.1	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	230	ID	ID
sec-Butylbenzene	1.0	<1.0	<1.0	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	230	ID	ID
Chlorobenzene	1.0	<1.0	2.0	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	100 A	25	470,000 S
Chloroethane	5.0	<5.0	6.5	<2,000	<5.0	<5.0	<25	<5.0	<40	<500	<25	<5.0	<5.0	<5.0	1,700	1,100 X	5,700,000 S
Chloroform	1.0	<1.0	2.1	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	1.5	<1.0	80 A,W	350	180,000
1,2-Dichlorobenzene	1.0	<1.0	**55**	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	600 A	13	160,000 S
1,4-Dichlorobenzene	1.0	<1.0	<1.0	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	75 A	17	74,000 S
1,1-Dichloroethane	1.0	<1.0	<2,000	**1,300**	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	2,500	740	2,300,000
1,2-Dichloroethane	1.0	<1.0	**42**	<820	<1.0	<1.0	<5.0	<1.0	<16	<100	<5.0	<1.0	<1.0	<1.0	5.0 A	360 X	59,000
1,1-Dichloroethene	1.0	<1.0	4.0	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	7.0 A	130	1,300
cis-1,2-Dichloroethene	1.0	<1.0	<2,000	**1,800**	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	70 A	620	210,000
trans-1,2-Dichloroethene	1.0	<1.0	43	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	100 A	1,500 X	200,000
Diethyl ether	5.0	<5.0	**61**	<1,000	<5.0	<5.0	<10	**47**	<20	<200	<10	<5.0	<5.0	<5.0	10 E	ID	61,000,000 S
Diisopropyl ether	5.0	<5.0	45	<1,000	<5.0	<5.0	5.9	**160**	<20	**180**	11	<5.0	<5.0	<5.0	86	ID	8,000 S
Ethylbenzene	1.0	<1.0	<2,000	**20,000**	3.1	3.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	74 E	18	170,000 S
2-Hexanone	5.0	<5.0	14	<2,000	<5.0	<5.0	<25	<5.0	<40	<500	<25	<5.0	<5.0	<5.0	2,900	ID	8,700,000
Isopropylbenzene	1.0	<1.0	24	<850	<1.0	<1.0	<5.0	<1.0	<17	<100	<5.0	<1.0	<1.0	<1.0	2,300	28	56,000 S
4-Isopropyltoluene	1.0	<1.0	<1.0	<630	<1.0	<1.0	<5.0	<1.0	<13	<100	<5.0	<1.0	<1.0	<1.0	NA	NA	NA
2-Methylnaphthalene	5.0	<5.0	<5.0	<3,900	<5.0	<5.0	<20	<5.0	<80	<390	<20	<5.0	<5.0	<5.0	750	19	25,000 S
4-Methyl-2-Pentanone (MIBK)	5.0	<5.0	**84,000 J,V+**	**180,000**	6.2	<5.0	<25	<5.0	<21	<500	<25	<5.0	<5.0	<5.0	5,200	ID	20,000,000 S
Methyl *tert*-butyl ether (MtBE)	1.0	3.1	**14,000**	**27,000 J, V-**	**220 E**	**210**	**740**	28	<40 J,V-	**9,900**	**710**	3.8	13	16	40 E	7,100 X	47,000,000 S
Naphthalene	5.0	<5.0	6.3	<1,000	<5.0	<5.0	<25	<5.0	<20	<500	<25	<5.0	<5.0	<5.0	1,500	11	31,000 S
n-Propylbenzene	1.0	<1.0	29	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	230	ID	ID
Styrene	1.0	<1.0	1.1	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	100 A	80 X	310,000 S
tert-Amylmethyl ether	5.0	<5.0	120	<1,000 J, V-	<5.0	<5.0	<5.0	<5.0	<5.0	<100	<5.0	<5.0	<5.0	<5.0	190 E	NA	570,000
Tetrachloroethene	1.0	<1.0	**36**	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	5.0 A	60 X	170,000
Tetrahydrofuran	5.0	<5.0	**43,000**	**85,000**	7.1	11	170	110	<100	**1,700**	<25	150	<5.0	<5.0	270	11,000 X	16,000,000
Toluene	1.0	<1.0	**24,000**	**99,000**	8.8	9.5	<5.0	2.2	<20	<100	<5.0	1.3	<1.0	<1.0	790 E	270	530,000 S
1,1,1-Trichloroethane	1.0	<1.0	9.6	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	200 A	89	1,300,000 S
Trichloroethene	1.0	<1.0	**29**	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	5.0 A	200 X	4,900
1,2,3-Trimethylbenzene	1.0	<1.0	37	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	NA	NA	NA
1,2,4-Trimethylbenzene	1.0	<1.0	**200**	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	63 E	17	56,000 S
1,3,5-Trimethylbenzene	1.0	<1.0	**62**	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	72 E	45	61,000 S
Vinyl Chloride	1.0	<1.0	**14**	<1,000	<1.0	<1.0	<5.0	<1.0	<20	<100	<5.0	<1.0	<1.0	<1.0	2.0 A	13 X	13,000
Xylenes	3.0	<3.0	**15,000**	**91,000**	14	14	**140**	<3.0	<40	<200	<10	<3.0	<3.0	<3.0	280 E	41	190,000 S
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary

All groundwater sample results in micrograms per Liter (µg/L) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
ND = not detected
E = The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated.
J = the concentration is an estimated value
V- = recovery in the associated continuing calibration verification sample (CCV) exceeds the lower control limit. Results may be biased low.
V+ = recovery in the associated continuing calibration verification sample (CCV) exceeds the upper control limit. Results may be biased high.
* = value reported is outside QA limits
< = limit of detection for sample
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
ID = insufficient data to develop criterion
A = Criterion is the state of Michigan drinking water standard established pursuant to Sceoin 5 of 1976 PA 399, MCL 325.1005
D = Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent of 1.0E+9 parts per billion (ppb)
E = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of NREPA, 1994 PA 451, as amended
S = Criterion defaults to the hazardous substance-specific water solubility limit
W = Concentrations of trihalomethanes in groundwaer shall be added together to determine compliance with the Michigan drinking water standard of 80 µg/L.
X = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source
NA = not available

Table 4 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Groundwater

Petro-Chem Processing Group Facility - Detroit, Michigan

Sample Identification	MDEQ TDL 10/2006	BSB-22	BSB-23	DUP-05	BSB-24	BSB-25	BSB-26	BSB-29	BSB-30	BSB-31	Dup-01	BSB-32	BSB-33	BSB-34	BSB-35	Dup-04	BSB-36	BSB-38	MDEQ Nonresidential Cleanup Criteria**		
(screen depth - feet)		(10-14)	(7-11)		(7-11)	(7-11)	(8-12)	(4-9)	(5-10)	(8-13)		(11-16)	(11-16)	(11-16)	(7-12)				Drinking Water	Groundwater Surface Water Interface	Volatilization to Indoor Air
Collection Date		8/26/2013	8/26/2013	8/26/2013	8/27/2013	8/27/2013	8/27/2013	4/17/2014	4/17/2014	4/17/2014	4/17/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014	9/18/2014	12/22/2014	12/22/2014			
Analysis Date		8/30/2013	8/30/2013 8/31/2013	8/30/2013	8/30/2013 8/31/2013	8/30/2013 8/31/2013	8/30/2013 8/31/2013	4/24/2014	4/24/2014	4/24/2014	4/24/2014	9/23/2014	9/23/2014	9/23/2014	9/23/2014	9/23/2014	12/24/2014	12/24/2014			
Collection Method		Screen Point 16										Temporary Monitoring Well									
VOCs																					
Acetone	20	<20	<20	<20	<20	<20	<20	<20	<20	<20	21	<20	<20	<20	<20	<20	<20	<20 J,*	2,100	1,700	1,000,000,000 D,S
Benzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**6.5**	5.0 A	200 X	35,000
Bromochloromethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
tert-Butyl alcohol	50	<50	100 J,*	91 J,*	<50	<50	<50	<50	<50	1,100	<50	<50	<50	<50	<50	<50	1,500	1,400	11,000	NA	1,000,000,000 D,S
2-Butanone	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,*	38,000	2,200	240,000,000 S
n-Butylbenzene	1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	230	ID	ID
Chlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100 A	25	470,000 S
Chloroethane	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	14	35	1,700	1,100 X	5,700,000 S
Chloroform	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	80 A,W	350	180,000
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	600 A	13	160,000 S
1,1-Dichloroethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2,500	740	2,300,000
1,2-Dichloroethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	360 X	59,000
1,1-Dichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.0 A	130	1,300
cis-1,2-Dichloroethene	1.0	<1.0	<1.0	<1.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70 A	620	210,000
trans-1,2-Dichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100 A	1,500 X	200,000
Diethyl ether	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	6.9	11	10 E	ID	61,000,000 S
Diisopropyl ether	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	**140**	**160**	86	ID	8,000 S
Ethylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	10	74 E	18	170,000 S
2-Hexanone	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,L+	<5.0 J,*	2,900	ID	8,700,000
Isopropylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2,300	28	56,000 S
4-Isopropyltoluene	1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
2-Methylnaphthalene	5.0	<5.0	<5.0	<5.0	7.4	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	750	19	25,000 S
4-Methyl-2-Pentanone	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5,200	ID	20,000,000 S
Methyl *tert*-butyl ether (MtBE)	1.0	5.0	**41**	16	<2.0	7.5	<2.0	<1.0	<1.0	**150**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**7,700**	**8,200**	40 E	7,100 X	47,000,000 S
Naphthalene	5.0	<5.0	<5.0	<5.0	6.9	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1,500	11	31,000 S
n-Propylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	230	ID	ID
Styrene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100 A	80 X	310,000 S
tert-Amylmethyl ether	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 J,V-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	7.3	8.6	190 E	NA	570,000
Tetrachloroethene	1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	2.5	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	60 X	170,000
Tetrahydrofuran	5.0	<5.0	<5.0	<5.0	<5.0	36	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	24	59	270	11,000 X	16,000,000
Toluene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	1.4	3.6	6.4	4.6	5.3	2.6	3.6	<1.0	5.2	790 E	270	530,000 S
1,1,1-Trichloroethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	200 A	89	1,300,000 S
Trichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	200 X	4,900
1,2,3-Trimethylbenzene	1.0	<1.0	<1.0	<1.0	14	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
1,2,4-Trimethylbenzene	1.0	<1.0	<1.0	<1.0	17	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.4	1.2	<1.0	<1.0	<1.0	<1.0	3.3	63 E	17	56,000 S
1,3,5-Trimethylbenzene	1.0	<1.0	<1.0	<1.0	4.9	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.2	72 E	45	61,000 S
Vinyl Chloride	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0 A	13 X	13,000
Xylenes	3.0	<3.0	<3.0	<3.0	4.6	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	8.3	4.7	4.9	<3.0	3.5	<3.0	**57**	280 E	41	190,000 S
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary

All groundwater sample results in micrograms per Liter (µg/L) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
ND = not detected
L+ = Recovery in the associated laboratory sample (LCS) exceeds the upper control limit. Results may be biased high.
J = the concentration is an estimated value
V- = recovery in the associated continuing calibration verification sample (CCV) exceeds the lower control limit. Results may be biased low.
* = value reported is outside QA limits
Yellow Shaded/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
ID = insufficient data to develop criterion
A = Criterion is the state of Michigan drinking water standard established pursuant to Sceoin 5 of 1976 PA 399, MCL 325.1005
D = Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent of 1.0E+9 parts per billion (ppb)
E = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of NREPA, 1994 PA 451, as amended
S = Criterion defaults to the hazardous substance-specific water solubility limit
W = Concentrations of trihalomelhanes in groundwaer shall be added together to determine compliance with the Michigan drinking water standard of 80 µg/L.
X = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source
NA = not available

Table 4 (continued)
Corrective Action Investigation
Laboratory Analytical Results for Volatile Organic Compounds in Groundwater

Petro-Chem Processing Group Facility - Detroit, Michigan

Sample Identification	MDEQ TDL 10/2006	TB-1	TB-02	TB-03	TB-04	Trip Blank	TB-9/18/14	FB-01	FB-02	FB-01	FB-9/18/14	RB-01	RB-02	RB-01	RB-9/18/14	Trip Blank	Rinsate	MDEQ Nonresidential Cleanup Criteria**		
Collection Date		8/22/2013	8/23/2013	8/26/2013	8/27/2013	4/18/2014	9/18/2014	8/22/2013	8/26/2013	4/17/2014	9/18/2014	8/23/2013	8/27/2013	4/17/2014	9/18/2014	12/22/2014	12/22/2014	Drinking Water	Groundwater Surface Water Interface	Volatilization to Indoor Air
Analysis Date		8/29/2013	8/29/2013	8/30/2013	8/30/2013	4/24/2014	9/29/2014	8/30/2013	8/30/2013	4/24/2014	9/29/2014	8/30/2013 8/31/2013	8/30/2013	4/24/2014	9/29/2014	12/26/2014	12/26/2014			
Collection Method		Grab																		
VOCs																				
Acetone	20	<28	<20	<20	<20	<20	<20	<20	<24	<20	<21	<20	<21	<20	<21	<20 J,L+	<21	2,100	1,700	1,000,000,000 D,S
Benzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	200 X	35,000
Bromochloromethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
Bromodichloromethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	80 A,W	ID	37,000
tert-Butyl alcohol	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	250 J,E	11,000	NA	1,000,000,000 D,S
2-Butanone	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 J,L+	<5.0 J,L+	38,000	2,200	240,000,000 S
n-Butylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	230	ID	ID
sec-Butylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	230	ID	ID
Chlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100 A	25	470,000 S
Chloroethane	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1,700	1,100 X	5,700,000 S
Chloroform	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	20	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	4.7	80 A,W	350	180,000
Dibromochloromethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	80 A,W	ID	110,000
1,2-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	600 A	13	160,000 S
1,4-Dichlorobenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	75 A	17	74,000 S
1,1-Dichloroethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2,500	740	2,300,000
1,2-Dichloroethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	360 X	59,000
1,1-Dichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7.0 A	130	1,300
cis-1,2-Dichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	70 A	620	210,000
trans-1,2-Dichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100 A	1,500 X	200,000
Diethyl ether	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	14	10 E	ID	61,000,000 S
Diisopropyl ether	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	86	ID	8,000 S
Ethylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	74 E	18	170,000 S
2-Hexanone	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0 J,L+	<5.0 J,L+	2,900	ID	8,700,000
Isopropylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2,300	28	56,000 S
4-Isopropyltoluene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
Methylene Chloride	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	210 J,E			
2-Methylnaphthalene	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	750	19	25,000 S
4-Methyl-2-Pentanone	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5,200	ID	20,000,000 S
Methyl *tert*-butyl ether (MtBE)	1.0	<2.0	<2.0	<2.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0	<1.0	<1.0	40 E	7,100 X	47,000,000 S
Naphthalene	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1,500	11	31,000 S
n-Propylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	230	ID	ID
Styrene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	100 A	80 X	310,000 S
tert-Amylmethyl ether	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	190 E	NA	570,000
Tetrachloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	60 X	170,000
Tetrahydrofuran	5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	270	11,000 X	16,000,000
Toluene	1.0	<1.5	<1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	790 E	270	530,000 S
1,1,1-Trichloroethane	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	200 A	89	1,300,000 S
Trichloroethene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	5.0 A	200 X	4,900
1,2,3-Trimethylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	NA	NA	NA
1,2,4-Trimethylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	63 E	17	56,000 S
1,3,5-Trimethylbenzene	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	72 E	45	61,000 S
Vinyl Chloride	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	2.0 A	13 X	13,000
Xylenes	3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	280 E	41	190,000 S
Other VOCs	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Vary	Vary	Vary

All groundwater sample results in micrograms per Liter (µg/L) or parts per billion (ppb)
MDEQ = Michigan Department of Environmental Quality
** = Part 201 Generic Cleanup Criteria and Screening Levels, dated December 30, 2013
TDL = Target Detection Limit
VOCs = volatile organic compounds
ND = not detected
< = limit of detection for sample
E = The analyte was detected at a concentration greater than the calibration range, therefore the result is estimated
J = The concentration is an estimated value
L+ = Recover in the associated laboratory sample (LCS) exceeds the upper control limit. Results may be biased high
Yellow Shadad/Bold typeface indicates that concentration exceeds MDEQ Generic Nonresidential Cleanup Criteria
Gray Shaded indicates that concentrations exceed this MDEQ Generic Nonresidential Cleanup Criteria

Criteria Footnotes
ID = insufficient data to develop criterion
A = Criterion is the state of Michigan drinking water standard established pursuant to Sceoin 5 of 1976 PA 399, MCL 325.1005
D = Calculated criterion exceeds 100 percent, hence it is reduced to 100 percent of 1.0E+9 parts per billion (ppb)
E = Criterion is the aesthetic drinking water value, as required by Section 20120a(5) of NREPA, 1994 PA 451, as amended
S = Criterion defaults to the hazardous substance-specific water solubility limit
W = Concentrations of trihalomethanes in groundweer shall be added together to determine compliance with the Michigan drinking water standard of 80 µg/L.
X = The GSI criterion shown in the generic cleanup criteria tables is not protective for surface water that is used as a drinking water source
NA = not availabla

Table 5
Corrective Action Investigation
MtBE Concentration Trends in Groundwater

Petro-Chem Processing Group Facility - Detroit, Michigan

Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
	Concentration (µg/L)									
6/10/2009	20	2	NS	150	20	3,100	<1	5.4	1,100	6.3
7/23/2009	NS	NS	NS	NS	NS	NS	NS	NS	1,500	NS
12/9/2009	37	6.3	NS	140	10	3,300	<1	5.8	2,100	7.8
6/30/2010	12	2.5	NS	170	8.5	3,700	1.1	6.2	3,000	12
7/30/2010	NS	NS	NS	NS	NS	NS	NS	NS	1,300	11
12/29/2010	19	3.7	1.6	140	8.3	3,100	<1.0	5.2	1,800	NS
2/16/2011	NS	NS	NS	NS	NS	3,000	NS	9.67	1,180	NS
6/22/2011	9.4	1.43	<1	102	7.73	2,080	1.11	6.17	852	7.45
8/10/2011	NS	NS	NS	NS	NS	2,460	NS	NS	922	NS
12/21/2011	13.9	1.15	<1	120	13	2,130	<1.0	6.21	1,060	8.12
3/9/2012	17.9	NS	NS	NS	15.2	798	NS	10.6	680	NS
6/7/2012	28.7	1.42	9.72	103	10	1,670	<1	11.2	1,030	<1
8/10/2012	27.5	<1.5	NS	NS	NS	1,900	NS	9.4	NS	NS
11/8/2012	32	<1.5	NS	140	11	2,500	<1	4.3	1,100	6.9
1/30/2013	12.5	NS	NS	NS	6.6	NS	NS	2.9	NS	NS
5/30/2013	26	<2.1	NS	130	7.7	1,400	<2.0	<3.0	700	4.5
11/27/2013	29	1.5	7.9	110	8.1	1,400	1.4	2.5	820	4.5
6/20/2014	4.7	1.3	5.4	89	6.3	1,100	<1.0	2.8	500	4.0
11/20/2014	27	<1.4	NS	110	7.4	1,300	<1.0	<3.7	760	5.1

