April 2, 2019

Mr. Dan Dailey
Michigan Department of Environmental Quality
Waste Management and Radiological Protection Division
Hazardous Waste Section
P.O. Box 30241
Lansing, Michigan 48909-7741

Bureau Veritas Project No. 11017-000116.00

Subject: Groundwater Sampling Workplan for PFAS
Petro-Chem Processing Group Facility
421 Lycaste Street, Detroit, Michigan

Dear Mr. Dailey:

On behalf of Stericycle Environmental Solutions, Inc., Bureau Veritas North America, Inc. is pleased to submit this Groundwater Monitoring Workplan incorporating sampling for per-and polyfluoroalkyl substances (PFAS), including perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) compounds, per the request of the Michigan Department of Environmental Quality (MDEQ) in their correspondence dated October 26, 2018, and agreed to in our meeting at the MDEQ offices in Lansing, Michigan on January 21, 2019.

Please call me at (248) 344-3014 if you have any questions regarding the attached Workplan.

Sincerely,

Kellie L. Wing
Program Manager
Health, Safety and Environmental Services
Detroit Regional Office

cc: Mr. Matt Marra, Stericycle

Enclosure

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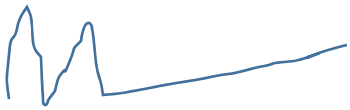
Groundwater Sampling Workplan for PFAS
Nortru, LLC
Petro-Chem Processing Group Facility
421 Lycaste, Detroit, MI

April 2, 2019

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.



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Matt Marra
VP, Global Environmental Liabilities & Due Diligence

Groundwater Sampling Workplan for PFAS

Petro-Chem Processing Group of Nortru, LLC
421 Lycaste Street
Detroit, Michigan 48214
MID 980 615 298

April 2, 2019

Project Number: 11017-000116.00

Prepared for
Stericycle Environmental Solutions, Inc.
Petro-Chem Processing Group of Nortru, LLC
421 Lycaste Street
Detroit, Michigan 48214

Bureau Veritas North America, Inc.
Health, Safety, and Environmental Services
22345 Roethel Drive
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1.0 INTRODUCTION

Bureau Veritas North America, Inc. (Bureau Veritas) under contract with Stericycle Environmental Solutions, Inc. (Stericycle) conducts semi-annual groundwater monitoring at the Stericycle, Petro-Chem Processing Group (PCPG) Facility (Site) located at 421 Lycaste Street in Detroit, Michigan (Figure 1). Groundwater monitoring is conducted in accordance with the Hazardous Waste Management Facility Operating License (Operating License, MID 980 615 298) and Groundwater Monitoring Program enforced by Michigan Department of Environmental Quality (MDEQ) dated December 18, 2012.

2.0 SITE DESCRIPTION

The PCPG Facility is located at 421 Lycaste Street, Wayne County, Detroit, Michigan, at the northwestern corner of Lycaste Street and Freud Street. It is situated on an estimated 8-acre parcel in an industrial and residential area approximately 0.5 miles north of the Detroit River. The average elevation at the site is 580 feet above mean sea level, as documented in the Facility Operating License. Parts of the Site historically operated as an Amoco refinery. The site currently operates as a fuel blending and solvent recycling plant. Spent solvents, rags, fuel sludges, and tank bottoms are brought to the facility where these materials are either cleaned and recycled, or sold as fuel to cement kilns. The site layout, showing the above noted buildings, is shown on Figure 2.

The Facility is surrounded by industrial properties to the north; Lycaste Street to the east, Freud Avenue to the south, and Old St. Jean Avenue to the west. See Figure 1 for site location.

The Facility is secured by a 6-foot-high chain-link security fence topped with barbed wire. A driveway on the east side of the facility is used for incoming and outgoing traffic at the facility. Other facility features include an employee and visitor parking area, aboveground storage tanks (ASTs), a drum storage area, and support facilities. PCPG continues to operate a fuel blending and solvent recycling plant in accordance with the current Operating License, dated December 18, 2012.

3.0 BACKGROUND

Bureau Veritas has been conducting semi-annual monitoring events at the Facility for multiple years in accordance with the Hazardous Waste Management Facility Operating License (Operating License, MID 980 615 298).

The MDEQ Waste Management and Radiological Protection Division (WMRPD) is the lead regulatory agency for the Site. The MDEQ WMRPD is conducting a review and addressing multiple aspects of the Corrective Measures Implementation Workplan (CMIWP) for the Site prepared by Bureau Veritas in May 2018. The MDEQ in their correspondence dated October 26, 2018, and during a follow up meeting in their Lansing, Michigan offices on January 21,2019, the MDEQ requested a plan to evaluate per-and polyfluoroalkyl substances (PFAS) including perfluorooctanoic acid (PFOA) and perfluorooctanesulfonate) (PFOS) in groundwater as part of their review of the CMIWP. It is the opinion of WMPRD that since the Facility has likely accepted wastes from plating operations, as well as other sources of PFAS, the potential exists for a release to have occurred at the Site.

Per their correspondence and discussions during the January 2019 meeting, the evaluation for the presence of PFAS will be addressed at the facility by sampling Monitoring Wells MW-3, MW-4, MW-8 and MW-9 during one sampling event.

One of the challenging aspects of investigating PFAS contamination is the very low concentrations that require measurement, usually in the parts per trillion, and the potential for accidental contamination of environmental samples during sample collection because of their presence in many commonly used

consumer products and sampling materials. This Workplan addresses the sampling protocols and laboratory methods to evaluate for the presence of PFAs in groundwater at the Site. The previously identified contaminants of potential environmental concern will be sampled during the routine semi-annual monitoring events.

4.0 ENVIRONMENTAL SETTINGS

An overview of the relevant information on geology and hydrogeology pertaining to the site is discussed below.

4.1 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).

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 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).

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 Chrysler plant depict a uniform clay layer from 10 to 103 feet bgs (WWE, 1991 with revisions, 1993).

4.2 HYDROGEOLOGY

Groundwater from onsite monitoring wells and groundwater samples collected from temporary wells installed in soil borings during prior investigations 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.

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. 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. 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 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).

4.3 GROUNDWATER MONITORING NETWORK

The site has a network of twelve monitoring wells MW-1 thru MW-12 as depicted in Figure 2. Ground water levels during the two 2018 sampling events ranged from 5.16 feet bgs in MW-2D to 14.31 feet bgs in MW-11. All monitoring well screens are set in a fill material beneath the site. Below the fill material, a dense clay is typically encountered. Groundwater depths typically range from five to fourteen feet bgs.

5.0 CONTAMINANTS OF POTENTIAL 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. The sampling event described in this Workplan will only include sampling and analysis of PFAS including PFOA and PFOS in Monitoring Wells MW-3, MW-4, MW-8 and MW-9. The specific list of compounds is listed in the Laboratory Analysis section of this report.

Other contaminants of concern and monitoring wells will be sampled during the normal semi-annual groundwater monitoring events at the facility.

6.0 PROJECT OBJECTIVES

The objectives for this sampling event is to evaluate whether PFAS are present in the four selected monitoring wells at the facility. The sample results will be compared to applicable regulatory guidelines and will be used to determine further steps, if any.

7.0 SCOPE OF WORK

Prior to sampling, Bureau Veritas will order a minimum of twenty-one,15-mil centrifuge tubes which includes three 15-mil centrifuge tubes per groundwater sample (i.e., 12 tubes) and three, QA/QC samples (9 tubes) from Merit Laboratories, Inc. (Merit). Merit requires three, 15-mil centrifuge tubes per sample to conduct ASTM D7979 with Isotopic Dilution method.

7.1 GROUNDWATER SAMPLING AND MONITORING

Bureau Veritas will include the following field activities:

- Measure static water levels (to the nearest 0.01-foot). The water level meter will be decontaminated between uses at each monitoring well.
- Decontamination will be conducted using Alconox® or Liquinox® with potable water (if known to be PFAS-free) followed by deionized rinse.
- Purge the monitoring wells using low-flow purging methods (e.g., using a YSI Pro DSS purge pump, or similar). It is anticipated that low-flow purging flow rates will be on the order of 0.1 to 0.5 liters per minute (L/min). Complete purging, keeping the pump approximately in the middle of the screened interval.

- Collect groundwater samples using low-flow sampling methods after each wells indicator parameters (e.g., temperature, pH, and dissolved oxygen, etc.) stabilize during low-flow purging. If the monitoring well does not yield sufficient groundwater to allow for the stabilization of indicator parameters. The monitoring well will be pumped dry and allowed to recover prior to sampling.

- Single-use, disposable polyethylene or silicone materials (i.e., tubing, bailers, etc.) for monitoring well purging and sampling will be utilized to the extent possible.

- When reuse of materials or sampling equipment across multiple sampling locations is necessary, project decontamination protocols will be followed with allowed materials identified in the table below and QA/QC samples will incorporate collection of equipment rinseate blanks into the sampling program, as appropriate.