MDEQ Generic Nonresidential Cleanup Criteria for Groundwater (µg/L)

Nonresidential Drinking Water	40
Groundwater Surface Water Interface	7,100
Non-Residential Volatilization to Indoor Air	47,000,000

Shaded concentration exceeds MDEQ Generic Nonresidential Drinking Water Cleanup Critera for Groundwater (dated December 30, 2013)

Table 6
Corrective Action Investigation
PCE Concentration Trends in Groundwater

Petro-Chem Processing Group Facility - Detroit, Michigan

Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
	Concentrations (µg/L)									
6/10/2009	NS	NS	NS	NS	NS	NS	NS	<1	NS	<1
7/23/2009	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/9/2009	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1
6/30/2010	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
7/30/2010	NS	NS	NS	NS	NS	NS	NS	<1	<1	NS
12/29/2010	<1	<1	1.18	<1	<1	<1	<1	<1	<1	<1
2/16/2011	NS	NS	NS	NS	NS	<1	NS	<1	<1	NS
6/22/2011	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8/10/2011	NS	NS	NS	NS	NS	<1	NS	<1	<1	NS
12/21/2011	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
3/9/2012	<1	NS	NS	NS	<1	<1	NS	<1	<1	NS
6/7/2012	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
8/10/2012	<1	<1	<1	NS	NS	<1	NS	<1	<1	NS
11/8/2012	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1
1/30/2013	<1	NS	NS	NS	<1	NS	NS	<1	NS	NS
5/30/2013	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1
11/27/2013	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
6/20/2014	<1	110	1.2	<1	<1	<1	<1	<1	<1	<1
11/20/2014	<1	<1	NS	<1	<1	<1	<1	<1	<1	<1

NS = Not Sampled

MDEQ Nonresidential Cleanup Criteria for Groundwater (µg/L)

Nonresidential Drinking Water	5
Groundwater Surface Water Interface	60
Non-Residential Volatilization to Indoor Air	170,000

Shaded concentration exceeds one or more MDEQ Generic Nonresidential Cleanup Critera for Groundwater (Dated December 30, 2013)

Table 7
Corrective Action Investigation
Xylenes Concentration Trends in Groundwater

Petro-Chem Processing Group Facility - Detroit, Michigan

Date	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6	MW-7	MW-8	MW-9	MW-10
	Concentration (µg/L)									
6/10/2009	<3	1.2	NS	<3	<3	<3	<3	<3	<3	<3
7/23/2009	NS	NS	NS	NS	<3	NS	NS	NS	<3	NS
12/9/2009	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
6/30/2010	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
7/30/2010	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/29/2010	<3	1.17	<3	<3	<3	<3	<3	<3	<3	<3
2/16/2011	NS	NS	NS	NS	NS	<3	NS	<3	NS	NS
6/22/2011	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
8/10/2011	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
12/21/2011	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
3/9/2012	NS	NS	NS	NS	<3	<3	NS	<3	<3	NS
6/7/2012	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
8/10/2012	<3	<3	<3	NS	NS	<3	NS	NS	NS	NS
11/8/2012	<3	<3	NS	<3	<3	<3	<3	<3	<3	<3
1/30/2013	NS	NS	NS	NS	NS	NS	NS	<3	NS	NS
5/30/2013	<3	<3	NS	<3	<3	<3	<3	<3	<3	<3
11/27/2013	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
6/20/2014	<3	<3	<3	<3	<3	<3	<3	<3	<3	<3
11/20/2014	<3	<3	NS	<3	<3	<3	<3	<3	<3	<3

NS = Not Sampled

MDEQ Nonresidential Cleanup Criteria for Groundwater (µg/L)

Nonresidential Drinking Water	280
Groundwater Surface Water Interface	41
Non-Residential Volatilization to Indoor Air	190,000

FIGURES

QUADRANGLE LOCATION

Scale 1:24000

0 1/2 1 MILE

1000 0 1000 2000 3000 FEET

(SOURCE OF MAP IS USGS 7.5 MINUTE QUADRANGLE MAP, BELLE ISLE(1980), MICHIGAN)

CHECK BY	KLW
DRAWN BY	JL
DATE	January 7, 2014
SCALE	AS SHOWN
CAD NO.	109200.02_A
PRJ NO.	11013-000191.00

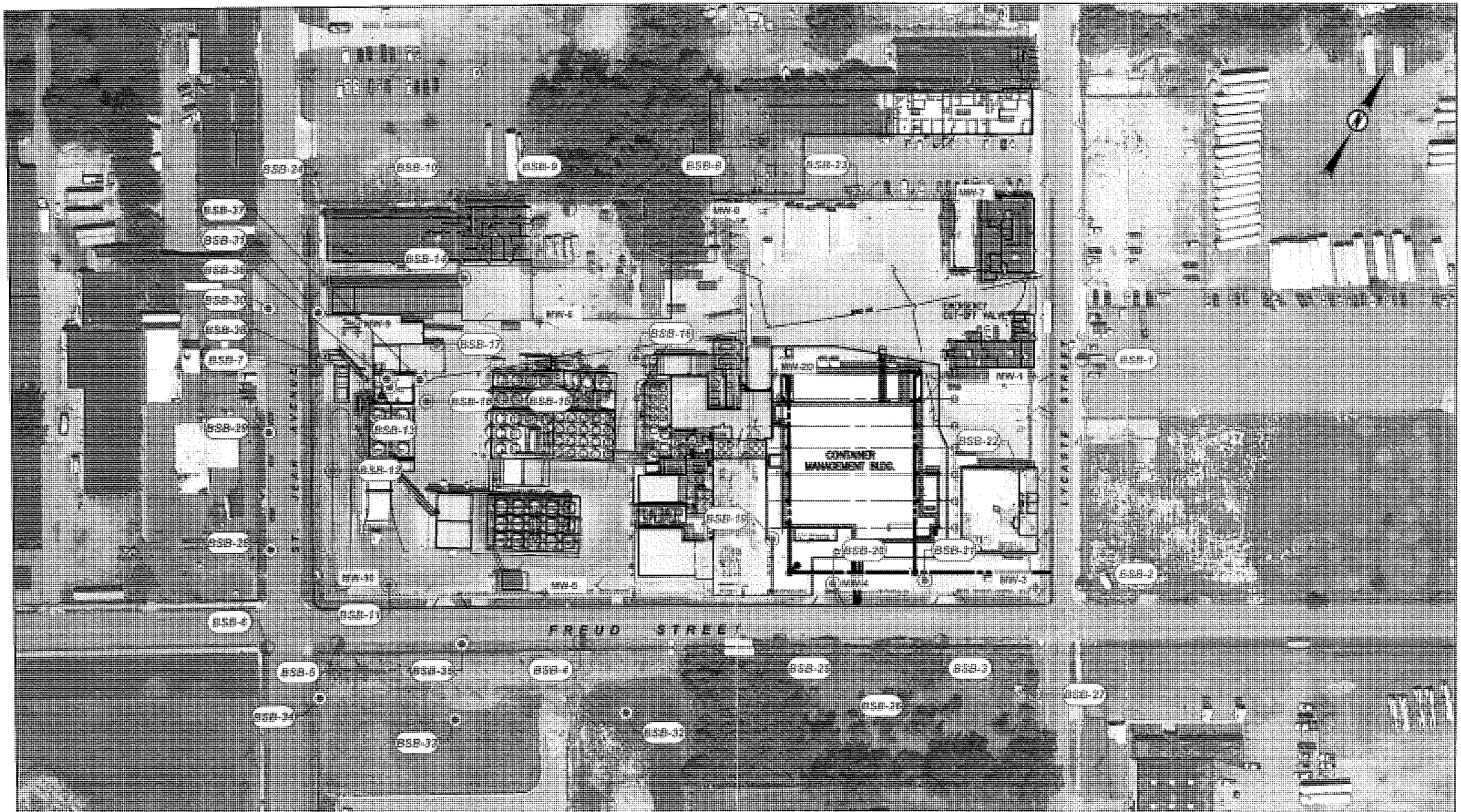
SITE LOCATION MAP

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

BUREAU VERITAS

FIGURE

1



LEGEND

- MW-4 — MONITORING WELL
- B-SB-4 — 2014 SOIL BORING
- B-SB-4 — 2013 SOIL BORING
- B-SB-4 — 2010 SOIL BORING

SCALE IN FEET

0 50 100 200

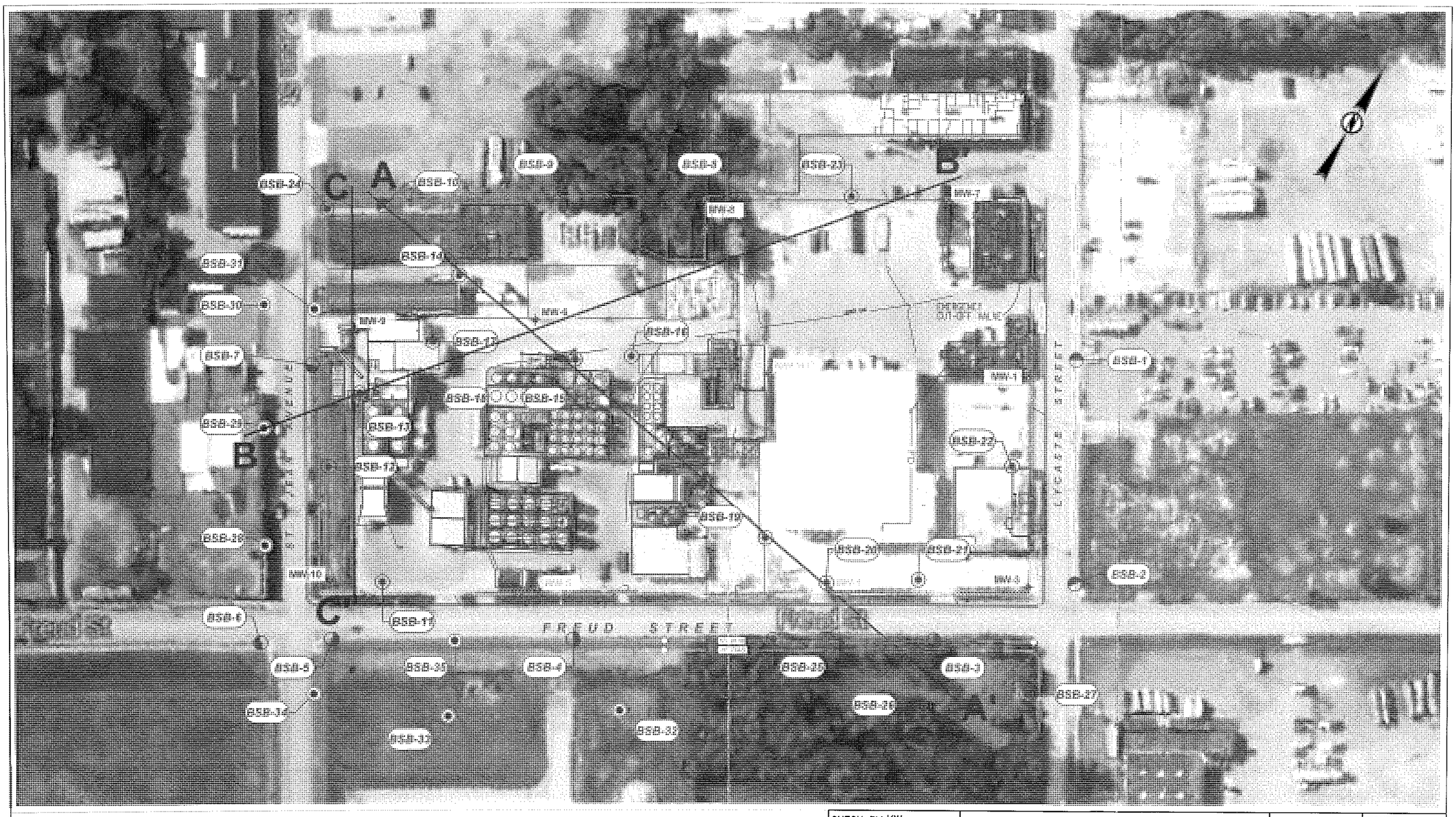
CHECK BY	KW
DRAWN BY	JL
DATE	1/13/2015
SCALE	AS SHOWN
CAD NO.	191.003.002b
PRJ NO.	11013-000191.00

BORING LOCATIONS

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

FIGURE

2



LEGEND

- MW-# MONITORING WELL
- BSB-# 2014 SOIL BORING
- BSB-# 2013 SOIL BORING
- BSB-# 2010 SOIL BORING

SCALE IN FEET

0 50 100 200

CHECK BY	KW
DRAWN BY	JL
DATE	10/15/2014
SCALE	AS SHOWN
CAD NO.	191.00.002b
PRJ NO.	11013-000191.00

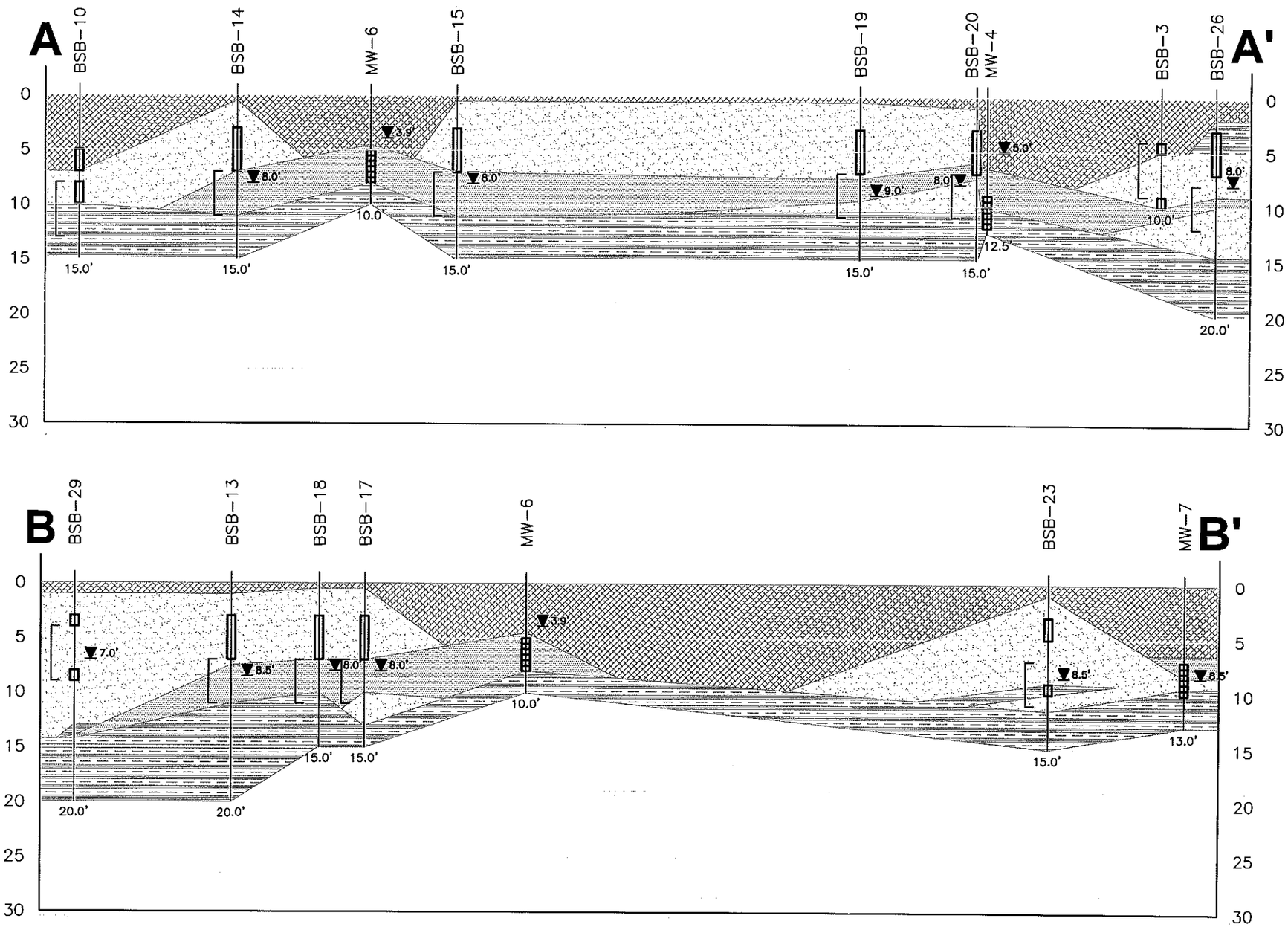
CROSS SECTION LOCATIONS

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

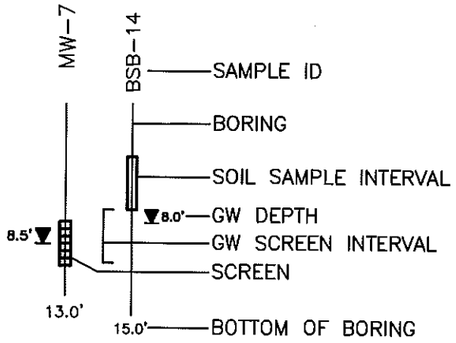
BUREAU VERITAS

FIGURE

3



LEGEND



FILL

PEAT

SAND

CLAY

1 inch = 10 ft.

1 inch = 80 ft.