- Each groundwater sample will be collected in laboratory-provided 15-mil centrifuge tubes (three per sample) following the instructions provided by the laboratory.

- Appropriate quality assurance/quality control (QA/QC) documentation will be provided with each batch of samples. Quality control replicates, laboratory spikes, and control blanks will be analyzed according to standard protocols. In addition, a trip blank will be prepared for each cooler of samples as part of the QA/QC documentation.

- Purge and sampling water collected from the wells will be containerized in a DOT-approved 55-gallon drum and stored on site for proper disposal.

7.2 PFAS SPECIFIC FIELD PROTOCOLS, REQUIREMENTS AND CONSIDERATIONS

Because of the potential presence of PFAs in common consumer products and in equipment typically used to collect groundwater samples, special handling and care must be taken when collecting samples for PFA analysis.

The following table provides a summary of items that are likely to contain PFAS (i.e. prohibited items) and therefore will not be used by field personnel sampling the site.

Category	Prohibited Items	Allowable Items
Pumps and Tubing	Teflon® and other fluoropolymer containing materials	High-density polyethylene (HDPE), low density polyethylene (LDPE) , or silicone tubing, peristaltic pump or stainless steel submersible pump
Decontamination	Decon 90	Alconox® or Liquinox®, potable water followed by deionized rinse.
Sample Storage and Preservation	LDPE or glass bottles, PTFE-or Teflon®-lined caps, chemical ice packs	Laboratory-provided sample container -preferred; or, HDPE or polypropylene bottles, regular ice
Field Documentation	Waterproof/treated paper or field books, plastic clipboards, non Sharpie® markers, Post-It® and other adhesive paper products	Plain Paper, metal clipboard, pens
Clothing	Clothing or boots made of or with Gore-Tex™ or other synthetic water resistant	Synthetic or cotton material, previously laundered clothing

Category	Prohibited Items	Allowable Items
	and/or stain resistant materials, Tyvek® material Special attention should be given to clothing that has been advertised as having waterproof, water-repellant, or dirt and/or stain characteristics. They are likely to have PFAS in their manufacturing.	(preferably previously washed) **without** the use of fabric softeners
Personal Care Products (for day of sample collection)	Cosmetics, moisturizers, hand cream and other related products	Suncreens: Alba Organics Natural Yes to Cucumbers Aubrey Organics Jason Natural Sun Block Kiss My Face Baby-safe sunscreens ('free' or 'natural) Insect Repellents: Jason Natural Quit Bugging Me Repel Lemon Eucalyptus Herbal Armor California Baby Natural Bug Spray BabyGanics Sunscreen and Insect Repellents: Avon Skin So Soft Bug Guard-SPF 30
Food and Beverage	Pre-packaged food, fast food wrappers or containers	Bottled water or hydration drinks

The following considerations should be taken during sample collection to prevent contamination:

- Dust and fibers must be kept out of sample containers.
- The sample cap should never be placed directly on the ground during sampling. If necessary, place the cap on a clean surface (cotton sheeting, HDPE sheeting, triple rinsed cooler lid, etc.).
- New, powderless Nitrile Gloves are required for all sampling activities.
- Regular/thick size markers (Sharpie® or otherwise) are to be avoided; as they may contain PFAS.
- Fine and Ultra-Fine point Sharpie® markers are acceptable to label the empty sample container while in the staging area, provided the lid is on the sample container and gloves are changed following labeling.
- Ballpoint pens may be used when labeling sample containers. If ballpoint pens do not write on the sample container labels, preprinted labels from the laboratory may be used.
- Hands should be well washed and gloved.
- Sample containers should only be opened immediately prior to sampling.
- Sample containers should be capped immediately after collecting the sample.
- Samples should be double bagged using resealable low density polyethelene (LDPE) bags (e.g., Ziploc®) and placed in shipping container packed only with ice.

8.0 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Sample blanks and duplicates are the primary means of assuring and assessing quality control during sample collection or transport. Three QA/QC samples will be collected during the sampling event and include the following: (1) equipment blank, (2) field blank, and (3) field duplicate.

Equipment blanks

Bureau Veritas will collect one equipment blank during the planned sampling event.

Equipment blanks consist of laboratory verified PFAS-free water poured over (for equipment such as static water level indicators) or through (for equipment such as pumps, bailers and flow through cells) the sampling equipment, collected in laboratory-supplied sample containers, and analyzed.

An equipment blank will be collected prior to the first use of sampling equipment in the field (particularly if there is any uncertainty as to whether the equipment is constructed from PFAS containing materials) or after decontamination of sampling equipment. An equipment blank will be collected from a representative sample of disposable sampling equipment (i.e., one bailer from a box, a length of tubing from a roll, etc.) to document that these items are not contributing PFAS to groundwater samples. In the field, equipment blanks will be collected at a frequency of one per day.

Field blanks

Bureau Veritas will collect one field blank during the planned sampling event.

Field blanks consist of laboratory verified PFAS-free water in a laboratory supplied sample container. Per method ASTM D7979, the laboratory will provide one centrifuge tube with PFC free water and one empty centrifuge tube. When in the field, BVNA personal will open the centrifuge tube with PFC free water and pour into the empty centrifuge tube. The field blank will be opened at the Site and exposed to ambient conditions for approximately the same amount of time as an actual sampling container (generally 1 to 3 minutes). Once complete, the tube will be capped and labeled

Field duplicates

Bureau Veritas will collect one field duplicate during the planned sampling event.

Groundwater sample duplicates are two samples collected immediately sequentially from the same well. Duplicate samples will be labeled to prevent anyone, other than the sample collector, from knowing which specific well(s) are being duplicated

9.0 LABORATORY ANALYSES

Groundwater samples will be delivered to Merit Laboratories Inc. (Merit) in East Lansing Michigan for analysis of the MDEQ PFA requested list of PFA substances per ASTM Method D7979 with Isotopic Dilution as recommended by MDEQ. Merit is certified for the analysis of PFAS by ISO/IEC 17025.

The compounds will be analyzed for the MDEQ Minimum Laboratory of PFAs as listed below:

- Perfluoropentanoic Acid (PFPeA)
- 4:2 Fluorotelomer Sulfonic Acid (4:2 FTSA)
- Perfluorohexanoic Acid (PFHxA)
- Perfluorobutane Sulfonic Acid (PFBS)
- Perfluoroheptanoic Acid (PFHpA)
- Perfluoropentane Sulfonic Acid (PFPeS)
- 6:2 Fluorotelomer Sulfonic Acid (6:2 FTSA)
- Perfluorooctanoic Acid (PFOA)
- Perfluorohexane Sulfonic Acid (PFHxS)
- Perfluorohexane Sulfonic Acid - Linear (PFHxS-LN)
- Perfluorohexane Sulfonic Acid - Branched (PFHxS-BR)
- Perfluorononanoic Acid (PFNA)
- 8:2 Fluorotelomer Sulfonic Acid (8:2 FTSA)
- Perfluoroheptane Sulfonic Acid (PFHpS)
- Perfluorodecanoic Acid (PFDA)
- N-Methyl Perfluorooctane Sulfonamidoacetic Acid (N-MeFOSAA)
- N-Ethyl Perfluorooctane Sulfonamidoacetic Acid (EtFOSAA)
- Perfluorooctane Sulfonic Acid (PFOS)
- Perfluorooctane Sulfonic Acid - Linear (PFOS-LN)
- Perfluorooctane Sulfonic Acid - Branched (PFOS-BR)
- Perfluoroundecanoic Acid (PFUnDA)
- Perfluorononane Sulfonic Acid (PFNS)
- Perfluorododecanoic Acid (PFDoDA)
- Perfluorodecane Sulfonic Acid (PFDS)
- Perfluorotridecanoic Acid (PFTrDA)
- Perfluorooctane Sulfonamide (FOSA)
- Perfluorotetradecanoic Acid (PFTeDA

10.0 REPORT SUBMITAL

An Environmental Monitoring Report will be prepared following receipt of the analytical results. The report will include:

- Site plan and sample location map
- Narrative of the of the field procedures including relevant field notes
- Summary table of laboratory analytical results of groundwater samples
- Laboratory data sheets and chain-of-custody forms
- Discussion of laboratory and field related QA/QC information
- Well development and groundwater sampling field data forms
- Findings and conclusions

11.0 REFERENCES

Bureau Veritas North America (BVNA), 2013. Corrective Action Investigation Work Plan, prepared for PCPG Processing Group, February 15, 2013.

Bureau Veritas North America (BVNA), 2014. Corrective Action Investigation Work Plan Addendum, prepared for PCPG Processing Group, November 6, 2014

W-W Engineering and Science, 1991 and revised 1993. Hydrogeological Report and Groundwater Detection Monitoring Program, in PCPG Processing, Inc. Part B Permit Application. March 1, 1991, Revised August 20, 1993.