CHECK BY	KW
DRAWN BY	JLB
DATE	11/18/2014
SCALE	AS SHOWN
CAD NO.	191.00.002b
PRJ NO.	11013-000191.00

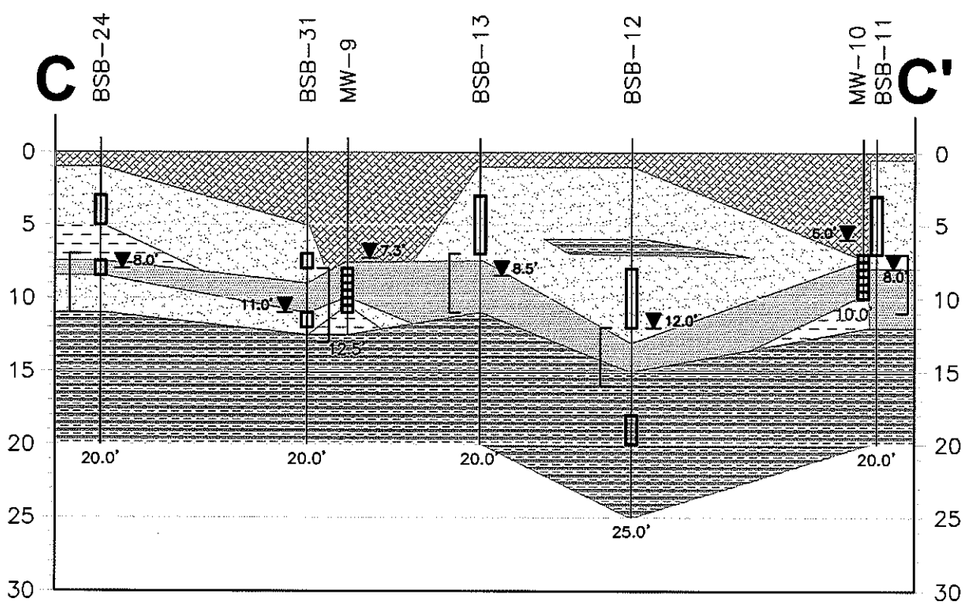
CROSS SECTIONS A-A' & B-B'

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

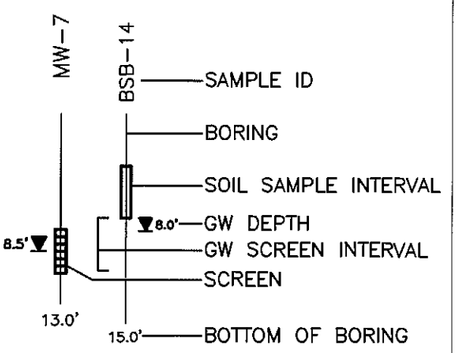
BUREAU VERITAS

FIGURE

4



LEGEND



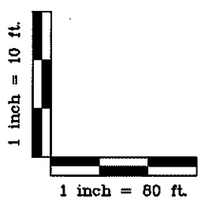
FILL

SILT

PEAT

SAND

CLAY



CHECK BY	KW
DRAWN BY	JLB
DATE	11/18/2014
SCALE	AS SHOWN
CAD NO.	191.00.002b
PRJ NO.	11013-000191.00

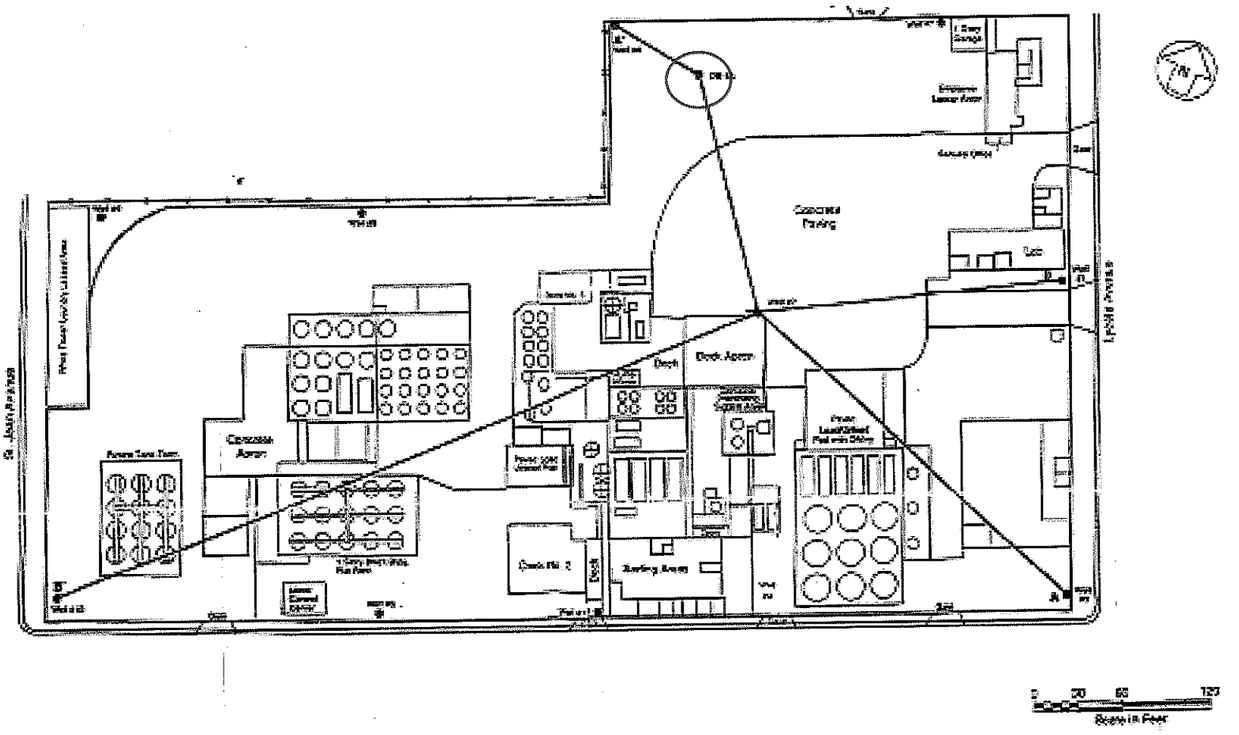
CROSS SECTIONS C-C'

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

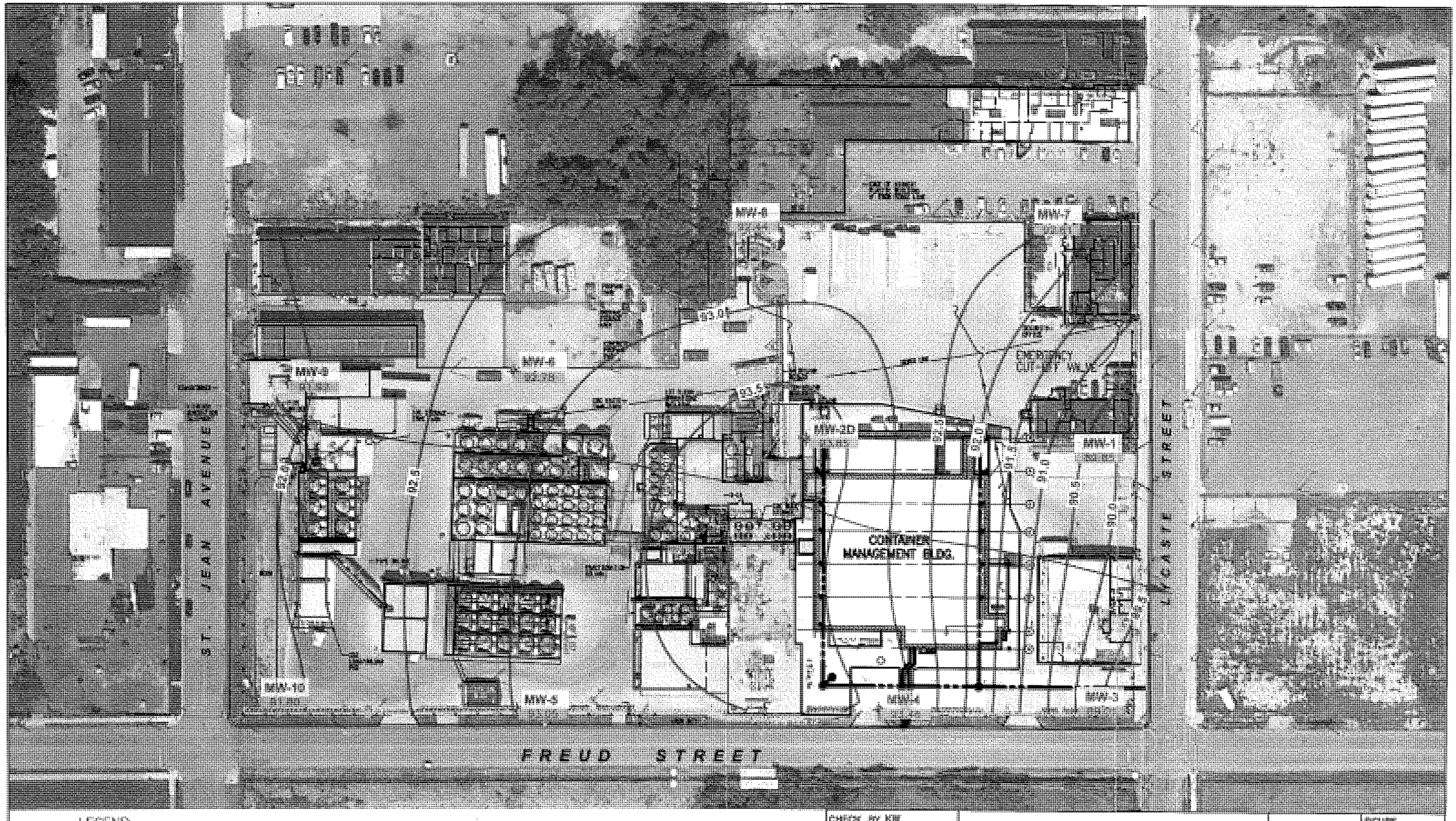
BUREAU VERITAS

FIGURE

5



SCALE AS SHOWN	LOCATION OF DB-1A (from WW Engineering and Science Report, 1991) 421 LYCASTE STREET DETROIT, MICHIGAN	FIGURE 6
DATE JANUARY 2015		
PRJ NO. 11013-000191.00		



LEGEND

—89.0— GROUNDWATER CONTOUR

GROUNDWATER ELEVATION (FT.)

GROUNDWATER FLOW

SCALE IN FEET

0 40 80 160

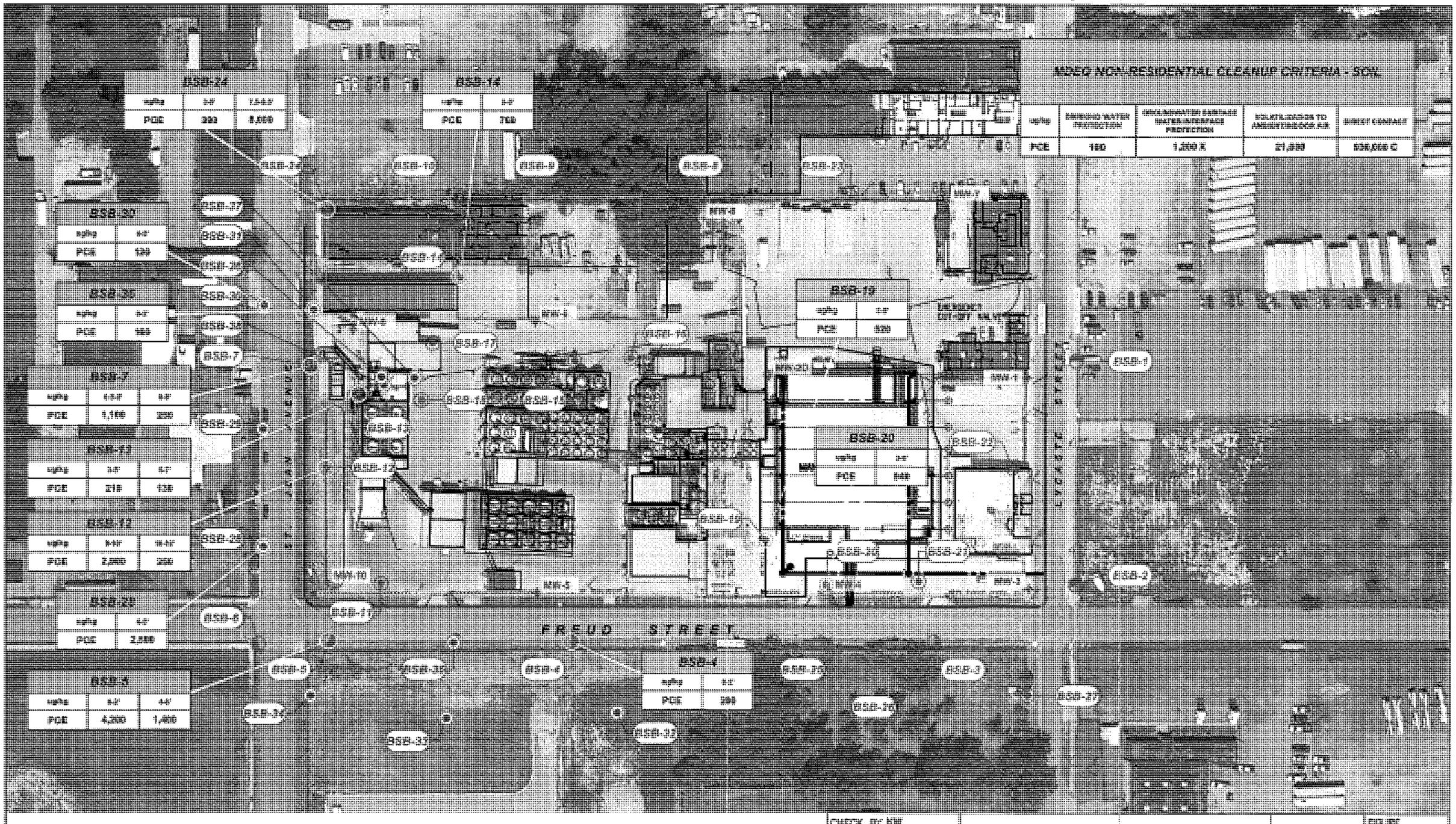
CHECK BY KW	
DRAWN BY JL	
DATE	8/8/2014
SCALE	AS SHOWN
CAD NO.087.00_GW_6-14	
PRJ NO.110144-000087.00	

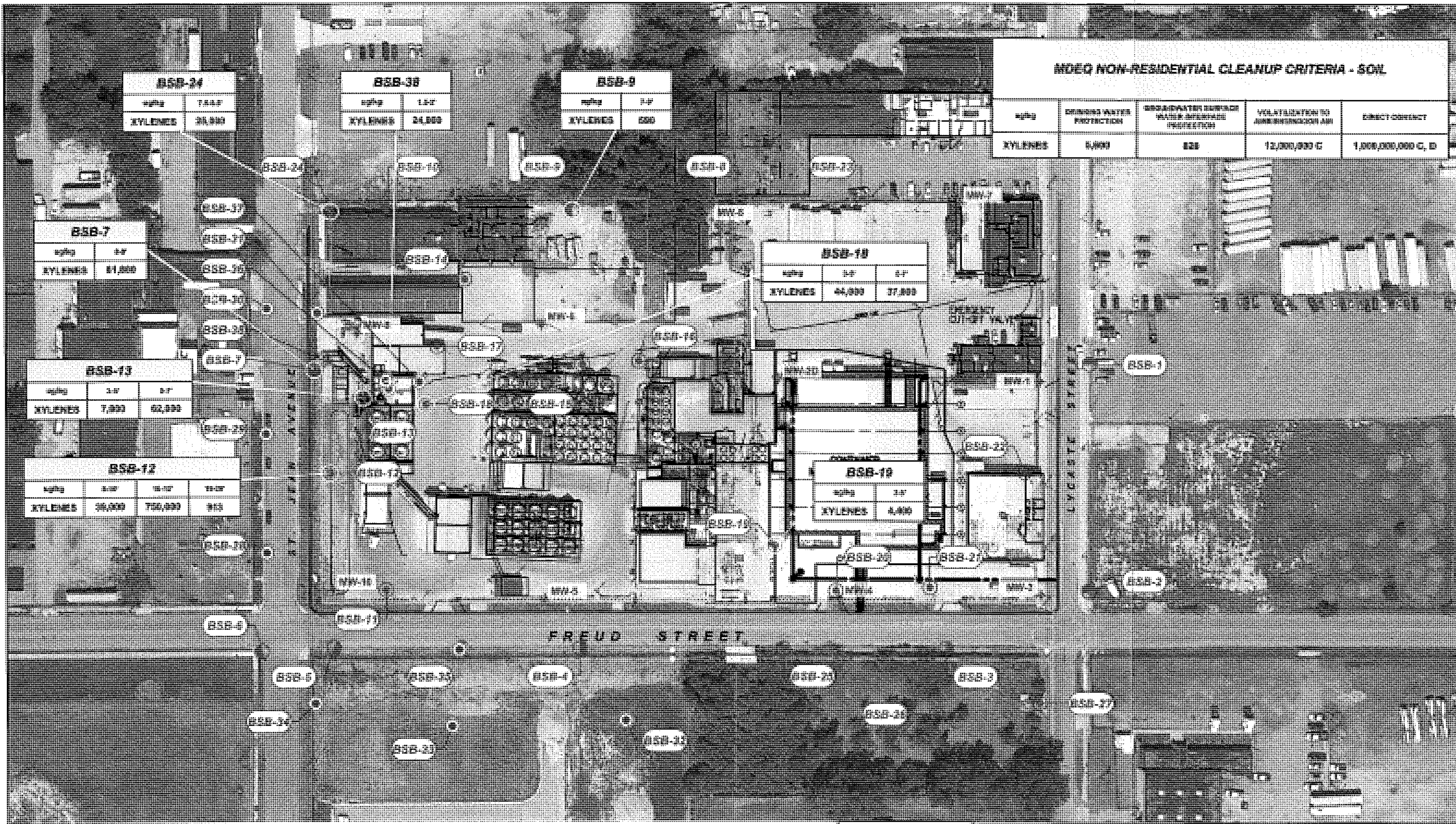
GROUNDWATER ELEVATION CONTOURS
JUNE 19, 2014

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

FIGURE

7


MDEQ NON-RESIDENTIAL CLEANUP CRITERIA - SOIL
FRSUD STREET
BSB-24
BSB-14
BSB-30
BSB-35
BSB-7
BSB-17
BSB-12
BSB-20
BSB-5
BSB-4
BSB-19
BSB-1
BSB-2
BSB-3
MW-1
MW-2
MW-3
MW-4
MW-5
MW-6
MW-7
MW-8
MW-9
MW-10
LEGEND
MONITORING WELL
2014 SOIL BORING
2013 SOIL BORING
2010 SOIL BORING
SCALE IN FEET
0
50
100
200
CHECK BY KW
DRAWN BY JL
DATE 2/10/2015
SCALE AS SHOWN
CAD NO. 181.06.pce
PRJ NO. (1043-00181.06)
PCE IN SOIL EXCEEDING
NON-RESIDENTIAL CLEANUP CRITERIA
PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN
FIGURE
8



CHECK BY KW
DRAWN BY JL
DATE 2/10/2015
SCALE AS SHOWN
CAD NO. 1H1.00.xyle
PRJ NO. 11013-000191.00

XYLENES IN SOIL EXCEEDING
NON-RESIDENTIAL CLEANUP CRITERIA

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

FIGURE
9

MDEQ NON-RESIDENTIAL CLEANUP CRITERIA GROUNDWATER

ug/L	DRINKING WATER	GROUNDWATER SURFACE WATER INTERFACE	VOLATILIZATION TO INDOOR AIR
MTBE	40 B	7,199 X	47,999,999 S

BSB-11	
ug/L	
MTBE	150

BSB-12	
ug/L	
MTBE	14,000

BSB-13	
ug/L	
MTBE	37,000

BSB-14	
ug/L	
MTBE	220

BSB-15	
ug/L	
MTBE	7,200

BSB-16	
ug/L	
MTBE	740

BSB-17	
ug/L	
MTBE	41

BSB-18	
ug/L	
MTBE	1,000

BSB-19	
ug/L	
MTBE	8,900

BSB-20	
ug/L	
MTBE	7,200

BSB-21	
ug/L	
MTBE	110

BSB-22	
ug/L	
MTBE	66

MW-1	
ug/L	
MTBE	760

MW-2	
ug/L	
MTBE	760

MW-4	
ug/L	
MTBE	110

FREUD STREET

CONTAINER MANAGEMENT BLDG.

LEGEND

- MW-# MONITORING WELL
- (BSB-#) 2013 SOIL BORING
- (BSB-#) 2014 SOIL BORING
- (BSB-#) 2010 SOIL BORING

SCALE IN FEET

0 50 100 200

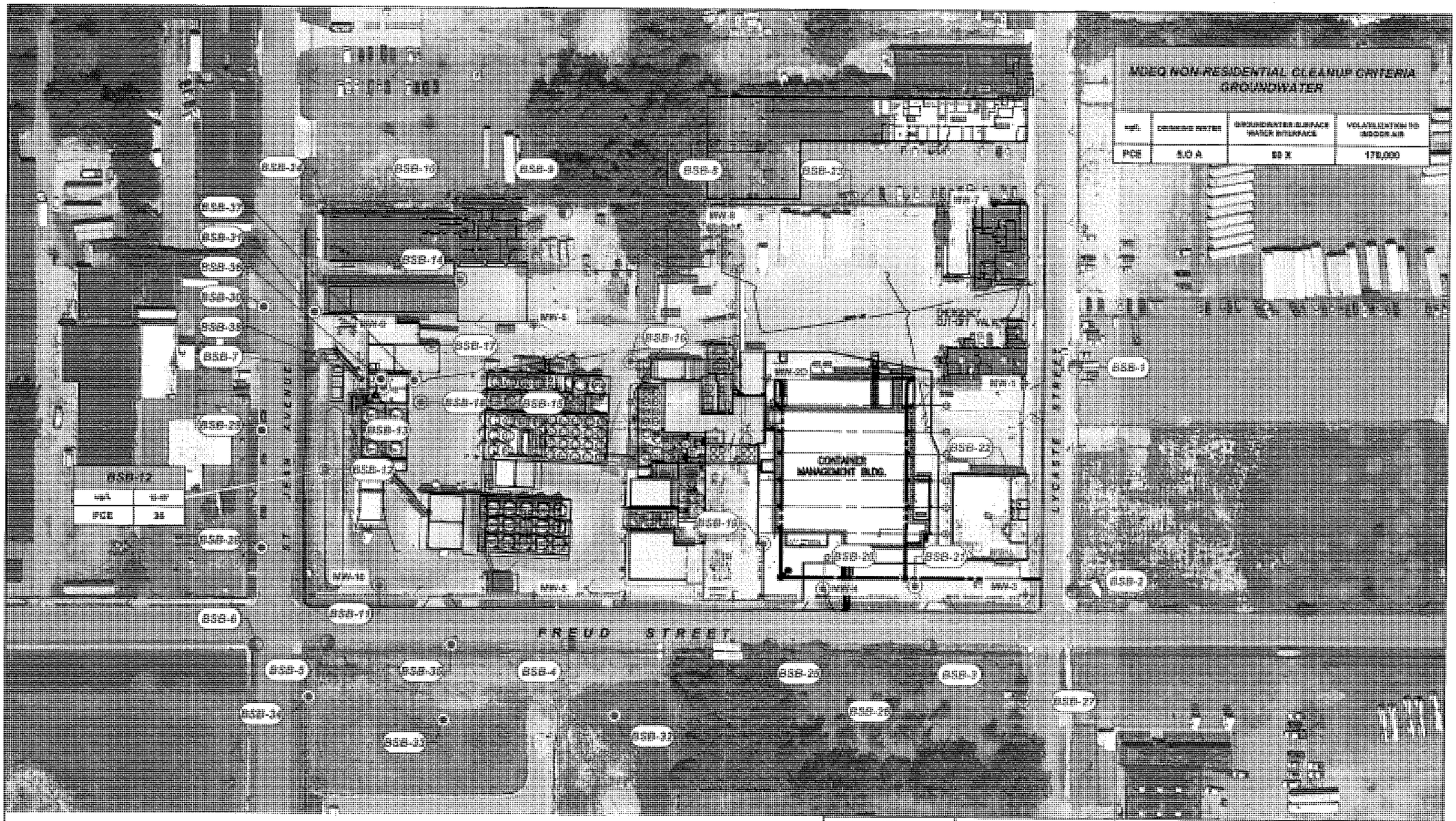
CHECK BY KW	
DRAWN BY JL	
DATE	3/10/2015
SCALE	AS SHOWN
CAD NO.	191.05.mxbx
PRJ NO.	11013-000191.00

MTBE IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEANUP CRITERIA

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

FIGURE

10


MDEQ NON-RESIDENTIAL CLEANUP CRITERIA GROUNDWATER
COMBINED WATER
GROUNDWATER SURFACE WATER INTERFACE
VOLATILIZATION TO INDOOR AIR
PCE
5.0 A
88 X
176,000
BSB-12
PCE
35
FREUD STREET
CONTAINER MANAGEMENT BLDG.
LEGEND
MONITORING WELL
2014 SOIL BORING
2013 SOIL BORING
2010 SOIL BORING
SCALE IN FEET
0
50
100
200
CHECK BY RW
DRAWN BY JL
DATE 2/10/2015
SCALE AS SHOWN
CAD NO. 191.02.pmf
PRJ NO.[1]013-0201191.00
PCE IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEANUP CRITERIA
PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN
FIGURE
11

MDEQ NON-RESIDENTIAL CLEANUP CRITERIA GROUNDWATER			
[illegible]	[illegible]	[illegible]	[illegible]
XYLENES	280 S	41	500,000 S

BSB-38	
[illegible]	
XYLENES	67

BSB-13	
[illegible]	[illegible]
XYLENES	97,000

BSB-12	
[illegible]	[illegible]
XYLENES	15,000

BSB-15	
[illegible]	[illegible]
XYLENES	148

FREUD STREET

LEGEND

- MW-# MONITORING WELL
- (BSB-#) 2014 SOIL BORING
- (BSB-#) 2013 SOIL BORING
- (BSB-#) 2010 SOIL BORING

SCALE IN FEET

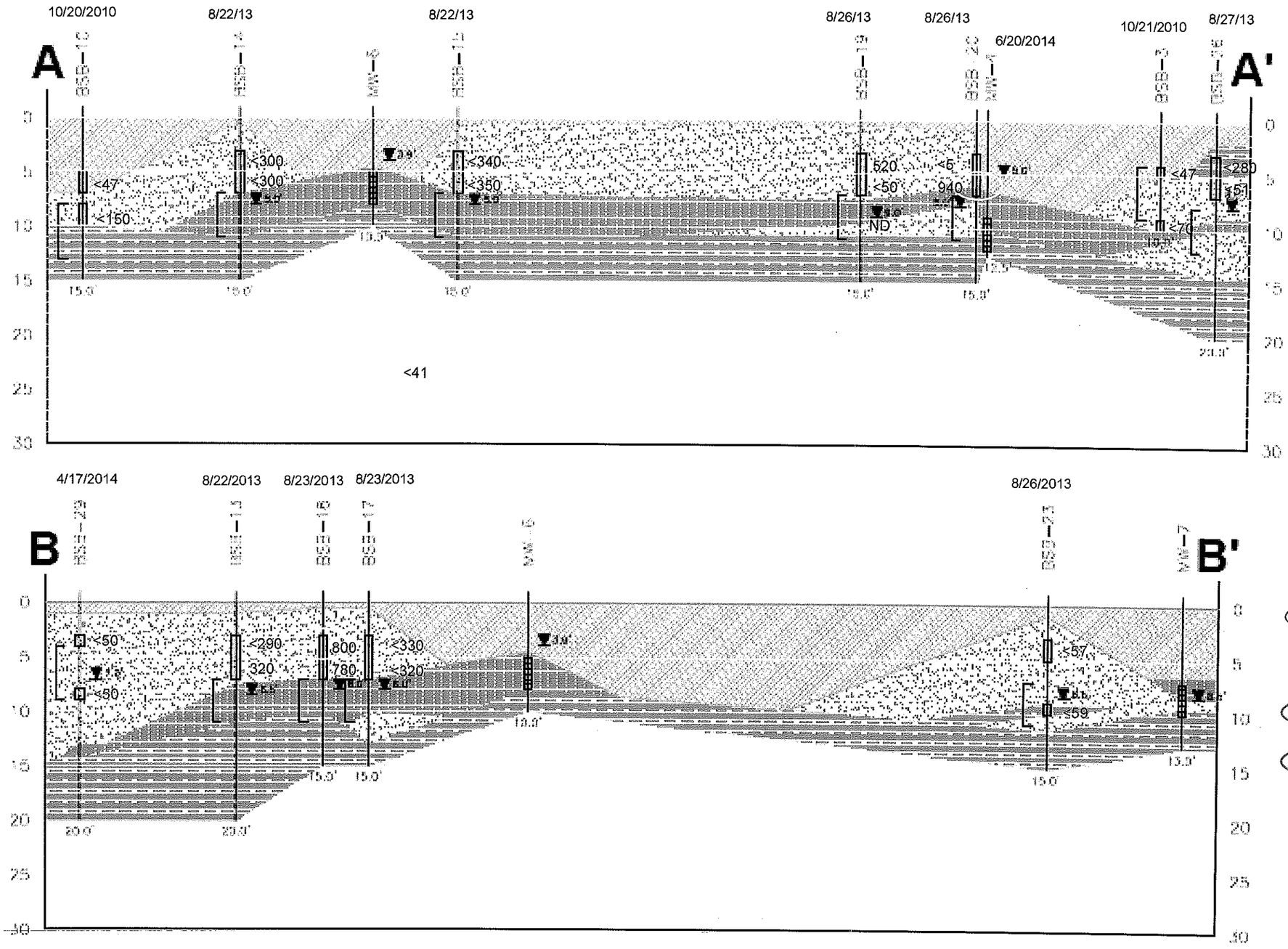
0 50 100 200

CHECK BY KW	
DRAWN BY JL	
DATE	2/10/2015
SCALE	AS SHOWN
CAD NO.	181.02.dgn
PM NO.	11013-000181.00

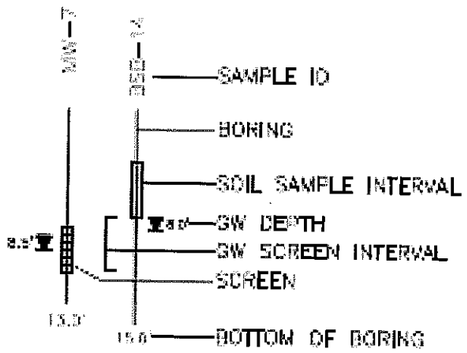
XYLENES IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEANUP CRITERIA

PETRO-CHEM PROCESSING GROUP
431 LYCASTE STREET
DETROIT, MICHIGAN

FIGURE 12



LEGEND



FILL

PEAT

SAND

CLAY

Iso-concentration (µg/kg) in hundreds of thousands

Iso-concentration 800 µg/kg
Drinking Water Protection clean-up criteria

Iso-concentration 140,000 µg/kg
GSI Protection clean-up criteria

Iso-concentration 18,000,000 µg/kg
Volatilization to Air Protection clean-up criteria

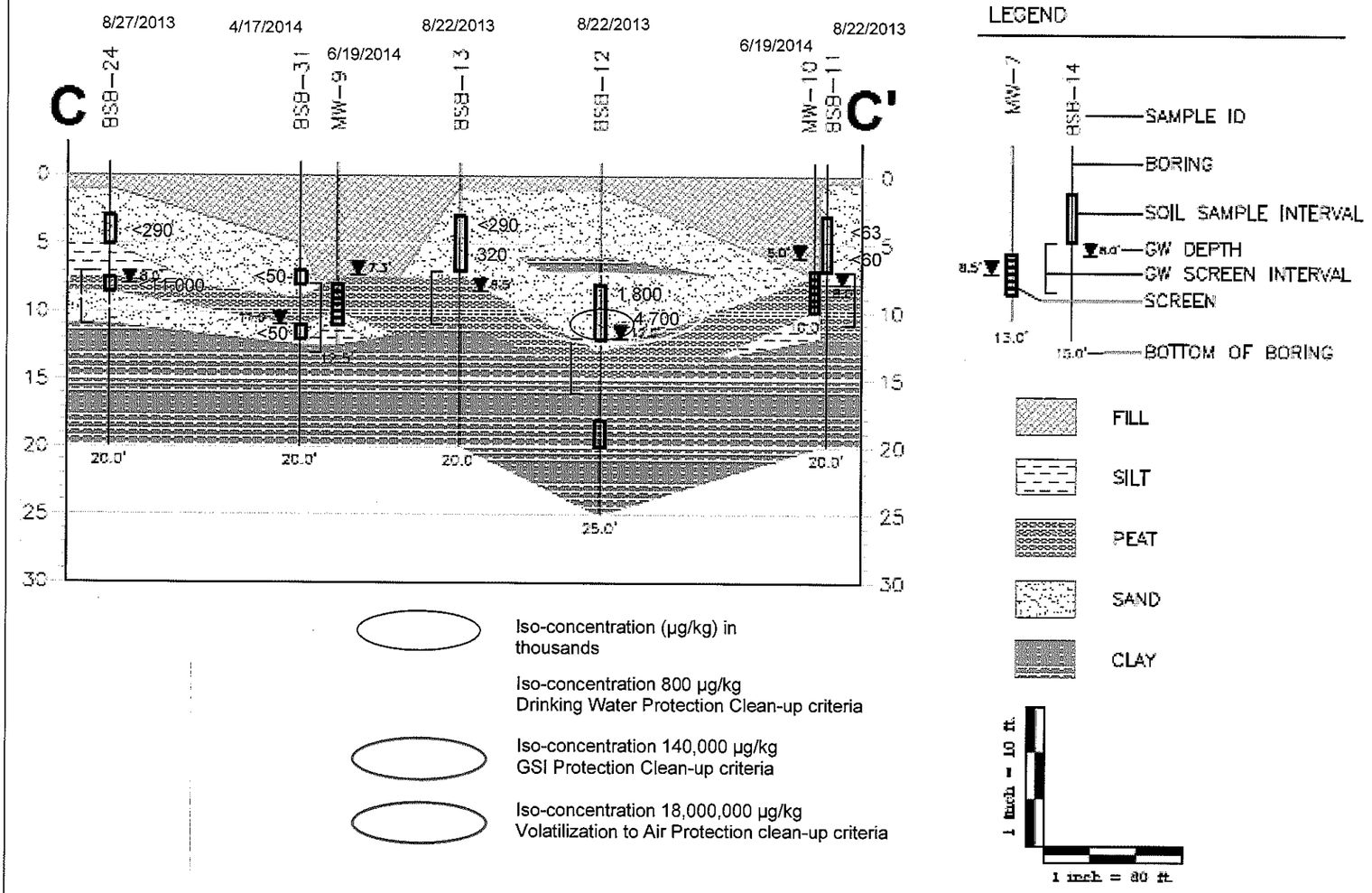
SCALE	AS SHOWN
DATE	JANUARY 2015
PRJ NO.	11013-000191.00

MTBE CONCENTRATIONS IN SOILS EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION

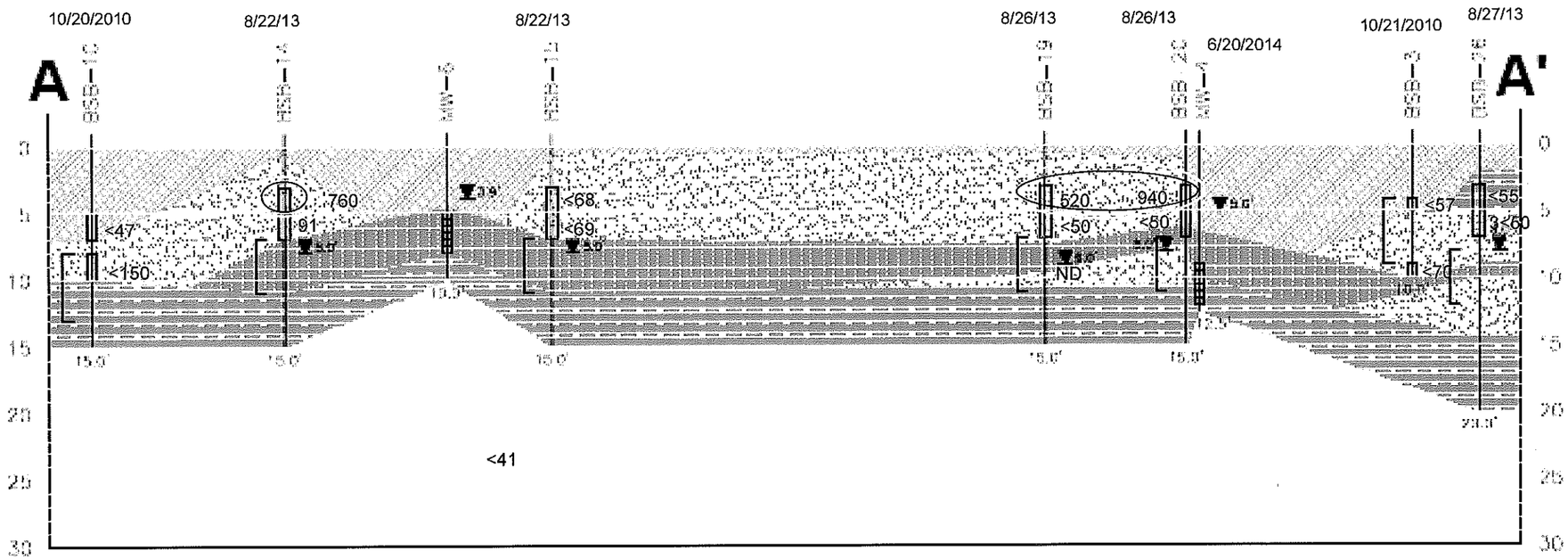
PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