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.	11013-000114.00

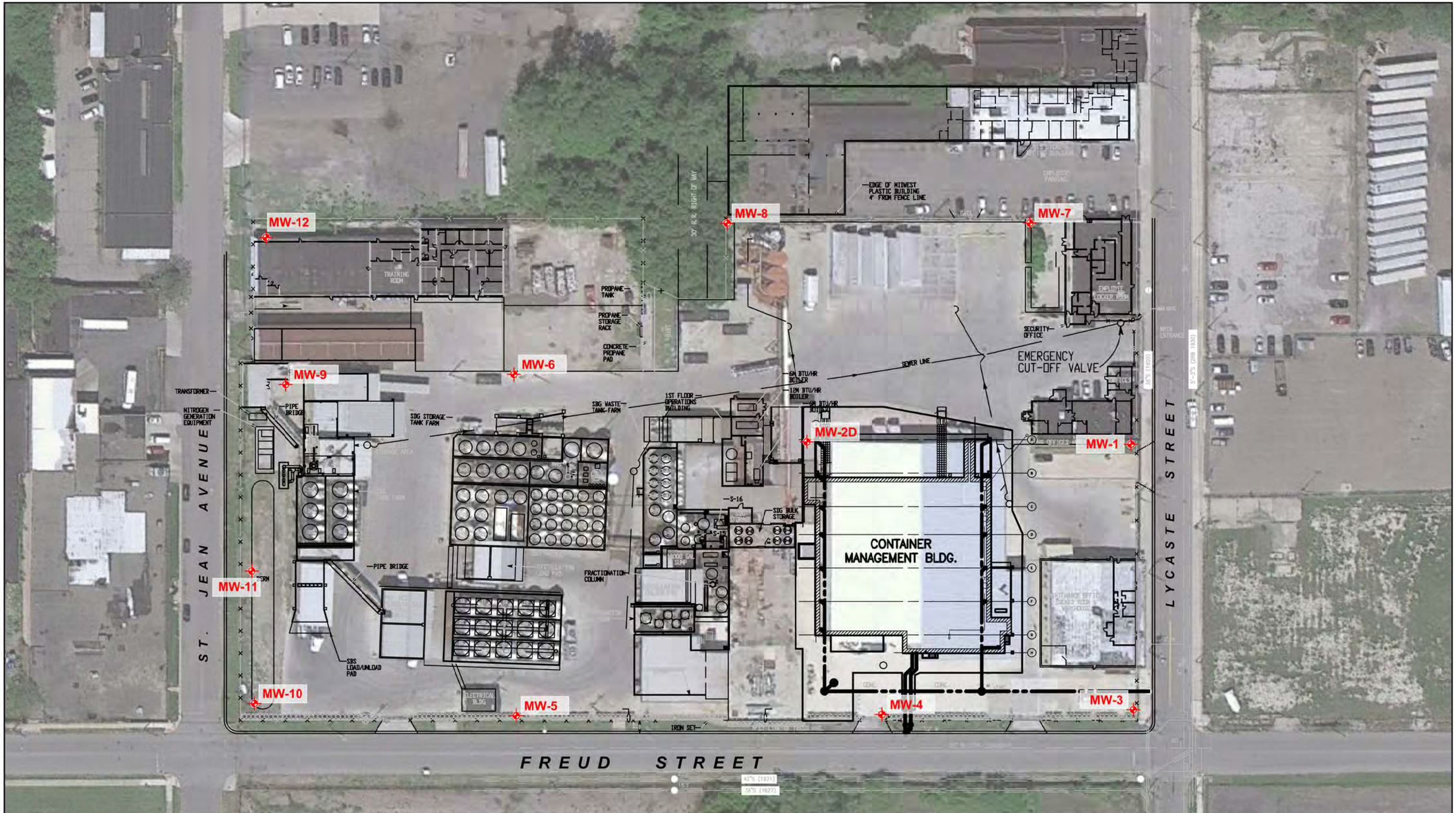
SITE LOCATION MAP

PETRO–CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

BUREAU VERITAS

FIGURE

1



LEGEND

MW-# MONITORING WELL LOCATION

SCALE IN FEET

0 40 80 160

CHECK BY	KW
DRAWN BY	JL
DATE	6/24/2016
SCALE	AS SHOWN
CAD NO.	11.16.143.00b
PRJ NO.	11016-000143.00

SAMPLING LOCATIONS

PETRO-CHEM PROCESSING GROUP
421 LYCASTE STREET
DETROIT, MICHIGAN

BUREAU VERITAS

FIGURE

2