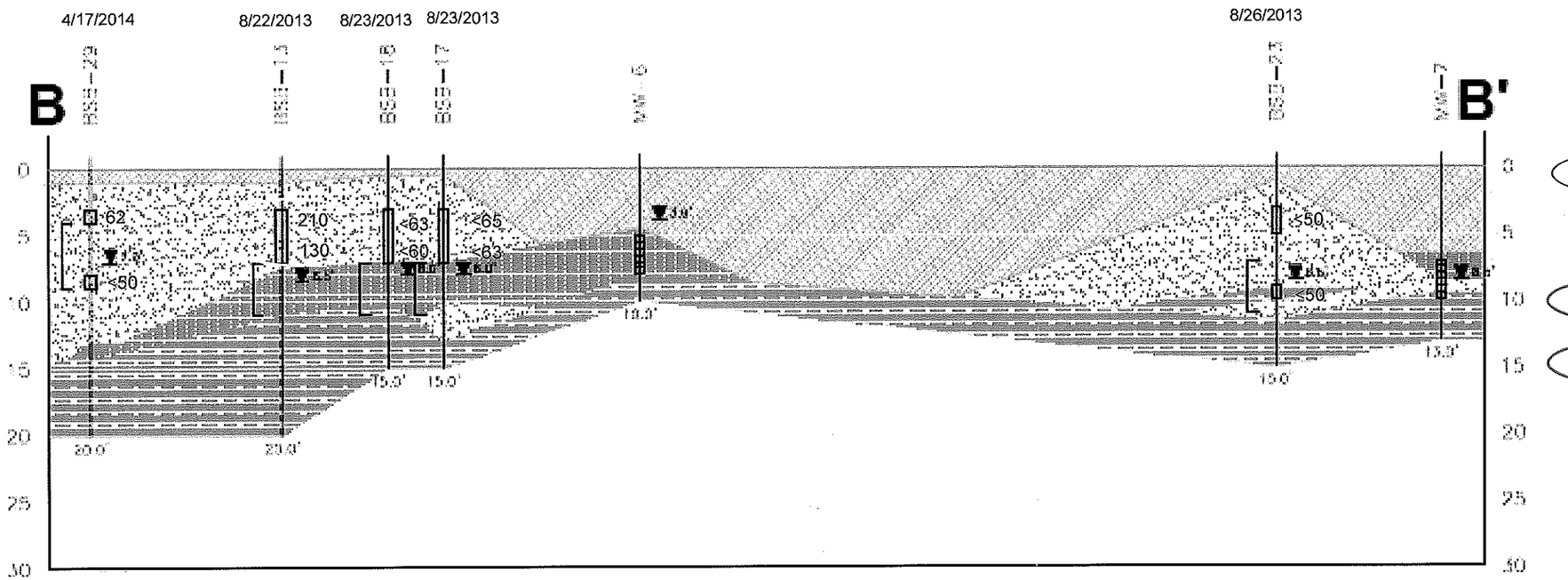
BUREAU VERITAS

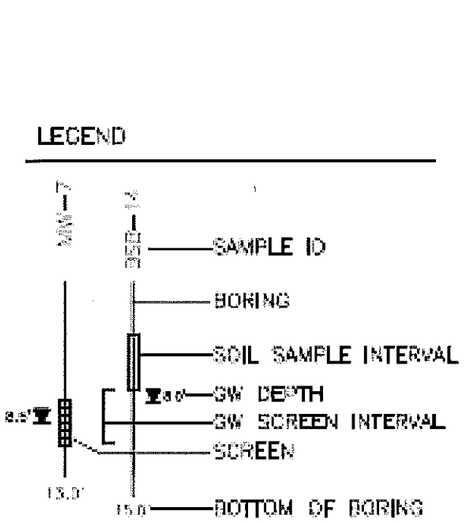
FIGURE
13



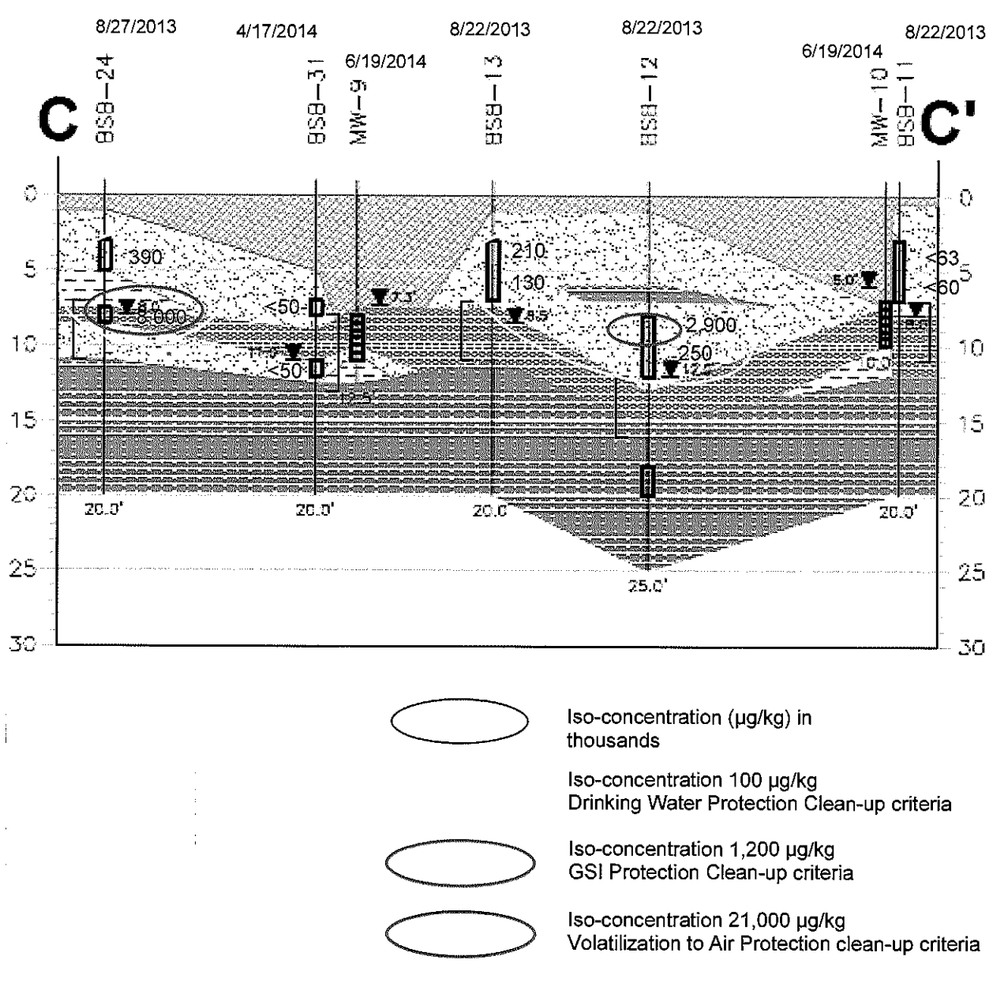
SCALE AS SHOWN	MTBE CONCENTRATIONS IN SOILS EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	FIGURE 14
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	
PRJ NO. 11013-000191.00		

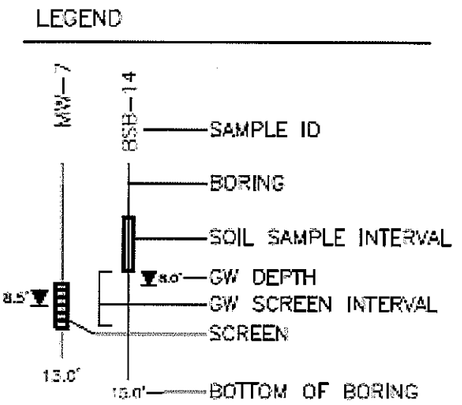


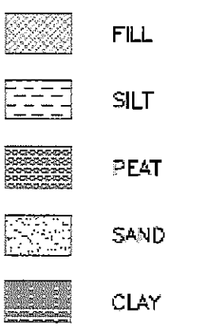




SCALE AS SHOWN	TETRACHLORETHENE CONCENTRATIONS IN SOILS EXCEEDING NON-RESIDENTIAL DRINKING WATER PROTECTION CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	FIGURE
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	15
PRJ NO. 11013-000191.00		





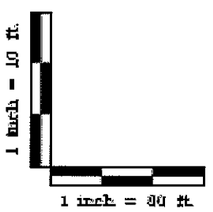


Iso-concentration (µg/kg) in thousands

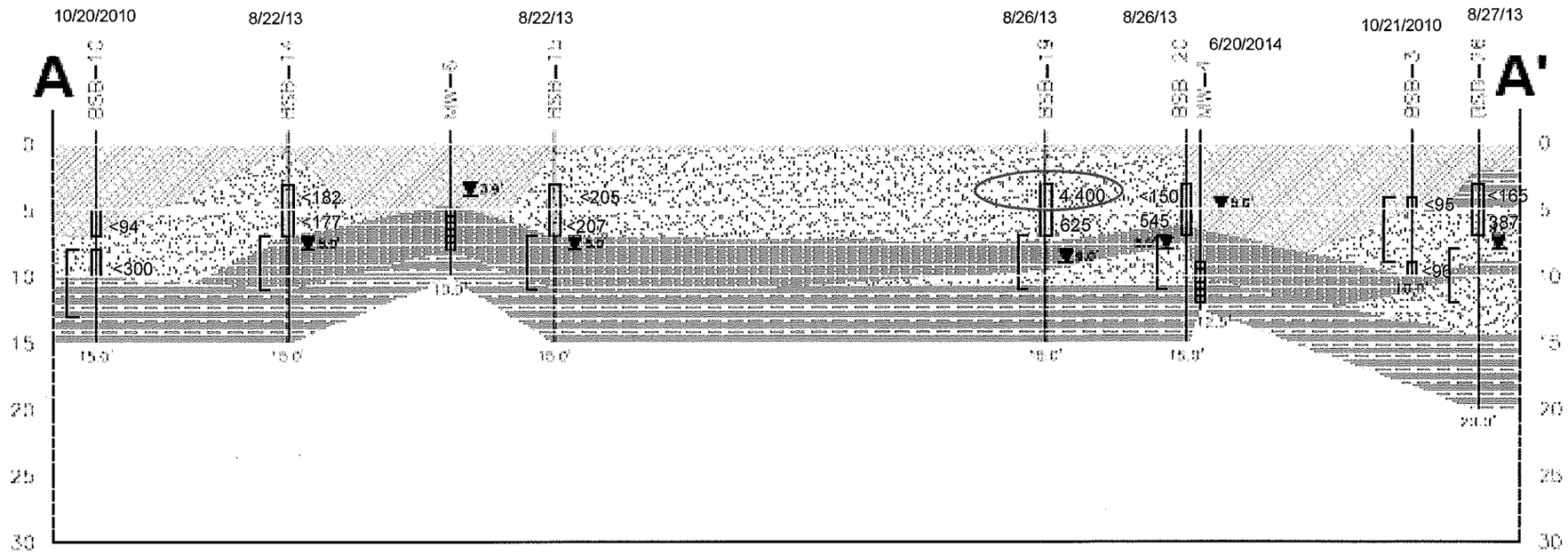
Iso-concentration 100 µg/kg
Drinking Water Protection Clean-up criteria

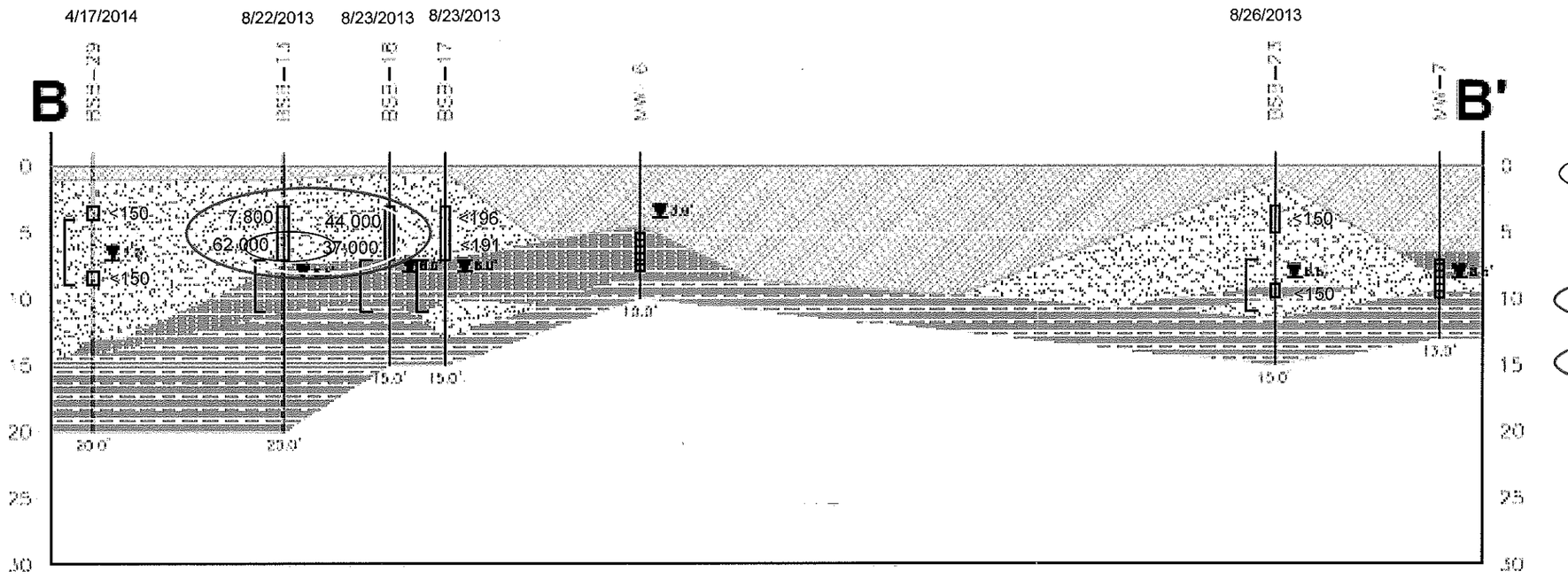
Iso-concentration 1,200 µg/kg
GSI Protection Clean-up criteria

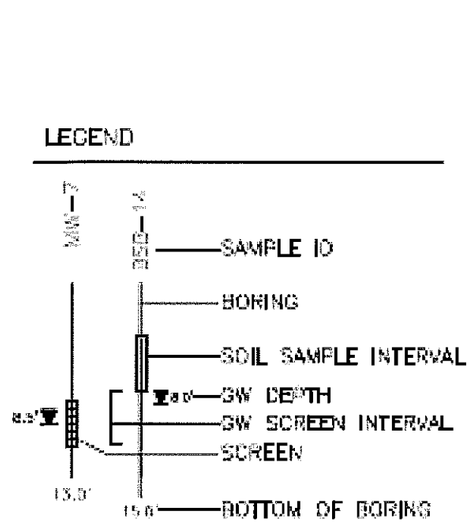
Iso-concentration 21,000 µg/kg
Volatilization to Air Protection clean-up criteria



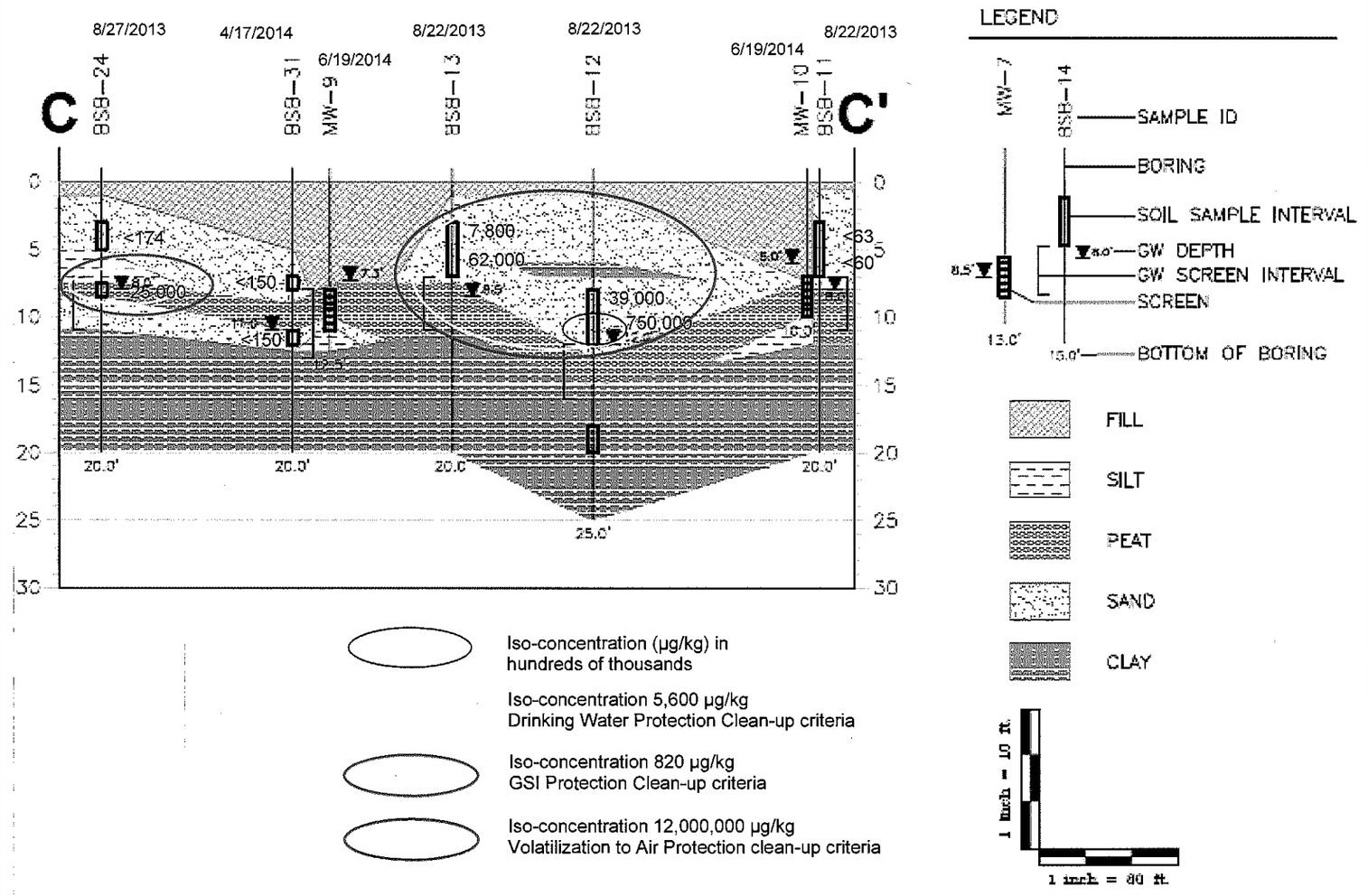
SCALE AS SHOWN	TETRACHLORETHENE CONCENTRATIONS IN SOILS EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION C	FIGURE 16
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	
PRJ NO. 11013-000191.00	BUREAU VERITAS	



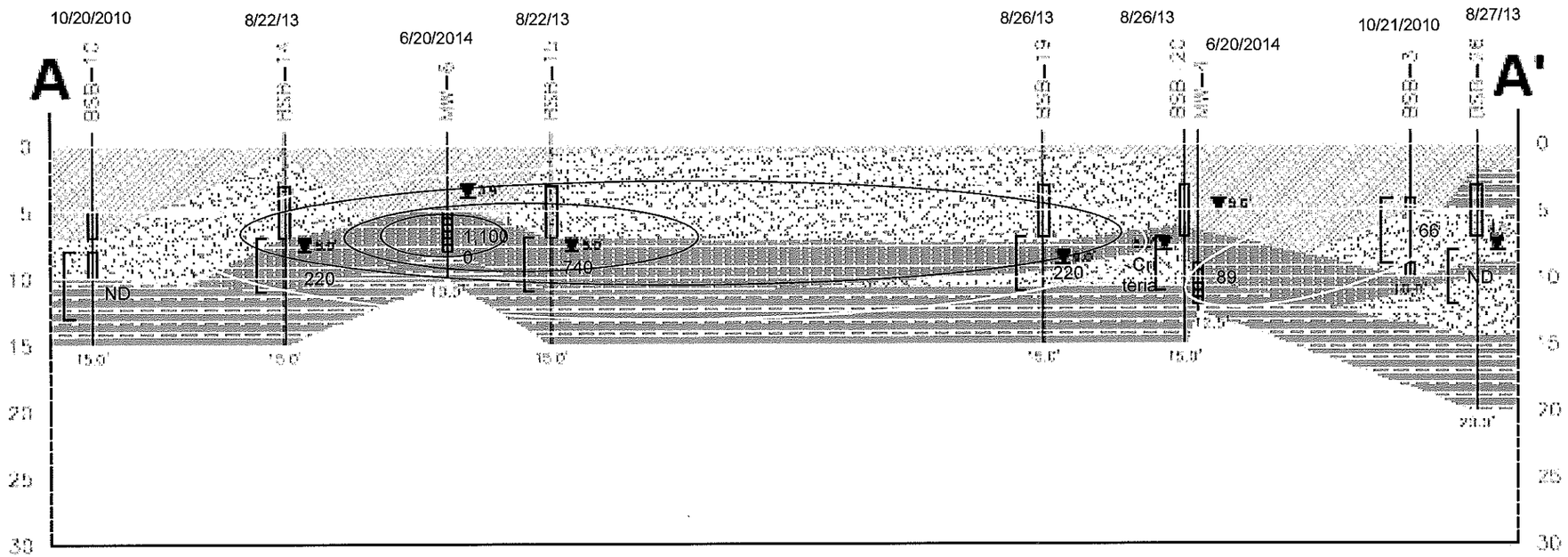


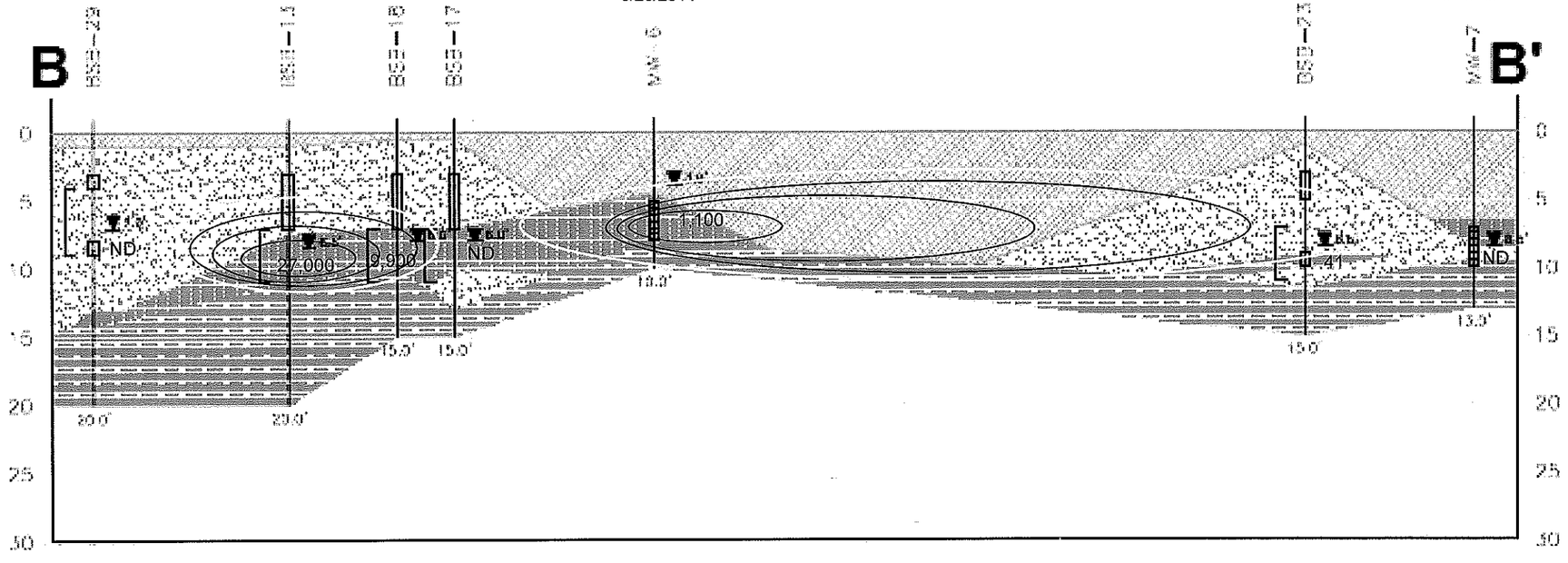


SCALE AS SHOWN	XYLENES CONCENTRATIONS IN SOILS EXCEEDING NON-RESIDENTIAL GSI CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	BUREAU VERITAS	FIGURE
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN		17
PRJ NO. 11013-000191.00			

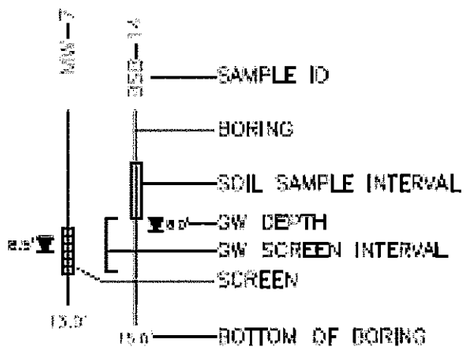


SCALE AS SHOWN	XYLENES CONCENTRATIONS IN SOILS EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	FIGURE 18
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	
PRJ NO. 11013-000191.00		





LEGEND



FILL

PEAT

SAND

CLAY

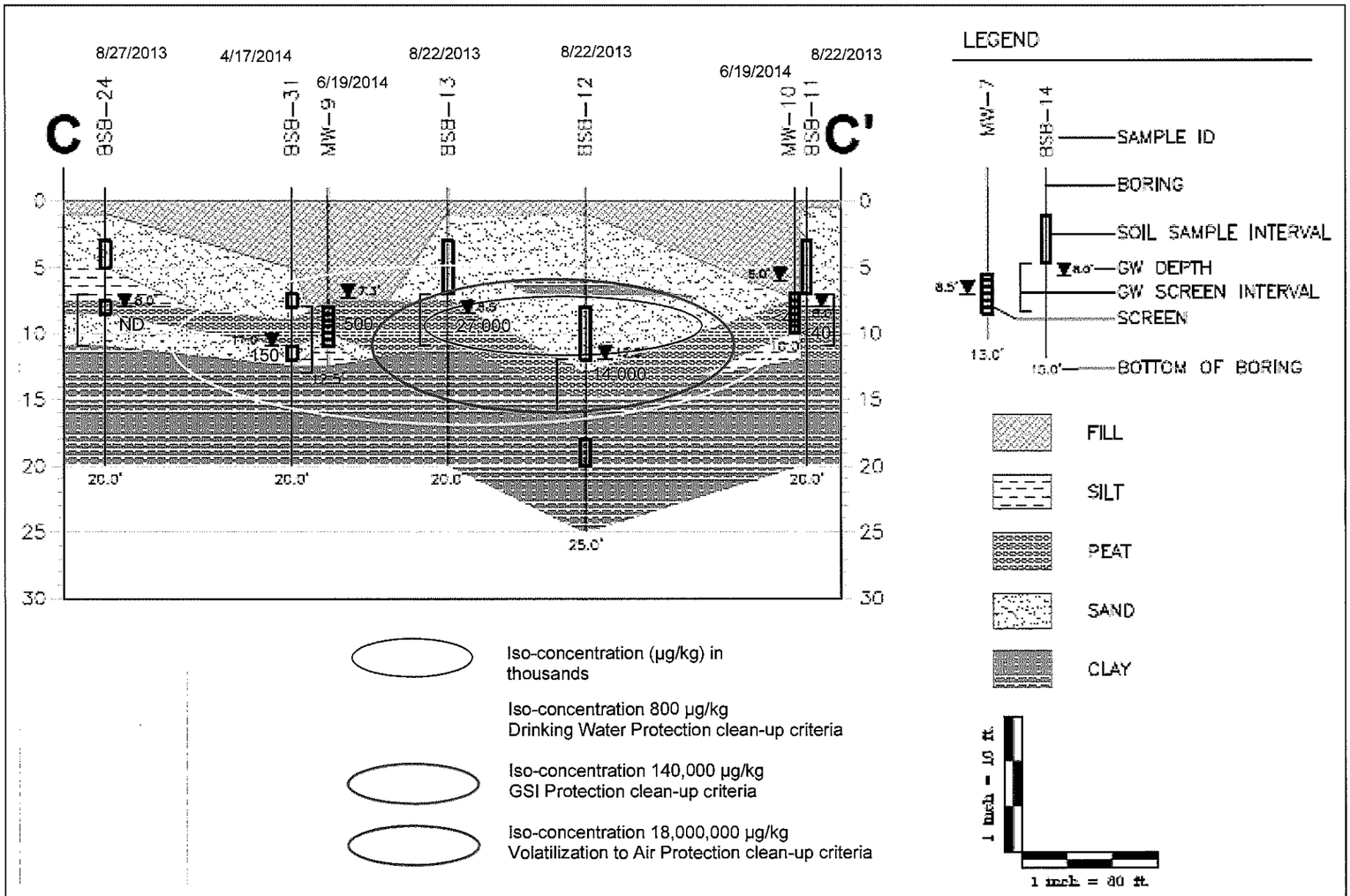
Iso-concentration (µg/L) in hundreds and thousands

Iso-concentration 40 µg/L
Drinking Water Protection clean-up criteria

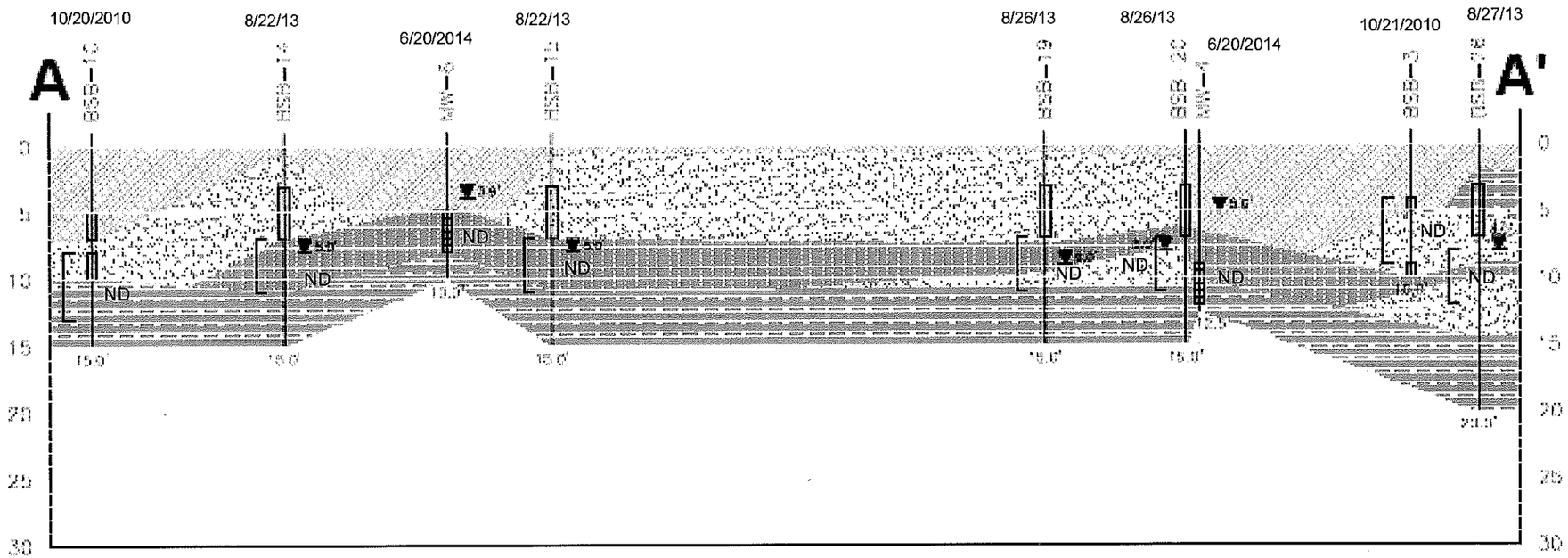
Iso-concentration 71,000 µg/L
GSI Protection clean-up criteria

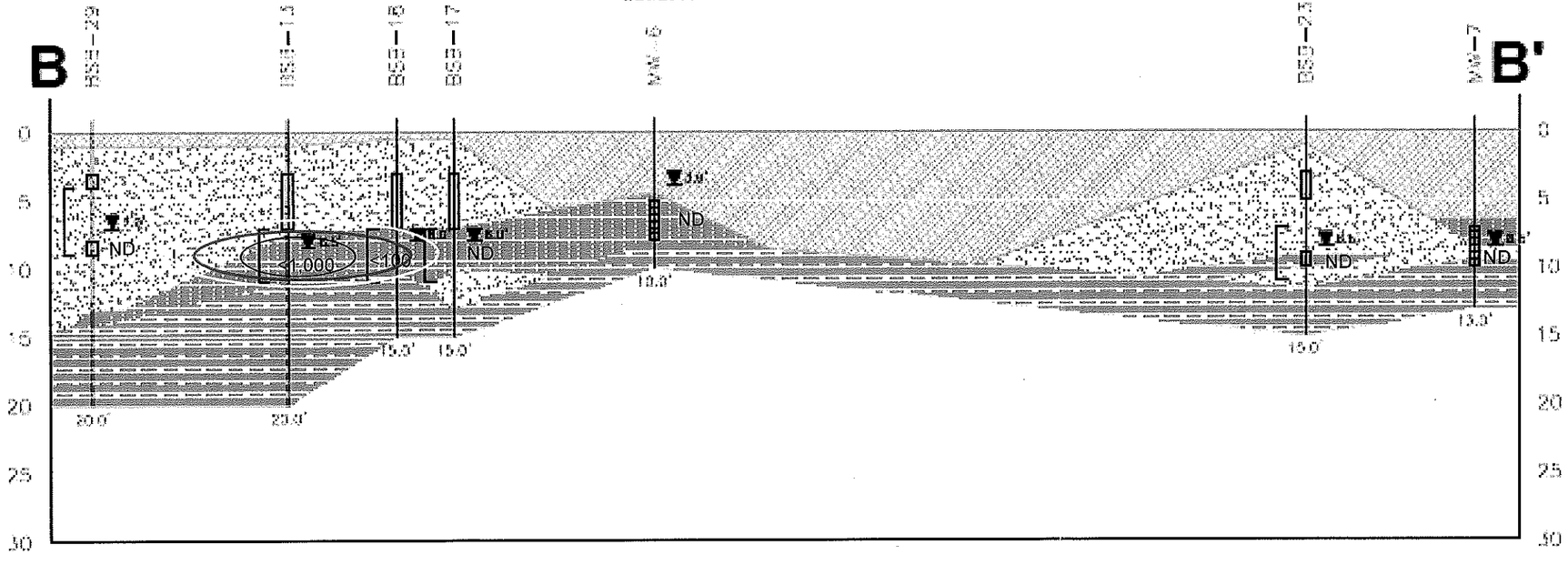
Iso-concentration 47,000,000 µg/L
Volatilization to Air Protection clean-up criteria

SCALE AS SHOWN	MTBE CONCENTRATIONS IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	FIGURE 19
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	
PRJ NO. 11013-000191.00		BUREAU VERITAS

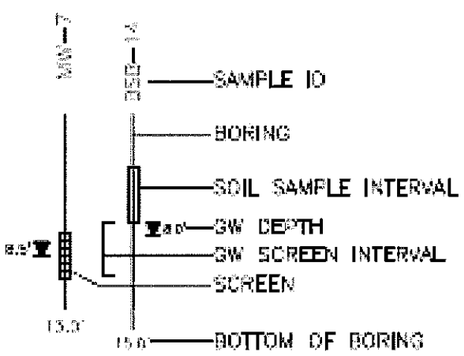


SCALE AS SHOWN	MTBE CONCENTRATIONS IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET	FIGURE 20
DATE JANUARY 2015		
PRJ NO. 11013-000191.00		





LEGEND



FILL

PEAT

SAND

CLAY

Iso-concentration (µg/L) in hundreds and thousands

Iso-concentration 5.0 µg/L
Drinking Water Protection clean-up criteria

Iso-concentration 60 µg/L
GSI Protection clean-up criteria

Iso-concentration 170,000 µg/L
Volatilization to Air Protection clean-up criteria

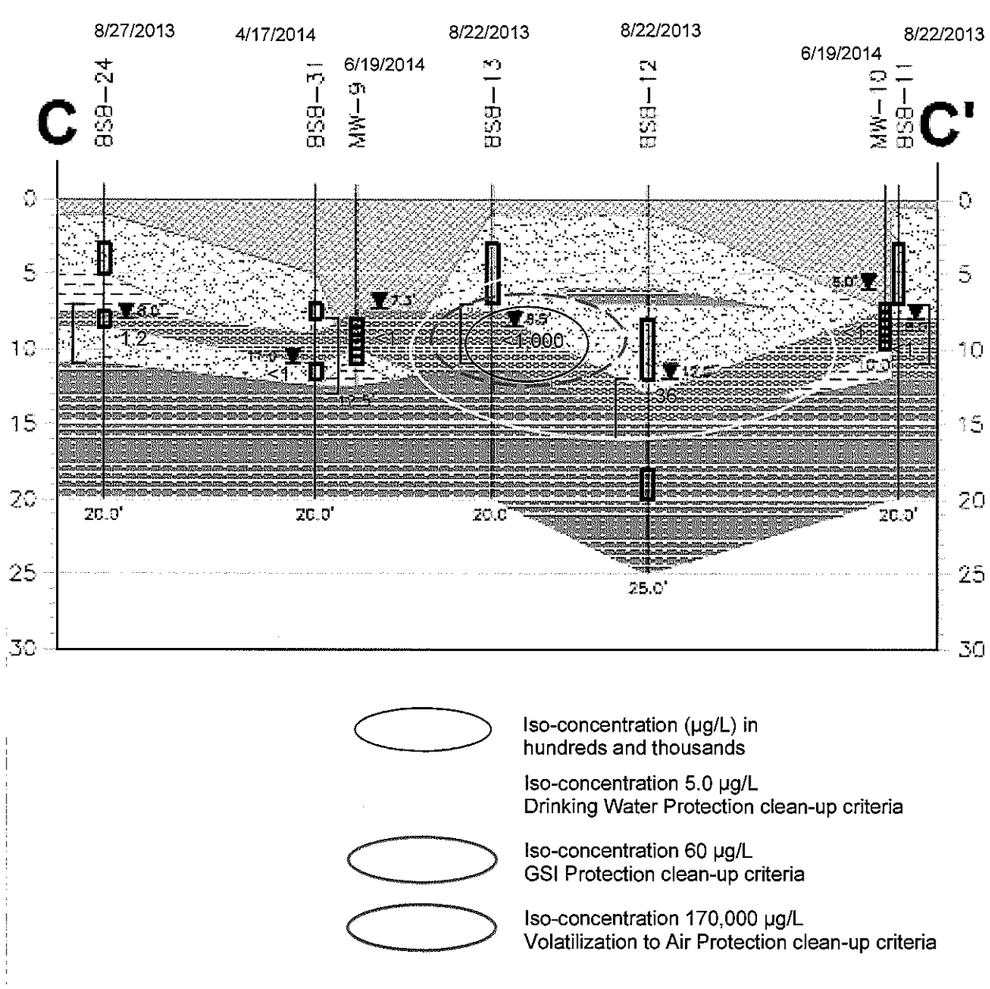
SCALE	AS SHOWN
DATE	JANUARY 2015
PRJ NO.	11013-000191.00

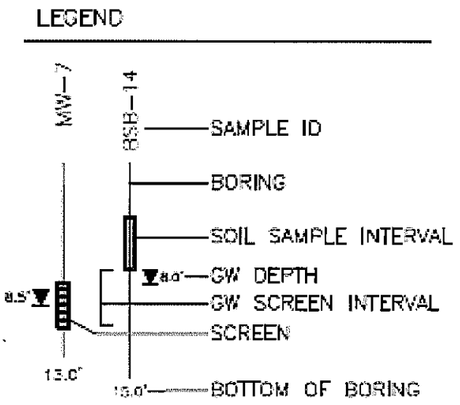
SUSPECTED TETRACHLOROETHENE CONCENTRATIONS IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION

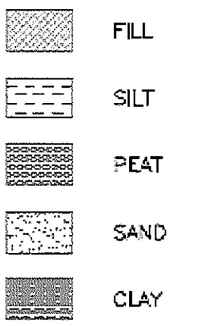
PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

BUREAU VERITAS

FIGURE
21





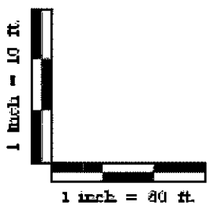


Iso-concentration (µg/L) in hundreds and thousands

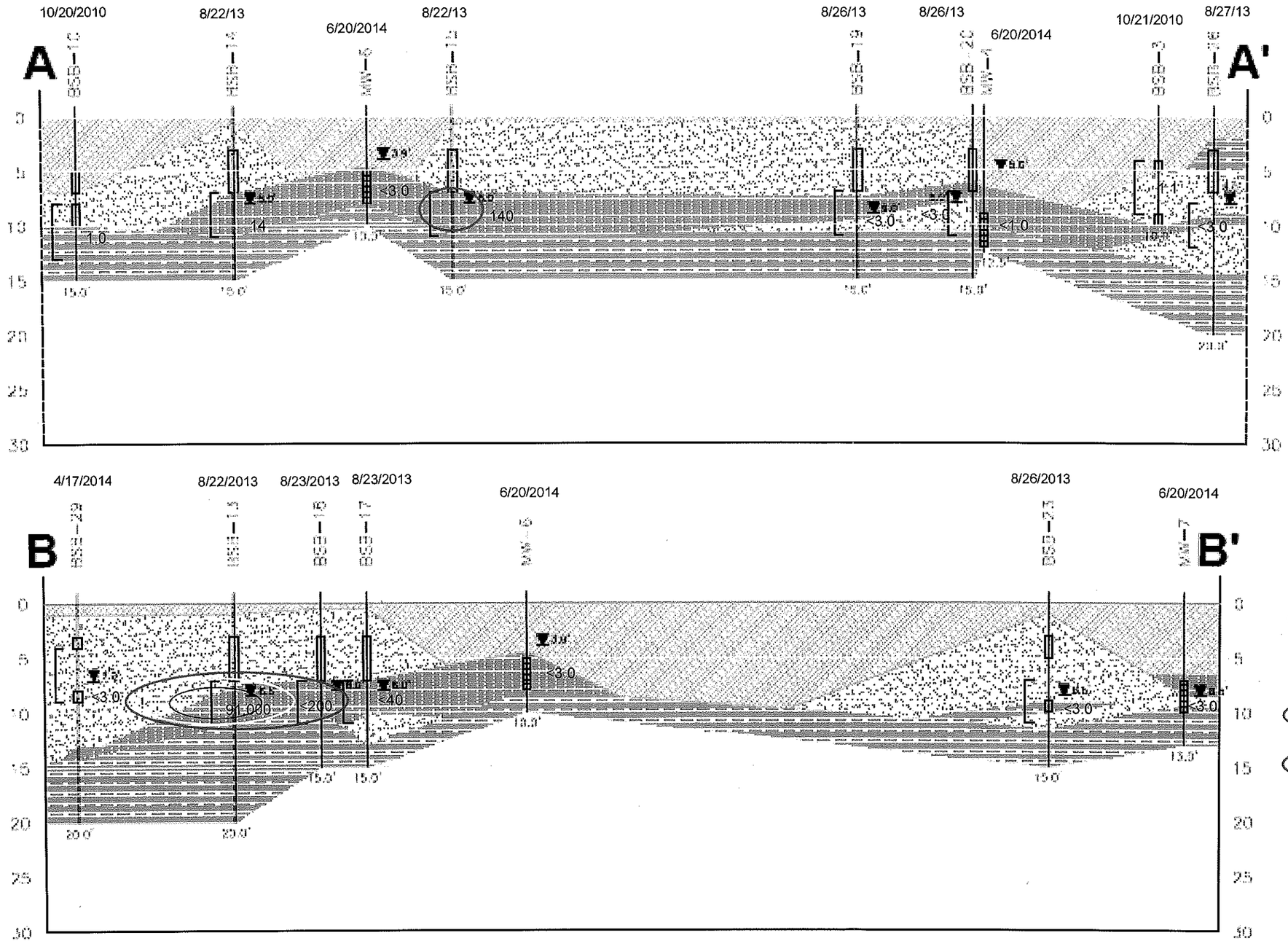
Iso-concentration 5.0 µg/L
Drinking Water Protection clean-up criteria

Iso-concentration 60 µg/L
GSI Protection clean-up criteria

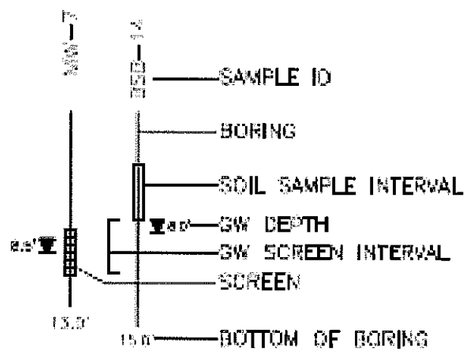
Iso-concentration 170,000 µg/L
Volatilization to Air Protection clean-up criteria



SCALE AS SHOWN	TETRACHLOROETHENE CONCENTRATIONS IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	FIGURE 22
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	
PRJ NO. 11013-000191.00	BUREAU VERITAS	



LEGEND



FILL

PEAT

SAND

CLAY

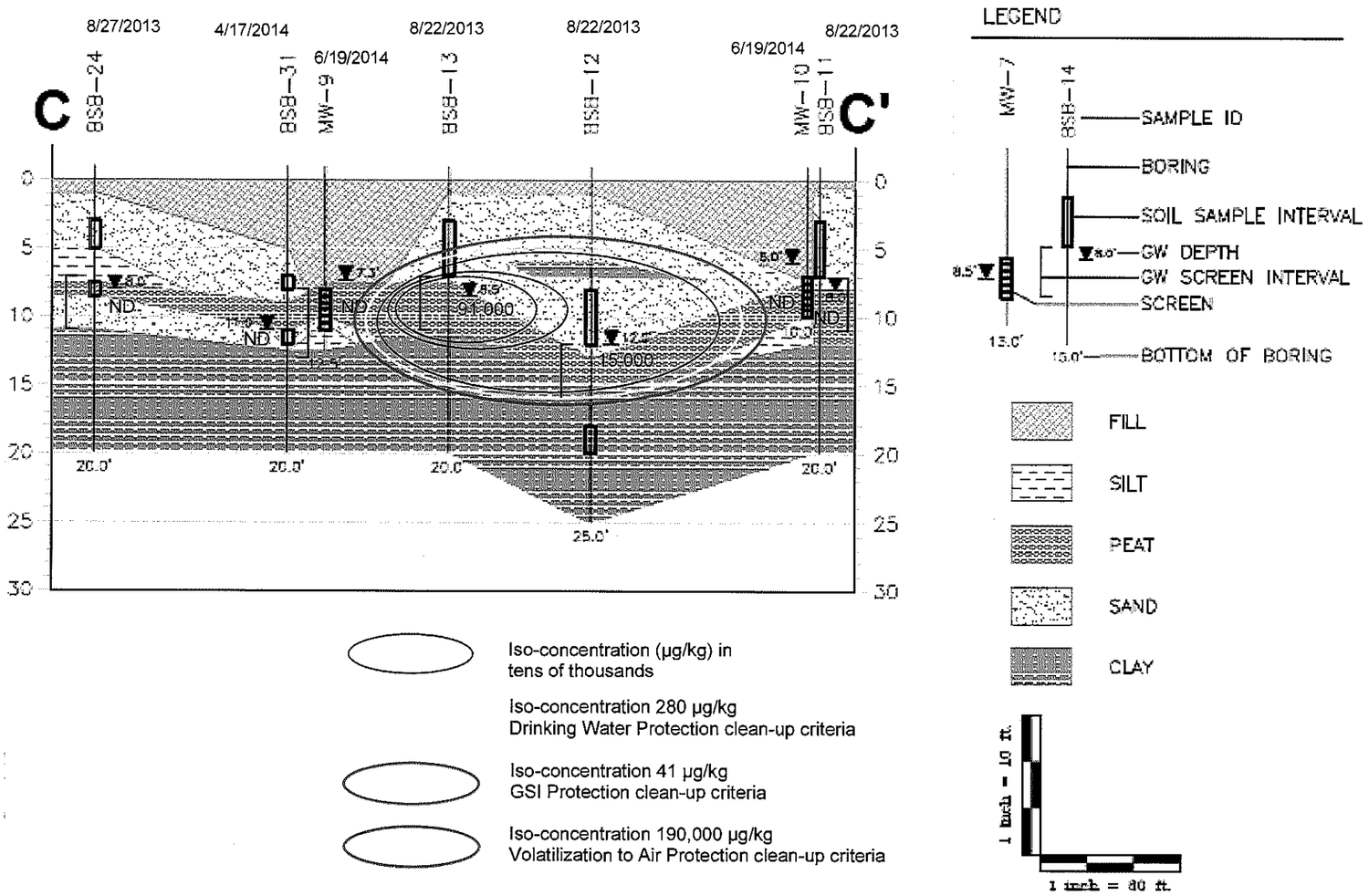
Iso-concentration (µg/L) in hundreds

Iso-concentration 280 µg/L
Drinking Water Protection clean-up criteria

Iso-concentration 41 µg/L
GSI Protection clean-up criteria

Iso-concentration 190,000 µg/L
Volatilization to Air Protection clean-up criteria

SCALE AS SHOWN	XYLENES CONCENTRATIONS IN GROUNDWATER EXCEEDING NON-RESIDENTIAL CLEAN UP CRITERIA SHOWN IN CROSS-SECTION	FIGURE 23
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET DETROIT, MICHIGAN	
PRJ NO. 11013-000191.00		



SCALE AS SHOWN	XYLENES CONCENTRATIONS EXCEEDING NON-RESIDENTIAL GSI CLEAN UP CRITERIA IN GROUNDWATER SHOWN IN CROSS-SECTION	FIGURE 24
DATE JANUARY 2015	PETRO-CHEM PROCESSING GROUP 421 LYCASTE STREET	
PRJ NO. 11013-000191.00	BUREAU VERITAS	

APPENDIX A

SOIL BORING AND MONITORING WELL COMPLETION LOGS

BORING NO: BSB-11	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: East of MW-10		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/22/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/22/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
2	20		SILTY SAND black, dry, loose, brick fragments			0.6		
4					BSB-11 (3-5 feet)			
6		2	brown, dry, loose, with trace coarse sand		BSB-11 (5-7 feet)	0.0		
8	45		brown/black, moist, with trace coarse sand			0.0 0.1	Organic odor	
10			PEAT dark brown to black, moist to wet			0.0	Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater.	
12	83	4	SILTY CLAY gray, moist, soft			0.0		
14			gray, dry, medium stiff, with trace coarse sand			0.0		
16			brown/gray mottled, dry, medium stiff, with trace coarse sand			0.0		
18	100					0.0	The soil boring was backfilled with original material and capped with an concrete patch upon completion.	
20		6	BORING TERMINATED					
22								
24								

Well No.:

BORING NO: BSB-12	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: North of MW-10		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/22/13	AND SAMPLED FROM: 12 - 16 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/22/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			BERM					
2	40		SILTY SAND black/brown, dry, loose, with trace coarse sand			0.1		
4						0.0		
6		2	SILTY CLAY light brown, dry, medium stiff			0.0		
8	75		SILTY SAND black/brown, dry, loose, with trace coarse sand		BSB-12 (8 - 10 feet)	0.5		
10			black/brown, dry, loose with pieces of brick		BSB-12 (10 - 12 feet)	62.2		
12	67	4	brown/black, moist to wet, with trace coarse sand				Groundwater was encountered at a depth of approximately 12 feet. A temporary well was installed for the collection of groundwater.	
14			PEAT dark brown to black, moist to wet			20.1		
16			SILTY CLAY gray/brown mottled, dry, soft, with trace coarse sand			34.5		
18	50				BSB-12 (18 - 20 feet)	54.5		
20		6	transitioning to gray			12.4	The soil boring was backfilled with original material upon completion.	
22	40					10.6		
24						9.8		
26		8	BORING TERMINATED					
28								
30								

Well No.:

BORING NO: BSB-13	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: South of MW-9		
SITE: Petro-Chem, 421 Lycaste Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/22/13	AND SAMPLED FROM: 12 - 16 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/22/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			GRASS					
2	50		SILTY SAND light gray/black, dry, loose			0.7		
4					BSB-13 (3 - 5 feet)			
6	80	2	dark brown, dry, loose, with trace coarse sand		BSB-13 (5 - 7 feet)	1.3		
8			PEAT dark brown to black, moist to wet			42.2	Groundwater was encountered at a depth of approximately 8.5 feet. A temporary well was installed for the collection of groundwater. An odor and sheen was observed.	
10						10.3		
12	83	4	SILTY CLAY gray, moist, soft					
14			gray/brown mottled, dry, medium stiff, with trace coarse sand			0.2		
16						0.1		
18	100						The soil boring was backfilled with original material upon completion.	
20		6	BORING TERMINATED					
22								
24								

Well No.:

BORING NO: BSB-14	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Northeast of MW-9		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/22/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/22/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**ASPHALT**					
2	35		**SILTY SAND** gray/black, dry, loose, with trace coarse sand			0.1		
4					BSB-14 (3-5 feet)			
6		2	dark brown, dry, loose, with trace coarse sand		BSB-14 (5-7 feet) Dup-01	0.1		
8	18		**PEAT** dark brown, moist to wet				Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater. A duplicate groundwater sample was collected (Dup-02).	
10						0.0		
12	83	4	**SILTY CLAY** gray, moist, soft gray/brown mottled, dry, with trace coarse sand, medium stiff			0.0	The soil boring was backfilled with original material and capped with an asphalt patch upon completion.	
14								
16			BORING TERMINATED					
18								
20		6						

Well No.:

BORING NO: BSB-15	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Southeast of MW-6		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/23/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/23/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
			SILTY SAND black, dry, loose, with trace coarse sand					
2	20					0.0		
4					BSB-15 (3 - 5 feet)			
			transitioning to gray/black			0.0		
6					BSB-15 (5-7 feet)			
2								
	27		PEAT dark brown, moist to wet				Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater.	
8								
10						0.0		
			SILTY CLAY gray, moist, soft					
12	80							
4			gray/brown mottled, dry, medium stiff, with trace coarse sand			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14								
			BORING TERMINATED					
16								
18								
6								
20								

Well No.:

BORING NO: BSB-16	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Southeast of MW-6		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/23/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/23/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
2	57		SILTY SAND dark brown/black, dry, loose, with trace coarse sand			0.3		
4					BSB-16 (3 - 5 feet)			
6			black, loose, moist to wet		BSB-16 (5-7 feet)	0.0		
8	68		PEAT dark brown/black, moist to wet			1.0	Groundwater was encountered at a depth of approximately 7.5 feet. A temporary well was installed for the collection of groundwater.	
10			SILTY CLAY gray/brown mottled, dry to moist, soft gray/brown mottled, dry, soft			0.0		
12	70							
14			gray/brown mottled, dry, medium stiff, with trace coarse sand			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
16			BORING TERMINATED					
18								
20								

Well No.:

BORING NO: BSB-17	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: East of MW-9		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/23/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/23/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
			SILTY SAND dark brown, dry, loose, with trace coarse sand					
2	57					0.0		
4					BSB-17 (3-5 feet) Dup-03			
6						0.0		
					BSB-17 (5-7 feet)			
	2							
			PEAT dark brown/black, moist to wet			1.8	Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater. A duplicate groundwater sample Dup-04 was collected.	
8	48							
10			SILTY SAND gray, moist to wet			0.3		
12	100							
	4		SILTY CLAY gray/light brown mottled, dry, medium stiff, with trace coarse sand			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14								
			BORING TERMINATED					
16								
18								
20	6							

Well No.:

BORING NO: BSB-18	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Southeast of MW-9		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/23/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/23/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
			SILTY SAND dark brown/black, dry, loose, with trace coarse sand					
2	35					15.8		
4					BSB-18 (3 - 5 feet)			
6					BSB-18 (5-7 feet)	28.0		
	2							
8	47		PEAT dark brown, moist			5.6	Groundwater was encountered at a depth of approximately 7 feet. A temporary well was installed for the collection of groundwater.8	
10			SILTY CLAY light gray, dry to moist, soft			0.1		
12	83							
	4		gray/brown mottled, dry, medium stiff			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14								
16			BORING TERMINATED					
18								
	6							
20								

Well No.:

BORING NO: BSB-19	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Northwest of MW-4		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/26/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/26/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
2	25		SILTY SAND dark brown, dry to moist, loose, with trace coarse sand			6.9		
4					BSB-19 (3 - 5 feet)			
6		2	black, dry to moist, loose, with trace coarse sand		BSB-19 (5-7 feet)	3.5		
8	50		PEAT dark brown, moist			0.1	Groundwater was encountered at a depth of approximately 9 feet. A temporary well was installed for the collection of groundwater.	
10			SILTY SAND brown, moist to wet, loose			0.2		
12	100		SILTY CLAY light gray, dry to moist, soft					
14		4	gray/brown mottled, medium stiff, with trace coarse sand			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
16			BORING TERMINATED					
18								
20		6						

Well No.:

BORING NO: BSB-20	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: North of MW-4		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/26/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/26/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
2	25		SILTY SAND dark brown, dry, loose, with trace coarse sand			0.1		
4					BSB-14 (3 - 5 feet)			
			turning dry to moist			1.4		
6			transitioning to black		BSB-14 (5-7 feet)			
	2		PEAT dark brown, moist			1.2	Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater.	
8	50		SILTY SAND light brown/light gray, moist to wet, loose			1.4		
10			brown, moist to wet, loose			0.0		
			SILTY CLAY light gray, dry to moist, soft, with trace fine gravel					
12	100							
	4					0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14			light brown/light gray mottled, medium stiff, with trace fine gravel					
16			BORING TERMINATED					
18								
20	6							

Well No.:

BORING NO: BSB-21	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: East of MW-4		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/26/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/26/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
			CONCRETE					
2	37		SILTY SAND dark brown, dry, loose, with trace coarse sand			0.2		
4					BSB-14 (3 - 5 feet)			
			dark brown, dry to moist, looset, with trace coarse sand			0.2		
6					BSB-14 (5-7 feet)			
2			PEAT dark brown, moist			0.4	Groundwater was encountered at a depth of approximately 8.5 feet. A temporary well was installed for the collection of groundwater. A duplicate groundwater sample (Dup-05) was collected.	
8	80							
			SILTY SAND gray, moist to wet, soft			0.2		
10			transitioning to gray/black			0.0		
12	100							
4			SILTY CLAY light gray, medium stiff, with trace fine gravel			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14								
			BORING TERMINATED					
16								
18								
6								
20								

Well No.:

BORING NO: BSB-22	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: South MW-1		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/26/13	AND SAMPLED FROM: 10 - 14 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/26/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
2	97		SILTY SAND black, dry, loose, with trace coarse sand			0.3		
4					BSB-14 (3-5 feet)			
6			becoming dry to moist			0.0		
8	53							
10			SILTY CLAY mottled light gray/light brown, with trace coarse sand		BSB-14 (9-10 feet)	0.1 0.0	Groundwater was encountered at a depth of approximately 10 feet. A temporary well was installed for the collection of groundwater.	
			SILTY SAND light brown, wet, loose, with trace coarse sand			0.0		
12			PEAT black, wet			0.0		
	88		SILTY CLAY gray, moist, soft				The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14			light brown/light gray, medium stiff, with trace coarse gravel			0.0		
16			BORING TERMINATED					
18								
20								

Well No.:

BORING NO: BSB-23	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: West of MW-7		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/26/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/26/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**ASPHALT**					
			SILTY SAND dark brown/black, dry, loose, with trace coarse sand					
2	7					0.0		
4					BSB-23 (3 - 5 feet)			
6	2							
8	20							
			SILTY CLAY mottled light gray/light brown, with trace coarse sand		BSB-23 (9 - 10 feet)	0.0	Groundwater was encountered at a depth of approximately 10 feet. A temporary well was installed for the collection of groundwater.	
10			**SILTY SAND** gray, wet, loose			0.0		
			SILTY CLAY gray, dry, soft, with trace coarse sand			0.0		
12	100							
	4					0.0	The soil boring was backfilled with original material and capped with an asphalt patch upon completion.	
14			mottled gray/brown, medium stiff, with trace coarse sand					
			BORING TERMINATED					
16								
18								
20	6							

Well No.:

BORING NO: BSB-24	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: North of MW-9		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/27/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/27/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE					
2	22		SILTY SAND black, dry, loose					
4					BSB-24 (3-5 feet)	7.0		
6	55	2	SILT light brown/tan, dry					
8			PEAT dark brown, moist		BSB-24 (7.5-8.5 feet) Dup-06	69.6 0.4	Odor	
10			SILTY SAND light gray, moist to wet, loose, with trace coarse sand			0.9 2.3	Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater.	
12	80	4	SANDY CLAY gray, moist to wet, soft			0.0	The soil boring was backfilled with original material and capped with a concrete patch upon completion.	
14			mottled gray/brown, dry, medium stiff, with trace coarse sand					
16			gray/tan, dry, medium stiff, with trace coarse gravel			0.0		
18	85		gray, dry, soft, with trace coarse gravel			0.0		
20		6	BORING TERMINATED					
22								
24								

Well No.:

BORING NO: BSB-25	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Vacant property, south of Freud Street and MW-4		
SITE: Petro-Chem, 421 Lycaste Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/27/13	AND SAMPLED FROM: 7 - 11 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/27/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**GRASS** organics					
2	30		**SAND (FILL)** black, dry, medium-grained, loose, brick fragments			0.0		
4					BSB-25 (3 - 5 feet)			
6	2		**SILTY CLAY** gray, dry to moist, with trace coarse sand		BSB-25 (5 - 7 feet)	0.0		
8	80		**PEAT** black, moist to wet			0.0	Groundwater was encountered at a depth of approximately 7.5 feet. A temporary well was installed for the collection of groundwater. The soil boring was backfilled with original material and capped with an asphalt patch upon completion.	
10			**SILTY CLAY** gray, moist, soft			0.0		
12	85							
14	4					0.0		
16			BORING TERMINATED					
18								
20	6							

Well No.:

BORING NO: BSB-26	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Vacant property, south of Freud Street and southeast of MW-4		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/27/13	AND SAMPLED FROM: 8 - 12 feet	TOP OF CASING ELEVATION:
FINISH DATE: 8/27/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
2			**GRASS** small trees on surface					
4	47		**SILTY CLAY** mottled gray/brown, dry, soft, with trace coarse sand black, dry, fine-grained sand lense		BSB-26 (3 - 5 feet)	0.0 0.0		
6	2		**SILTY SAND** light brown, dry, loose, with trace coarse sand transitioning to dark brown		BSB-26 (5 - 7 feet)			
8	68					0.0		
10			**PEAT** black, moist			0.0	Groundwater was encountered at a depth of approximately 10 feet. A temporary well was installed for the collection of groundwater.	
12			**SILTY SAND** gray, moist to wet, loose, with trace coarse sand					
14	67					0.0	The soil boring was backfilled with original material and capped upon completion.	
16	4		**SILTY CLAY** mottled gray/brown, moist, soft gray, dry, medium stiff, with trace coarse sand			0.0		
18	100		becoming mottled gray/brown			0.0		
20	6		BORING TERMINATED					
22								
24								

Well No.:

BORING NO: BSB-27	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: Vacant property, south of Freud Street		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 8/27/13	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 8/27/13	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**GRASS** with organics and brick fragments					
2	78		**SILTY CLAY** light brown, dry, soft to medium stiff, with trace coarse sand			0.0		
4					BSB-27 (3 - 5 feet)			
6		2	**SILTY SAND** light brown, dry, loose, with trace coarse sand		BSB-27 (5 - 7 feet)	0.0	Not able to collect groundwater from this location.	
8	27							
10			becoming light brown/brown			0.0		
			PEAT dark brown, dry					
12	82	4	**SILTY CLAY** light gray, moist to wet, soft, with trace coarse sand mottled gray/brown, dry, soft, with fine gravel			0.0	The soil boring was backfilled with original material upon completion.	
14								
16			BORING TERMINATED					
18								
20		6						

Well No.:

BORING NO: BSB-28	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: West of St. Jean Avenue and MW-10		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 4/17/14	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 4/17/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**GRASS** topsoil with organics					
2	50		**SILTY SAND** black, dry, loose			0.2		
4			brown, dry to moist, loose with trace coarse sand		BSB-28 (4 - 5 feet)	0.3		
6					BSB-28 (5 - 6 feet)	0.2		
	2		**SILTY CLAY** gray, dry to moist, soft			0.0		
8	100					0.0	Not able to collect groundwater from this location.	
						0.1		
10						0.1		
						0.1		
12	100					0.0		
	4		**PEAT** black, dry			0.0		
14			**SILTY CLAY** mottled gray and brown, dry, medium stiff with trace coarse sand			0.0		
16						0.0		
	100					0.0		
18						0.0	The soil boring was backfilled with original material upon completion.	
	6					0.0		
20								

Well No.:

BORING NO: BSB-29	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: West of St. Jean Avenue and southwest of MW-9		
SITE: Petro-Chem, 421 Lyeaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 4/17/14	AND SAMPLED FROM: 4-9 feet	TOP OF CASING ELEVATION:
FINISH DATE: 4/17/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**GRASS** topsoil with organics					
2	70		**SILTY SAND** black, moist, loose			0.0		
4					BSB-29 (3 - 4 feet)	0.4		
6	70	2				0.1		
8					BSB-29 (8 - 9 feet)	0.0	Groundwater was encountered at a depth of approximately 7 feet. A temporary well was installed for the collection of groundwater. A duplicate groundwater sample (Dup-01) was collected.	
10			becoming gray			0.2		
12	80	4	gray/brown, dry to moist, loose with trace coarse sand			0.2		
14			**SILTY CLAY** mottled brown and gray, medium stiff with trace coarse sand			0.1		
			PEAT black, dry			0.0		
16	100		**SILTY CLAY** mottled gray and brown, dry, medium stiff with trace coarse sand			0.0		
18		6				0.0	The soil boring was backfilled with original material upon completion.	
20						0.0		

Well No.:

BORING NO: BSB-30	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: West of St. Jean Avenue and MW-9		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 4/17/14	AND SAMPLED FROM: 5-10 feet	TOP OF CASING ELEVATION:
FINISH DATE: 4/17/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**ASPHALT/CONCRETE**					
2	50		**SILTY SAND** brown, dry, loose			0.1		
4					BSB-30 (4 - 5 feet)	0.4		
6		2	brown, dry to moist, loose					
8	50		black, moist, loose				Groundwater was encountered at a depth of approximately 7 feet. A temporary well was installed for the collection of groundwater. Odor and sheen noted.	
			PEAT black, moist			0.9		
10			**SILTY SAND** black, moist, loose		BSB-30 (9 - 10 feet) (Dup-02)	1.0		
			SILTY CLAY gray, dry to moist, soft			0.5		
12	80					0.5		
		4	**PEAT** black, dry			0.5		
14			**SILTY CLAY** mottled brown and gray, medium stiff with trace coarse sand			0.1		
16						0.1		
						0.0		
18	100					0.0	The soil boring was backfilled with original material and capped with an asphalt patch upon completion.	
		6				0.0		
20						0.0		

Well No.:

BORING NO: BSB-31	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: West of MW-9		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec Environmental	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: G. Blinkiewicz
START DATE: 4/17/14	AND SAMPLED FROM: 8-13 feet	TOP OF CASING ELEVATION:
FINISH DATE: 4/17/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**GRASS** topsoil with organics					
2	0		**HAND AUGER** no recovery					
4								
6	60	2	**SILTY SAND** black, dry to moist, loose becoming gray		BSB-31 (7 - 8 feet)	0.1		
8								
10			**PEAT** black, dry			0.2 0.1		
12	100	4	**SILTY SAND** gray, moist, loose		BSB-31 (11 - 12 feet)	0.3	Groundwater was encountered at a depth of approximately 11 feet. A temporary well was installed for the collection of groundwater.	
14			**SILTY CLAY** gray, dry, soft with trace coarse sand			0.0 0.0 0.0		
16	100		becoming stiff			0.0 0.0	The soil boring was backfilled with original material upon completion.	
18		6				0.0 0.0		
20						0.0		

Well No.:

BORING NO: BSB-32	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: South of Freud Street		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 9/18/14	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 9/18/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**TOPSOIL**			1.0		
2	95		**SILTY SAND** black, dry, loose, with pebbles, brick and slag fragments					
4			**SILTY CLAY** brown, dry, stiff, with pebbles glass fragments		BSB-32 (2-4 feet)	32.9		
6	2		becoming soft			65.0		
8	70		transitioning to gray, slag fragments			0.0		
10						0.0	Groundwater was not encountered	
12	55		becoming moist		BSB-32 (10-12 feet)	0.0		
14	4					0.0		
16			**SILTY SAND** gray, wet **SILTY CLAY** gray, dry, stiff			0.0		
18	100					0.0	The soil boring was backfilled with original material upon completion.	
20	6		BORING TERMINATED			0.0		
22								
24								

Well No.:

BORING NO: BSB-33	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: South of Freud Street		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fihertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 9/18/14	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 9/18/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**TOPSOIL**			0.0		
2	55		**SILTY SAND** brown, dry, loose, with brick, slag, glass fragments		BSB-33 (2-4 feet)	0.0		
4			trace medium-grained sand			0.0		
6	70	2				0.0		
8					BSB-33 (8-10 feet)	0.0	Groundwater was encountered at a depth of approximately 10 feet. A temporary well was installed for the collection of groundwater. A duplicate groundwater sample (Dup-04) was collected.	
10			**PEAT** black, moist			0.0		
12	95	4	**SAND** brown, wet, medium- to coarse-grained **PEAT** black, moist			0.0		
14			**SILTY CLAY** gray, dry, medium stiff			0.0		
16						0.0		
18	100	6				0.0	The soil boring was backfilled with original material upon completion.	
20			BORING TERMINATED					
22								
24								

Well No.:

BORING NO: BSB-34	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: South of Freud Street		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 9/18/14	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 9/18/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**TOPSOIL**			0.0		
2	60		**SILTY SAND** brown, dry, loose, with brick, glass, slag fragments			2.7		
4					BSB-34 (3-5 feet)			
6	50	2	**SAND** brown, moist, coarse-grained			13.0		
			PEAT black, moist			0.6		
8			**SILTY CLAY** brown, moist, soft		BSB-34 (8-10 feet)	0.0	Groundwater was encountered at a depth of approximately 10.5 feet. A temporary well was installed for the collection of groundwater.	
10			**SAND** brown, wet, coarse-grained with gravel			0.0		
12	95	4	**SILTY CLAY** gray, dry, soft			0.0		
14						0.0		
16	100					0.0		
18						0.0	The soil boring was backfilled with original material upon completion.	
20		6	BORING TERMINATED					
22								
24								

Well No.:

BORING NO: BSB-35	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION: South of Freud Street		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigau	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 9/18/14	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 9/18/14	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			**TOPSOIL**			0.0		
2	45		**SILTY SAND** brown, dry, loose, with brick, slag fragments			0.0		
4			trace clay		BSB-35 (2-4 feet)	0.0		
6	50	2	becoming moist with pebbles		BSB-35 (6-8 feet)	0.0		
8			**PEAT** black, moist			0.0	Groundwater was encountered at a depth of approximately 10 feet. A temporary well was installed for the collection of groundwater.	
10			**SILTY SAND** brown, wet, with pebbles, porcelain and glass fragments			0.0		
12	95	4				0.0	The soil boring was backfilled with original material upon completion.	
14			wood, brick fragments			0.0		
16			BORING TERMINATED			0.0		
18						0.0		
20		6						
22								
24								

Well No.:

BORING NO: BSB-36	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION:		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 12/22/2014	AND SAMPLED FROM: 7-12 feet	TOP OF CASING ELEVATION:
FINISH DATE: 12/22/2014	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE			0.0		
			SILTY SAND FILL trace gravel and plastic, light brown, moist		BSB-36 (0.5-2 feet)	0.0		
2	50					0.0		
						0.0		
4						0.0		
						0.0		
						0.0		
6			with occasional cobbles, brick, and wood, dark brown, moist			0.7	Groundwater was encountered at a depth of approximately 8 feet. A temporary well was installed for the collection of groundwater.	
	2					0.8		
						0.5		
	40					0.4		
8						0.4		
			MIXED SAND AND GRAVEL FILL gray, moist			0.1		
			PEAT dark brown, moist		BSB-36 (8-10 feet)	1.0		
10						0.6		
						1.3		
			CLAYEY PEAT trace sand and organics, gray, moist			0.2		
						0.0	The soil boring was backfilled with original material and capped with an concrete patch upon completion.	
12						0.0		
			SILTY CLAY trace sand, gravel, and organics, stiff to hard, gray, moist		BSB-36 (12.5-13 feet)	0.0		
	4					0.0		
14						0.0		
			BORING TERMINATED					
16								
18								
	6							
20								

Well No.:

BORING NO: BSB-37	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION:		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fihertec	DRILLING METHOD: Direct-Push
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 12/22/2014	AND SAMPLED FROM:	TOP OF CASING ELEVATION:
FINISH DATE: 12/22/2014	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
0			CONCRETE			0.0		
			MIXED SAND AND GRAVEL FILL cobbles, brown and gray, moist			0.0 0.0 0.0 0.2		
2						0.0 0.0		
4			SILTY SAND FILL brown, moist			0.0 0.0 0.0 0.0 0.0		
6	2					0.0 0.0 0.0 0.0		
8						0.0 0.0 0.0		
			SAND AND GRAVEL			0.0		
10			PEAT dark brown, moist			0.0	The soil boring was backfilled with original material and capped with an concrete patch upon completion.	
			CLAYEY PEAT with organics, gray, moist			0.0		
12			SILTY CLAY with organics, stiff, gray, moist			0.0		
	4					0.0		
14						0.0		
16			BORING TERMINATED					
18								
20	6							

Well No.:

BORING NO: BSB-38	PROJECT NO: 11013-000191.00	PROJECT NAME: Corrective Action Investigation
BORING LOCATION:		
SITE: Petro-Chem, 421 Lycaste, Detroit, Michigan	DRILLING CO: Fibertec	DRILLING METHOD: Hand Auger
CLIENT: PSC Environmental Services	GROUNDWATER SCREENED	LOGGED BY: K. Wing
START DATE: 12/22/2014	AND SAMPLED FROM: 0.75 - 5.75 feet	TOP OF CASING ELEVATION:
FINISH DATE: 12/22/2014	GROUT:	GROUND SURFACE ELEVATION:
BENTONITE PLUG:	FILTER PACK:	VOLUME PURGED:

DEPTH	RECOVERY %	BLOW CNT (6")	DESCRIPTION	SOIL DIAGRAM	SAMPLE DEPTH	PID (ppm)	COMMENT	TEMPORARY WELL DIAGRAM
			CONCRETE					
			MIXED SAND AND GRAVEL FILL trace plastic, brick, and glass, gray and black, moist		BSB-38 (1.5-2 feet)	397.9	Strong odor noted	
2						27.8		
							Groundwater was encountered at a depth of approximately 5 feet. A temporary well was installed for the collection of groundwater.	
						22.8		
4								
			PEAT trace sand, gravel, organics, and glass, black, moist		BSB-38 (4.5-5 feet)	18.4		
						8.5		
6			BORING TERMINATED				The soil boring was backfilled with original material and capped with an concrete patch upon completion.	
	2							
8								
							Boring was located in a pit, approximately 50 inches below grade.	
10								

Well No.: