FORMER GULF OIL TERMINAL

NASSAU COUNTY

OCEANSIDE, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 130165

Prepared for:

Chevron Environmental Management Company
1500 Louisiana Street, #38142
Houston, Texas 77002

Prepared by:

Arcadis U.S., Inc.
6041 Wallace Road Ext.
Suite 300
Wexford, Pennsylvania 15090
724-742-9180

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

SEPTEMBER 2022

CERTIFICATION STATEMENT

I Joseph Molina certify that I am currently a New York State registered professional engineer (PE) as defined in 6 New York Codes, Rules and Regulations Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation (DER-10).

Joseph Molina III [P.E]

July 16, 2025 DATE

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SITE MANAGEMENT PLAN

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List of Acronyms

AST	Aboveground Storage Tank
AWQS	Ambient Water Quality Standards
BCP	Brownfield Cleanup Program
BGS	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
CAMP	Community Air Monitoring Plan
Catamount	Catamount Petroleum LP
CEMC	Chevron Environmental Management Company
CFI	Cumberland Farms, Inc.
Chevron	Chevron U.S.A. Inc.
COC	Certificate of Completion
CP	Commissioner Policy
CVOC	Chlorinated Volatile Organic Compound
DCE	Dichloroethene
DER-10	Division of Environmental Remediation Technical Guidance for Site Investigation and Remediation
DER-31	Division of Environmental Remediation Green Remediation
DUSR	Data Usability Summary Report
EC	Engineering Control
ECL	Environmental Conservation Law
Gulf	Gulf Oil Limited Partnership
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
ISCO	In-Situ Chemical Oxidation
LNAPL	Light Non-Aqueous Phase Liquid
Lowe’s	Lowe’s Home Centers, Inc.
mg/kg	Milligrams per Kilogram
MIP	Membrane Interface Probe
MNA	Monitored Natural Attenuation
MTBE	Methyl Tert-Butyl Ether
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OWS	Oil/Water Separator
PAH	Polyaromatic Hydrocarbon
PE	Professional Engineer

RAO	Remedial Action Objective
RCA	Recycled Concrete Aggregate
RI	Remedial Investigation
ROD	Record of Decision
RSO	Remedial System Optimization
SCG	Standards, Criteria and Guideline
SCO	Soil Cleanup Objective
Site	Former Gulf Oil Terminal located in Oceanside, New York
SMP	Site Management Plan
SSD	Sub-slab Depressurization
TCE	Trichloroethene
TO	Toxic Organic
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound
VRU	Vapor Recovery Unit

Site Identification:	Site Identification No. 130165 Former Gulf Oil Terminal 1 Industrial Place Oceanside, New York 11572
Institutional Controls:	1. The property may be used for commercial and industrial uses as described in 6 New York Codes, Rules and Regulations (NYCRR) Part 375-1.8(g), although land is subject to local zoning laws.
	2. The use of groundwater underlying the property is prohibited without necessary water quality treatment and regulatory approvals identified in this Site Management Plant (SMP).
	3. Access to the Site must be provided to agents, employees, or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified in the Environmental Easements.
	4. Compliance with the New York State Department of Environmental Conservation approved SMP and Periodic Review Reporting is required.
Engineering Controls:	1. A Site cover has been placed over the Site in areas exceeding commercial Soil Cleanup Objectives (SCOs) (NYSDEC 2006) as shown on Figure 6C. The cover is either a hardscape (asphalt and concrete, building) or a minimum of 12-inches of depth of exposed material meeting the requirements as set forth in 6 NYCRR Part 375—6.7(d) for commercial use.
	2. Residual groundwater impacts will be addressed through monitored natural attenuation (MNA) in the shallow fill and lower sand units with attenuation reports provided annually.
	3. The potential for soil vapor intrusion will be mitigated through the use of a sub-slab depressurization (SSD) system within the on-Site buildings with periodic sub-slab air monitoring beneath the occupied on-Site commercial building. A Liquid Boot vapor barrier has also been installed beneath the building, but is not a engineering control.

Site Identification:	Site Identification No. 130165 Former Gulf Oil Terminal 1 Industrial Place Oceanside, New York 11572
Inspections:	**Frequency**
1. Cover and SSD	Annually
Monitoring:	
1. Groundwater monitoring per the MNA monitoring plan.	Semi-annual
2. Sub-slab air monitoring beneath the occupied on-Site commercial building; indoor air monitoring contingent on sub-slab monitoring results.	Bi-annually first year; Annual the following year if needed.
3. Soil vapor intrusion evaluation for new buildings	As needed
4. Community Air Monitoring Plan	As needed
Reporting:	
1. Groundwater monitoring report	Annually
2. Periodic Review Report	Annually first year; then every 5 years after
3. Site inspection	Annually

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this SMP:

Further descriptions of the above requirements are provided in detail in the latter sections of this SMP. In the event of any conflict between this Executive Summary and the detailed sections below, the detailed sections below shall control.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Former Gulf Oil Terminal located in Oceanside, New York (hereinafter referred to as the "Site"). See Figure 1. The Site is currently in the New York State Inactive Hazardous Waste Disposal Site Remedial Program (Site No. 130165), which is administered by New York State Department of Environmental Conservation (NYSDEC or Department).

Chevron Environmental Management Company (CEMC) manages environmental matters on behalf of its affiliate, Chevron U.S.A. Inc. (Chevron). Chevron is the party responsible for implementing remediation at the Site. Chevron entered into a Consent Order on December 23, 2009, with the NYSDEC. The Order obligates Chevron to implement a remedial program for the contamination associated with its previous petroleum storage terminal operations. A figure showing the Site location and boundaries of this Site is provided in Figure 2. The boundaries of the Site are more fully described in the metes and bounds Site description that is part of the Environmental Easement provided in Appendix A.

After completion of the remedial work, residual contamination was left at this Site, which is hereafter referred to as "residual contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the Site remedy to control exposure to residual contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Nassau County Clerk, requires compliance with this SMP and all ECs and ICs placed on the Site.

This SMP was prepared to manage residual contamination at the Site until the Environmental Easement is extinguished in accordance with Environmental Conservation Law (ECL) Article 71, Title 36. This plan has been approved by the NYSDEC. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the Site-specific implementation procedures that are required by the Environmental Easement. The intentional failure to properly implement the SMP is a violation of the Environmental Easement, which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP may also constitute a violation of ECL, 6 New York Codes, Rules and Regulations (NYCRR) Part 375 (NYSDEC 2006) and the

Consent Order (Index #W3-1142-09-08; Site #130165) for the Site, and thereby subject to applicable penalties.

All reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State.

This SMP was prepared by Arcadis of New York Inc., on behalf of CEMC in accordance with the requirements of the NYSDEC's Division of Environmental Remediation "Technical Guidance for Site Investigation and Remediation" (DER-10), (NYSDEC 2010a), and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Environmental Easement for the Site.

Chevron as the party responsible for implementing remediation at the Site in accordance with the Consent Order, assumes the obligations contained in this SMP which include, but are not limited to, sampling, monitoring, inspections and/or operating a treatment system, and providing certified reports to the NYSDEC. The owner of the Site parcel, is obligated to only provide access to the Site and to comply with the use limitations and restrictions and requirements of this SMP as they apply to the owner and owner's tenant's activity on the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Upon reasonable notice to the then current owner which shall be not less than sixty (60) days, NYSDEC can also make changes to the SMP or request revisions from the remedial party. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the Site conditions. In accordance with the Environmental Easement for the Site, the NYSDEC project manager will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted to the NYSDEC, as needed by Chevron or the property owner as set forth in Table 1.1, in accordance with NYSDEC's DER-10 for the following reasons:

1. 60-day advance notice of any proposed changes in Site use that are required under the terms of the Consent Order, 6 NYCRR Part 375 and/or ECL.

2. 7-day advance notice of any field activity associated with the remedial program.
3. 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan (Appendix B). If the ground-intrusive activity qualifies as a change of use as defined in 6 NYCRR Part 375, the above mentioned 60-day advance notice is also required.
4. Notice within 48 hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC within established restricted areas as shown on Figure 6C, and likewise, any action to be taken to mitigate the damage or defect.
5. In the event of any emergency, verbal notice by noon of the following day of any such emergency that reduces or has the potential to reduce the effectiveness of ECs in place at the Site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
6. Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

7. Within 15 days after the transfer of all or part of the Site, the new owner’s name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1-1 on the following page includes contact information for the above notifications. The information on this table will be updated as necessary to provide accurate contact information. A full listing of Site-related contact information is provided in Appendix C.

Table 1-1. Notifications*

Name	**Contact Information**	**Required Notification****	**Notifications Made By**
NYSDEC Project Manager - Steven Scharf	518-402-9620 steven.scharf@dec.ny.gov	All Notifications	Chevron – Notifications 2 and 6 as well as 3, 4, 5, and 6 as applicable to Chevron. Property Owner – Notifications 1 and 7 as well as 3, 4, 5, and 6 as applicable to Owner
NYSDEC Project Manager's Supervisor - John Swartwout	518-402-9570 john.swartwout@dec.ny.gov	All Notifications	
NYSDEC Site Control – Kelly Lewandowski	518-402-9553 kelly.lewandowski@dec.ny.gov	Notifications 1	
NYSDOH Project Manager - Jacquelyn Nealon	518-402-7860 jacquelyn.nealon@dec.ny.gov	Notifications 4, 5, and 6	

* Note: Notifications are subject to change and will be updated as necessary.

** Note: Numbers in this column reference the numbered bullets in the notification list in this section.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Oceanside, Nassau County, New York and is identified as Section 43, Block 400 with Lots 502, 503, & 504 on the Nassau County Tax Map (see Figure 3). The Site is an approximately 7.2-acre area and is bounded by the Former Exxon Terminal Site which contains most of a Costco warehouse building (currently 85 percent of the Costco warehouse building footprint is located on Lots 712 and 713, which is not affiliated with the Former Gulf Terminal Consent Order, and 15 percent of the Costco warehouse building is on Lot 502), Daly Avenue, and Liotta Bros Recycling Corporation across Daly Avenue to the north. In addition, the Site is bounded by Hog Island Channel to the south, Long Island Railroad to the east, and Hampton Road, an office building, and an automobile recycling facility (Novak Auto Corporation) to the west (see Figure 3 – Tax Map). The boundaries of the Site are more fully described in Appendix A – Environmental Easement. The owner of the Site parcel at the time of issuance of this SMP is/are:

> *KLEIN-COSTCO, LLC, 2066 EAST-WEST, LLC, GATE OCEANSIDE, LLC, LANDMARK OCEANSIDE, LLC, DA OCEANSIDE, LLC AND 330 OCEANSIDE, LLC, collectively having an office c/o Nike Equities, 25A Hanover Road, Suite 350, Florham Park, New Jersey 07932*

The operator of the Site parcel at the time of issuance of this SMP is:

> *Costco Wholesale Corporation*
> *3705 Hampton Rd, Oceanside, NY 11572-4808*

2.2 Physical Setting

2.2.1 Land Use

The Site consists of a portion of a Costco warehouse building footprint, a paved parking lot with landscaped features, and a fuel service station with a small modular kiosk building to the south. The Site is zoned for commercial and industrial use and is currently utilized for commercial use as a Costco in conjunction with the adjacent parcel to the North.

The other properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial and industrial properties. The properties north of the Site (and adjoining Costco parcel) include commercial and industrial properties; the properties immediately east of the Site include industrial properties; and the properties to the west of the Site include commercial and industrial properties.

2.2.2 Geology

The geologic units identified at the Site during the Remedial Investigation (RI) include:

- An average of approximately 4 feet (below ground surface [bgs]) of fill (below commercial Soil Cleanup Objective [SCOs]) was added to the Site during redevelopment in 2015 prior to paving;
- Sand and gravel fill from the 4 feet bgs to approximately 12 feet bgs;
- Meadow mat (silt with fibrous organics and trace clay) 12 feet bgs to approximately 20 feet bgs;
- Underlying sand (coarse to fine sand, trace to some fine gravel) from 20 feet bgs to approximately 90 feet bgs; and
- Gardiners clay below 90 feet bgs.

With the exception of the southern area of the Site, the meadow mat was encountered throughout the Site at a thickness ranging from 5 to 12 feet.

Cross section locations are shown on Figure 4A; and Cross Sections A’ and B’ are provided on Figures 4B and 4C, respectively.

2.2.3 Hydrogeology

The underlying sand (lower sand unit) has been divided into three horizons for purposes of discussion: monitoring wells in the D1 horizon are generally screened between 20 and 30 feet bgs, monitoring wells in the D2 horizon are screened between 30 and 42 feet bgs, and monitoring wells in the VD horizon are screened at the base of the unit (58 to 83 feet bgs).

Groundwater has historically been observed at elevations ranging between 2 and 5 feet above mean sea level (7 to 9 feet bgs). The groundwater elevation in the lower sand unit is strongly influenced by the tidal cycle. The groundwater elevation in the lower sand unit can change by as much as 3 feet in response to tidal changes. The groundwater elevation in the shallow fill material shows a minimal response to the tidal cycle (less than 0.5 feet). The groundwater flow direction in the shallow fill material is consistently to the southwest, regardless of the tidal cycle. The groundwater flow direction in the lower sand unit can change by as much as 180 degrees in response to the tidal cycle.

Groundwater contour maps are presented in Figures 5A through 5C. Groundwater elevation data is provided in Table 1. Groundwater monitoring well construction logs are provided in Appendix D.

2.3 Investigation and Remedial Action History

2.3.1 Site History

The Site consists of three lots, Lots 502, 503, and 504. In 1931, Gulf Oil Corporation developed a portion of the Site (Lot 504) as a petroleum storage terminal. Gulf Oil Corporation purchased Lots 503 and 502 in 1950 and 1956, respectively. Chevron acquired Gulf Oil Corporation in the mid-1980s. As part of the purchase agreement, Chevron was required to divest the northeast division. In 1986, Cumberland Farms, Inc. (CFI) purchased the northeast marketing assets of Gulf Oil Corporation from Chevron. The purchase included the Oceanside Terminal, which was transferred to CFI in May 1986. In December 1993, CFI, in a joint venture with Catamount Petroleum LP (Catamount), formed Gulf Oil Limited Partnership (Gulf). CFI owned two-thirds of Gulf as a limited partner, and Catamount owned one-third of Gulf as the general partner. In September 2005, CFI exercised its option to buy out Catamount and reorganized Gulf under a new general partner. However, ownership percentages of Gulf did not change during the reorganization. In 2015, the Site was sold to Coremark Group Holdings LLC, who has leased the property to Costco. The Site is currently developed as a Costco Wholesale Warehouse facility.

Operation of the petroleum storage terminal ceased in the early 1990s. Demolition of the 2003. The remaining on-Site buildings (maintenance building, office building, and several small buildings associated with historical petroleum terminal operations) were demolished in 2005.

The Site has undergone extensive investigation and remediation since the 1990s under NYSDEC oversight (Spill No. 92-03883). In January 2007, the NYSDEC accepted Lowe's Home Centers, Inc. (Lowe's) as a volunteer under the Brownfield Cleanup Program (BCP) – Site No. C130165. Following the decision by Lowe's to withdraw from the BCP in 2009, the NYSDEC transferred the Site into the Hazardous Waste Program (State Superfund Site). An Order on Consent and Administrative Settlement were executed between the NYSDEC and CEMC on December 23, 2009 (Index # W3-1142-09-08, Site #130165).

The following were previously located on the Gulf parcel:

- Nine large-quantity aboveground storage tanks (ASTs) containing fuel oil, kerosene, and gasoline;

- Two small 550-gallon ASTs containing fuel oil for the on-Site garage and office building;
- Three underground storage tanks (USTs) containing fuel oil (one 550-gallon, one 1,000-gallon, and one 5,000-gallon);
- One 1,000-gallon UST containing waste oil;
- A loading rack;
- A retention pond;
- A maintenance garage;
- A vapor recovery unit (VRU); and
- An office complex.

Four of the nine large ASTs were demolished prior to 2000, with the remaining five large ASTs reportedly demolished in 2003. The two 550-gallon ASTs containing fuel oil for the maintenance garage and the office building were demolished in 2005. A Site map depicting the approximate locations of the former building, structures, tanks, and monitoring wells is provided on Figure 2.

Light non-aqueous phase liquid (LNAPL), consisting of a mixture of No. 2 and No. 4 fuel oil, kerosene, and gasoline, had previously been detected in a monitoring well near the bulkhead at the southern portion of the Site at a thickness up to 2.28 feet. LNAPL was also encountered near the former VRU and the former garage building. The observed occurrences of LNAPL and shallow soil impacts were addressed through a series of initial remedial measures. Measurable LNAPL has not been observed at the Site since 2004.

In 2015, approximately four to seven feet of recycled concrete aggregate (RCA) fill from an NYSDEC-approved facility was added to the Site.

2.3.2 Summary of Previous Investigations

The former Gulf Oil Terminal Site has undergone extensive investigation and remediation since the 1990s. Historical soil and groundwater investigations conducted prior to 2004 indicated that soil impacted with volatile organic compounds (VOCs) at concentrations above NYSDEC SCOs were observed primarily in the western and southern portions of the Site. VOC-impacts in groundwater had been observed predominantly in the northeastern, central, and southern portions of the Site. Chlorinated volatile organic compounds (CVOCs), including trichloroethene (TCE), cis-1,2-

dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and vinyl chloride were also detected in soil and groundwater at the Site in proximity to the former VRU. Concentrations of CVOCs in excess of criteria were also observed in groundwater in the meadow mat and the deep sand layer immediately underlying the meadow mat (Arcadis 2011).

Since 2010, a series of supplemental investigation activities were completed to further characterize the Site conditions. An RI was conducted from November 2010 through April 2011 to further characterize the petroleum impacts (including limits of historically observed LNAPL), augment the existing monitoring well network, and develop additional water quality data required to support selection of a remedial technology. RI field activities included the excavation of a series of test pits, drilling of soil borings, installation of new groundwater monitoring wells, and collection of soil and groundwater samples for field and laboratory analyses. Data generated during the RI is documented in the *Remedial Investigation Data Summary Report* (Arcadis 2011).

In 2016, post 2013-2014 interim remedial measure (IRM), a residual source area investigation was conducted in the former VRU area that included: membrane interface probes (MIPs) advanced in the lower sand unit for the collection of soil data to provide a semi-quantitative delineation of the residual source area and to select the location of the AMW-15 (Figure 2) well cluster; drilling of soil borings for the collection of soil samples and grab groundwater samples from select borings to provide additional characterization in the lower sand unit and to support future remedial actions; installation of new groundwater monitoring wells; and three groundwater monitoring events at 31 existing and 11 newly-installed monitoring wells and eight temporary wells. Data generated during the residual source area investigation is documented in the *Supplemental Remedial Investigation Report* (Arcadis 2017).

Previous investigations indicate that there are two primary sources of contamination at the Site impacts from the historical petroleum terminal operations which occurred from 1931 to the early 1990s, including the operation of the former VRU, and the historical fill used to create the landmass which became the Site. Soil impacts from terminal operations and historical fill exist primarily in six areas of the Site: the former turbine pump area; the former garage building area; the southwest area which includes a former one-story block building, a former two-story brick building, and a former one-story brick office building; the former loading rack area; the former VRU area; and the former oil/water separator (OWS) area. Isolated soil impacts also exist along Hampton Road.

As shown on Figure 6A and 6A, polyaromatic hydrocarbons (PAHs), including benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, benzo(a)pyrene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected in the shallow fill unit at concentrations exceeding Protection of Groundwater SCOs and/or Commercial Use SCOs. Generally, the PAHs are not located within the shallow fill unit where historical terminal operations occurred. The detected PAHs are not volatile and are highly insoluble. These PAHs are primarily pyrogenic in nature or are the result of combustion of fossil fuels. The presence of these PAHs in the shallow fill unit strongly indicates that the terminal operations were not the source of these PAHs.

It is evident that the PAH COCs in the soils were historically deposited on the Site with the historic fill used to create the landmass which became the Site. Thus, PAHs are not considered COCs related to terminal operations for the Site and are not carried forward in following discussions.

The data generated during the RI and Supplemental RI were used to evaluate the nature and extent of COCs related to terminal operations and identify potential source areas, and in the development of the alternatives presented in the Feasibility Study (Leidos 2017). Maps and presentation of the data are provided in the *Supplemental Remedial Investigation Report* (Arcadis 2017).

2.3.3 Summary of Historical Remedial Actions and Interim Remedial Measures

Historical remedial actions implemented prior to 2011 were completed while the Site was being addressed under the Spills program. Since 2011, two IRMs have been completed at the Site: excavation in the former VRU area and three excavations to address isolated hot spots. A summary of the historical remediation actions and IRMs is provided below.

2.3.3.1 In-Situ Chemical Oxidation Pilot Test - November 2004

An In-Situ Chemical Oxidation (ISCO) pilot test study was completed in November 2004 within the former turbine pump area. A modified Fenton's reagent consisting of ferrous sulfate, citric acid, and hydrogen peroxide was used for the pilot test. The pilot test used 2 and 4 percent aqueous solutions.

Two types of injection methods were tested. The first method used Geoprobe injection points and the second method used temporary well injection points. The reagent was injected at 20 pounds per square inch pressure in the Geoprobe points, whereas gravity feed was used in the temporary well injection points. Pre- and post-injection soil samples were collected and analyzed; results indicated no significant change (less than 10 percent increase or decrease) to the concentration subsequent to injection. Fenton's reagent was determined to be an ineffective means of delivering the reagent to the soil due to poor reagent-soil mixing (Arcadis 2011).

2.3.3.2 Former Vapor Recovery Unit Area – Interim Remedial Measure Activities – 2013 and 2014

In 2013 and early 2014, an IRM was completed in the former VRU area. The VRU area measured approximately 60 feet by 65 feet and was excavated to a final depth that varied from 13 to 18 feet bgs. The excavation was performed using a cement-bentonite slurry, which mitigated the need for dewatering and maintained adequate hydraulic pressure to prevent water infiltration and failure of the minimal remaining clay zone above the lower sand. Impacted material was excavated using traditional construction equipment to the limits shown on Figure 4A. Approximately 3,464 tons of soil were excavated for off-Site disposal. The cement-bentonite slurry was left in place upon completion of the excavation to stabilize. The remainder of the open excavation was backfilled with approximately 6 inches of 1- to 2- inch stone to match the existing grade. Excavation and removal of soil impacts identified within the pre-defined area successfully facilitated protection of human health and the environment through recovery of contaminant mass and elimination or control of potential exposure.

Field activities associated with the former VRU IRM, including well decommissioning and pre-characterization soil borings, are documented in the *Interim Remedial Measure Completion Report* (Arcadis 2014a).

2.3.3.3 Interim Remedial Measure Addendum Activities − 2014

Three IRM Addendum excavation areas were excavated in 2014 in accordance with the Interim Remedial Measure Addendum Work Plan (Arcadis 2014b): the AMW-5 excavation measured 10 feet by 10 feet and was excavated to 13 feet bgs; the GS-2/GP-NORTH excavation measured 10 feet by 15 feet and was excavated to 8 feet bgs; and the GP-6 excavation measured 5 feet by 5 feet and was excavated to 7 feet bgs. Impacted material was excavated using traditional construction equipment to the limits is presented on Figure 4A. Approximately 110 tons of soil was excavated for off-Site disposal. Each excavation was backfilled with acceptable materials. At the AMW-5 and GS-2/GP-NORTH excavations, stone was placed in the bottom of the excavation to bridge the saturated zone. The top of each excavation, as well as the entire GP-6 excavation, was backfilled with compacted general fill materials to match the existing grades. Excavation and removal of soil impacts identified within the pre-defined areas successfully facilitated protection of human health and the environment through recovery of contaminant mass and elimination or control of potential exposure (Arcadis 2014b).

In summary, the completed IRMs have addressed the sources of VOCs and CVOCs at the Site.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site as listed in the Record of Decision (ROD) dated December 10, 2021 are as follows:

2.4.1 Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Prevent the discharge of contaminants to surface water.

2.4.2 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

2.4.3 Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a Site.

2.5 Residual Contamination

The sources of the Site contamination are associated with historical petroleum terminal operations conducted from 1931 to the early 1990s, and discharges from piping associated with former ASTs, loading rack operations, turbine pump area operations, and bulkhead area loading/unloading operations that have contributed to the impact of soil and groundwater.

Prior investigations have determined that the Site contains soil impacted by petroleum in the historic fill above the meadow mat and groundwater is impacted by petroleum related constituents above and below the meadow mat. In addition, soil and groundwater impacted by chlorinated VOCs have been documented in the area of the former VRU located in the northwestern/central western portion of the Site directly above and below the meadow mat. The chlorinated VOC impacts include TCE, cis-DCE, trans-DCE and vinyl chloride.

2.5.1 Soil

Since 2004, a total of 227 soil samples have been collected for analysis at the Site. Of the 227 soil samples, 162 samples were collected from the shallow fill unit, 10 samples were collected from the meadow mat, and 55 samples were collected from the lower sand unit. The following is a summary of the COCs, that have not been excavated or remediated, that exceed the Protection of Groundwater and/or the Commercial Use SCOs for each of the impacted areas that have been identified at the Site.

Impacted soil and areas of elevated petroleum-hydrocarbons were removed from the area surrounding the former VRU/small AST pad, an area west of the former garage building, an area southeast of the former truck loading racks and an area southeast of the former garage building.

Following the completed IRMs, petroleum-related soil impacts, at concentrations above the Protection of Groundwater SCOs, remain in the shallow fill unit at various depths ranging from approximately 8 to 15 feet bgs in six areas of the Site: the former turbine pump area; the former garage building area; the southwest area; the former loading rack area; the former VRU area; and along Hampton Road. Arsenic, at concentrations up to 28.1 milligrams per kilogram (mg/kg) above the commercial use SCO of 16 mg/kg below 6 feet and remains in isolated areas of the southwest area.

Although reduced as a result of the completed IRMs, soil impacts that remain in the meadow mat and lower sand unit are generally associated with the former VRU, which include chlorinated VOCs (TCE, cis-1,2-DCE, methylene chloride, vinyl chloride) that create concentrations in groundwater above applicable standards. Petroleum-related contaminants (benzene and methyl tert-butyl ether [MTBE]) are also present in the former VRU area at concentrations above the Protection of Groundwater SCOs. Soil impacts remain at various depths ranging from 12 to 30 feet bgs.

Table 2 and Figure 6A and 6B summarize and present the results of the soil samples collected that exceed the Unrestricted Use and the Commercial Use SCOs at the Site following completion of remedial actions. Figure 6C presents the areas of residual soil exceedances (above Protection of Groundwater and/or Commercial Use SCOs) at the Site that remain in place and have not been previously remediated.

2.5.2 Groundwater

Shallow and deeper groundwater at the Site are impacted by VOCs and SVOCs when concentrations were compared to Ambient Water Quality Standards (AWQS) (NYSDEC 1998) as a result of residual VOC and SVOC affects in shallow soil and the meadow mat beneath the Site. The identified areas of concern are the former VRU area, the former loading rack area, the barge dock/bulkhead area, and the area west, south and southeast of the former garage building.

Deeper groundwater in the western half of the Site has been impacted by a mixture of chlorinated hydrocarbons (primarily methylene chloride and TCE) and petroleum hydrocarbons consisting of gasoline fuel-related compounds (benzene, toluene, ethylbenzene and xylene [BTEX] and MTBE) and diesel/fuel oil-related compounds (acenaphthene, fluorene, naphthalene, and phenanthrene) when concentrations were compared to AWQS. Concentrations of these VOCs and SVOCs remain elevated in deeper groundwater. Chlorinated hydrocarbons, primarily methylene chloride and TCE, remain elevated in the deeper groundwater beneath the former VRU area. The daughter products (1,2-DCE and vinyl chloride) from biodegradation of TCE were evident in the groundwater sample results from prior sampling events.

On-Site groundwater at the former VRU is affected by chlorinated hydrocarbons, consisting primarily of TCE, TCE daughter products, and methylene chloride. The plume in the shallow groundwater (water table) zone has moderate dissolved phase concentrations at its core and is located southwest of the former VRU extending beneath Hampton Road. The deeper groundwater plume, below the meadow mat layer, is relatively compact in size, but dissolved phase concentrations are high at its core. This plume is centered almost directly beneath the location of the former VRU.

Results from post-remedial sampling confirms that natural attenuation is occurring.

Table 3 and Figures 7A through 7C summarize the results of samples of groundwater that exceed the AWQS after completion of the remedial action.

2.5.3 Soil Vapor

Soil vapor has the potential to serve as a pathway for volatile COCs within the subsurface (including BTEX and CVOCs) to migrate into on-Site buildings. However, the potential for a complete pathway to receptors within the building are unlikely. The existing Costco warehouse building is approximately 158,775 square feet and is of significant height. The floor is concrete and serves as a cap. Additionally, a Liquid Boot® vapor intrusion barrier is installed across the warehouse floor. A passive sub-slab depressurization (SSD) system is also installed at the Costco facility and can be made active/operational, if warranted based on proposed sub-slab monitoring and sampling. Further actions to assess the potential for soil vapor will be discussed in Section 4.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since residual contamination exists at the Site, ICs and ECs are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the Site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC project manager.

This plan provides:

- A description of all IC/ECs on the Site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Environmental Easement;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (Appendix B) for the proper handling of residual contamination that may be disturbed during maintenance or redevelopment work on the Site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the Site remedy, as determined by the NYSDEC project manager.

3.2 Institutional Controls

A series of ICs is required by the December 2021 ROD to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to residual contamination; and, (3) limit the use and development of the Site to commercial and industrial uses only. Adherence to these ICs on the Site is required by the Environmental Easement and will be implemented under this SMP. ICs identified in the Environmental Easement may not be discontinued without an amendment to or extinguishment of the Environmental Easement. These ICs are:

- The property may be used for: commercial and industrial use;
- All ECs must be operated and maintained as specified in this SMP;

- All ECs must be inspected at a frequency and in a manner defined in the SMP;
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the New York State Department of Health (NYSDOH) or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to Site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb residual contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the Site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Environmental Easement;
- The potential for vapor intrusion must be evaluated for any buildings developed in the area within the Site boundaries (Figure 2) and if potential impacts are identified based on vapor intrusion screening criteria and sampling, they must be monitored or mitigated;
- Vegetable gardens and farming on the Site are prohibited; and

3.3 Engineering Controls

3.3.1 Cover System

Exposure to residual contamination at the Site is prevented by a cover system placed over the Site. Figure 6C presents the areas of residual soil exceedances (above Protection of Groundwater and/or Commercial Use SCOs) at the Site that remain in place and have not been previously remediated. The cover system only applies to the areas of the Site with residual soil impacts exceeding applicable Protection of Groundwater and/or Commercial Use SCOs as shown on Figure 6C. The SMP requires a minimum cover thickness of 1 feet of exposed soil meeting the requirements as set forth in 6 NYCRR Part 375—6.7(d) for commercial use, or an asphalt or concrete cover system and/or building that will be maintained throughout any future Site activities.

The on-Site existing cover system is comprised of a minimum of one to seven feet of soil meeting the requirements as set forth in 6 NYCRR Part 375—6.7(d) for commercial use, topped with asphalt pavement, concrete-covered sidewalks, and concrete building slabs. The Excavation Work Plan provided in Appendix B of this SMP outlines the procedures to be implemented in the event the existing cover system within the restricted areas with residual soil impacts is breached, penetrated or temporarily removed. The procedures to inspect the existing cover system are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the Excavation Work Plan must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP; Appendix E) and associated Community Air Monitoring Plan (CAMP; Appendix F). The template versions of the HASP and CAMP provided must be revised consistent with the specific activities to be implemented prior to implementation. Any disturbance of the Site's cover system must be overseen by a qualified environmental professional as defined in 6 NYCRR Part 375, a Professional Engineer (PE) who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

3.3.2 Locked Monitoring Well Cover System

Exposure to residual contamination in groundwater via the Site monitoring wells is prevented by a well cover system. This cover system is comprised of a locked seal at the top of the well casing (locked j-plug) and bolted flush-mounted cover over the well. Procedures for the inspection and sampling of the monitoring wells are provided in the Monitoring Plan included in Section 4 of this SMP.

3.3.3 Sub-Slab Depressurization System

The potential for soil vapor intrusion within the Costco warehouse building is mitigated through the use of a Liquid Boot® vapor intrusion barrier installed across the warehouse floor, and existing passive SSD venting system installed as part of the Site IRMs. The SSD system is currently passive. The existing passive SSD will be inspected annually and sampled (for sub-slab vapor, and indoor air contingent on sub-slab vapor sampling results) as part of the Site annual inspection, discussed in Sections 4.4 and 6. If sub-slab data indicate that the SSD and Liquid Boot® vapor intrusion barrier is effectively mitigating vapor intrusion, a proposal will be sent to the NYSDEC to discontinue annual inspections. Alternatively, based on sub-slab and indoor air sampling results, if site-related vapors are impacting the indoor air at the Costco warehouse building, then the passive SSD will be modified to an active SSD.

Procedures for inspecting and monitoring the SSD are documented in Section 4.4. An SSD operation and maintenance (O&M) Plan and as-built drawings, signed and sealed by a PE who is licensed and registered in New York State, are included in Appendix G.

3.3.4 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the RAOs identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10. Unless waived by the NYSDEC, confirmation samples of applicable environmental media are required before terminating any remedial actions at the Site. Confirmation samples require Category B deliverables and a Data Usability Summary Report (DUSR).

As discussed below, the NYSDEC may approve termination of a groundwater monitoring program. When a remedial party receives this approval, the remedial party will decommission all Site-related monitoring, injection and recovery wells as per the NYSDEC Groundwater Monitoring Well Decommissioning Policy (CP-43).

The remedial party will also conduct any needed Site restoration activities, such as asphalt patching and decommissioning treatment system equipment.

3.3.4.1 Cover

The cover system is a permanent control, and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP. As stated in the NYSDOH letter dated August 16, 2022, the “Special Requirements” CAMP (Appendix F) would apply if any ground-intrusive activities occur below the 8-foot demarcation layer within 20 feet of the Costco Service Station.

3.3.4.2 Sub-Slab Depressurization System

The passive SSD system will be maintained unless prior written approval is granted by the NYSDEC and the NYSDOH project managers. If sub-slab monitoring and sampling data indicates that the passive SSD system is not sufficiently mitigating potential vapor intrusion, a proposal to convert to an active SSD system will be submitted by the remedial party to the NYSDEC and NYSDOH project managers. If sub-slab monitoring data indicates that the passive SSD (and existing Liquid Boot® vapor intrusion barrier) is effectively mitigating vapor intrusion and that there is no risk for vapor intrusion inside the Costco warehouse building, a proposal will be submitted to the NYSDEC and

NYDOH to remove the SSD as an engineering control such that no additional monitoring or inspection of the SSD will be needed.

3.3.4.3 Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC project manager in consultation with NYSDOH project manager, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the Site Standards, Criteria and Guidelines (SCGs), or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the monitoring will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC project manager.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

The monitoring plans incorporated into this SMP include a groundwater monitoring plan, a field sampling procedures plan (Appendix H), a Quality Assurance Project Plan (Appendix I), sub-slab soil gas sampling plan which describes the sub-slab and indoor air (contingent on sub-slab sampling results) sampling methods for evaluating the performance and effectiveness of groundwater and SSD system. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of Site management for the Site are included in the Quality Assurance Project Plan provided in Appendix I.

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC project manager.

4.2 Site Wide Inspection

Site-wide inspections will be performed by a Qualified Environmental Professional on a regular schedule at a minimum of once per year (Table 4-1). Modification to the frequency or duration of the inspections will require approval from the NYSDEC project manager. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. The form will determine and document the following:

- Compliance with all ICs, including Site usage;
- Whether the EC continues to perform as intended;
- If EC continues to be protective of human health and the environment; and
- Compliance with requirements of this SMP and the Environmental Easements.
- Compliance with the Site usage ICs;
- An evaluation of the condition and continued effectiveness of the EC; and
- General Site conditions at the time of the inspection.

Table 4-1. Remedial System Sampling Requirements and Schedule

Monitoring Program	Frequency*
Site-wide periodic inspection of cover system	Annually
Site-wide inspection of cover system after severe weather	10 days after severe event** or when it is safe to access the Site

* The frequency of events will be conducted as specified until otherwise approved by NYSDEC and NYSDOH.
** A severe weather event includes rainfall totaling in excess of 8-inches in a 24-hour period.

Reporting requirements are outlined in Section 6 of this plan.

4.3 Groundwater Monitoring

Groundwater monitoring is being implemented by Arcadis on behalf of CEMC at the Site to assess natural attenuation. Groundwater contamination in the shallow fill unit and lower sand unit is being addressed by monitored natural attenuation (MNA) program. Following the IRM activities, the monitoring well network was evaluated for each water-bearing horizon – shallow fill unit and lower sand unit. A total of 18 monitoring wells are proposed for sampling using Hydrasleeve™ no-purge sampling as part of a MNA program. Groundwater will be monitored for Site related VOCs and for MNA parameters (carbon dioxide, total chloride, sodium, total alkalinity, nitrate-nitrite, pH, ferric iron and total iron) which will provide an understanding of the biological activity breaking down the contamination. Monitoring for Site related contamination will be conducted semi-annually and for MNA indicators annually. Wells will be sampled in accordance with the Hydra-sleeves field sampling procedures (Appendix H). The remedial party will measure depth to the water table for each monitoring well in the network before sampling. The groundwater monitoring plan and schedule is included in Table 4 and the well construction logs for wells included in the monitoring plan are included in Appendix D.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC project manager will be notified prior to any repair, replacement or decommissioning of any monitoring well. The repair or decommissioning and replacement processes implemented during any reporting period will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC project manager. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures". Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC project manager.

The sampling frequency may only be modified with the approval of the NYSDEC project manager. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC project manager. Deliverables for the groundwater monitoring program are specified in Section 6.

4.4 Sub-Slab Depressurization System Monitoring

Sub-slab sampling will be performed initially using existing sub-slab monitoring points beneath the occupied on-Site Costco warehouse building. Indoor air monitoring will be performed only if needed and contingent on the results of sub-slab monitoring, as identified in Table 4-2 Remedial System Monitoring Requirements and Schedule (see below). The inspection of the SSD will be conducted by a qualified environmental professional, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State. If results of the initial sub-slab monitoring and sampling indicates that there is no potential for vapor intrusion and that the passive SSD (and existing Liquid Boot® vapor intrusion barrier) is adequately mitigating vapor intrusion, a proposal will be submitted to the NYSDEC and NYDOH to remove the SSD as an engineering control and no additional monitoring or inspection of the SSD will be needed. Alternatively, based on sub-slab and indoor air sampling results, if site-related vapors are impacting the indoor air at the Costco warehouse building, then the passive SSD will be modified to an active SSD. Modification to the SDS and/or frequency or sampling requirements will require approval from the NYSDEC project manager.

Table 4-2. Remedial System Monitoring Requirements and Schedule

Remedial System Component	Schedule
Piping Inspection	Annually
Building Slab Inspection	Annually

Sub-slab Vapor Sampling	Bi-annually first year; annual the following year if required by NYSDEC
Indoor Air Sampling	Contingent on sub-slab sampling results

Sub-slab vapor sampling will be conducted bi-annually, followed by an annual sampling the following year if required by the NYSDEC. Sub-slab samples will be analyzed for United States Environmental Protection Agency (USEPA) Method Toxic Organic (TO)-15. The purpose of the vapor sampling is to determine if the SSD system needs to remain in passive operation or be upgraded to an active system or removed as an EC. Should the vapor sample results determine the SSD must be operated as an active system, a revision to this SMP and SSD O&M Plan and As-Builts (Appendix G) will be submitted at a later date. Figure 8 presents the proposed locations of the sub-slab vapor sampling points (and indoor air samples contingent on sub-slab sampling results) inside the Costco warehouse building and Figure 9 presents details of the site survey and relevant drainage features. Appendix H presents the field sampling procedures for sampling the SSD system and sub-slab samples. As per the NYSDEC Comment Letter dated June 7, 2022, it was agreed that soil vapor intrusion evaluation is not needed for the building at the southern portion of the site since it was an open portico type structure covering the gas station bays and it is not an actual building.

SSD inspection will be conducted annually if needed contingent on the results of the initial sub-slab monitoring and sampling. Any damaged piping, pipe supports, or piping labels will be repaired or replaced. Each SSD piping discharge will be inspected to verify that no air intakes into the building have been located nearby. A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix J Monitoring and Sampling Protocol.

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix H. Other observations (e.g., groundwater monitoring well integrity) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the field sampling procedures in Appendix H.

5.0 PERIODIC ASSESSMENTS/EVALUATIONS

5.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given Site and associated remedial systems. Vulnerability assessments provide information so that the Site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

The subject Site is considered to have low vulnerability related to climatic conditions. There are no State or Federal wetlands located on the Site. Portions of the parking lot are located in a floodplain. The Site will not employ any remedial systems reliant upon electrical power unless the SSD is converted to an active system; the Site is serviced by municipal sewer system (storm and sanitary). As such, acute cover system erosion to a depth greater than 12-inches, and the resultant potential exposure to residual contamination, is highly unlikely.

5.2 Green Remediation Evaluation

NYSDEC’s DER-31 Green Remediation (NYSDEC 2010b) requires that green remediation concepts and techniques be considered during all stages of the remedial program including Site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the Site during Site management, and as reported in the Periodic Review Report.

The maintenance of SSD system is not anticipated to use energy for operations, generate additional waste, produce emissions, require substantial water to promote vegetative cover growth, and/or affect any ecosystem.

5.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC project manager or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;
- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the Site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a Site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information, and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

6.0 REPORTING REQUIREMENTS

6.1 Inspection Frequency

All inspections, maintenance and monitoring events will be conducted at the frequency specified in the schedule provided in section-4 and 5 of this SMP. At a minimum, a Site-wide inspection will be conducted annually. Inspections of remedial components will also be conducted when a breakdown of any remediation system component has occurred or whenever a severe condition has taken place, such as an erosion or flooding event that may affect the ECs.

6.2 Site Management Reports

All Site management inspection, maintenance and monitoring events will be recorded on the appropriate Site management forms provided in Appendix J. These forms are subject to NYSDEC revision. All Site management inspection, maintenance, and monitoring events will be conducted by a qualified environmental professional as defined in 6 NYCRR Part 375, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

All applicable inspection forms and other records, including all media sampling data, generated for the Site during the reporting period will be provided in electronic format in the Periodic Review Report.

Table 6-1. Schedule of Interim Monitoring/Inspection Reports

Task/Report	**Reporting Frequency***
Site-Wide Inspection Report	Annually
Groundwater Monitoring Report	Annually
SDS System - Maintenance and Sampling Report	Annually (contingent on vapor sampling results)
Periodic Review Report	Annually after first year; every 5 years following

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC project manager.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air);
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

6.3 Periodic Review Report

A Periodic Review Report will be submitted to the NYSDEC project manager beginning eighteen (18) months after the COC or equivalent document is issued. After submittal of the initial Periodic Review Report, the next Periodic Review Report shall be submitted every fifth year to the NYSDEC project manager or at another frequency as may be required by the NYSDEC project manager. In the event that the Site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the Site described in Appendix A -Environmental Easement. The report will be prepared in accordance with NYSDEC’s DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the Site.
- Results of the required annual Site inspections, if applicable.
- All applicable Site management forms and other records generated for the Site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- Data summary tables and graphical representations of contaminants of concern by media, which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These tables and figures will include a presentation of past data as part of an evaluation of contaminant concentration trends, including but not limited to:
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC.
- A Site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the Site-specific December 2021 ROD;
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;
    - Any new conclusions or observations regarding Site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan;
    - An evaluation of trends in contaminant levels in the affected media to determine if the remedy continues to be effective in achieving remedial goals as specified by the December 2021 ROD; and
    - The overall performance and effectiveness of the remedy.
- A performance summary for all treatment systems at the Site during the calendar year, including information such as:
    - The number of days the system operated for the reporting period;
    - The average, high, and low flows per day;
    - The contaminant mass removed and the cost per pound of mass removed during the certification period and during the life of the treatment system;
    - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
    - A description of the resolution of performance problems;

  - Alarm conditions;
  - Trends in equipment failure; and
  - A summary of the performance, effluent and/or effectiveness monitoring.

6.3.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a New York licensed PE will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"For each institutional or engineering control identified for the Site, I certify that all of the following statements are true:

- *The inspection of the Site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this Site is unchanged from the date the control was put in place, or last approved by the Department;*
- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any SMP for this control;*
- *Access to the Site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the Site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the Site is compliant with the environmental easement;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the Site remedial program]; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner/Remedial Party or Owner's/Remedial Party's Designated Site Representative]. [I have been authorized and designated by all Site owners/remedial parties to sign this certification] for the Site."

"I certify that the New York State Education Department has granted a Certificate of Authorization to provide Professional Engineering services to the firm that prepared this Periodic Review Report."

6.4 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control or failure to conduct Site management activities, a Corrective Measures Work Plan will be submitted to the NYSDEC project manager for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC project manager.

7.0 REFERENCES

Arcadis 2011. Remedial Investigation Data Summary Report, Former Gulf Oil Terminal, Oceanside, Township of Hempstead, New York.

Arcadis 2014a. Interim Remedial Measure Completion Report, Former Gulf Oil Terminal, Oceanside, Township of Hempstead, New York. November.

Arcadis 2014b. Interim Remedial Measure Addendum Work Plan. Former Gulf Oil Terminal Oceanside, Township of Hempstead, New York. NYSDEC Site #1301365.

Arcadis 2017. Supplemental Remedial Investigation Report, Former Gulf Oil Terminal, Oceanside, Township of Hempstead, New York. January.

Leidos 2017. Feasibility Study Report, Former Gulf Oil Terminal, Oceanside, Township of Hempstead, New York. December 31.

NYSDEC 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. June.

NYSDEC 2006. NYSDEC Technical and Operational Guidance Series for Soil, Subpart 375-6: Remedial Program Soil Cleanup Objectives. December 14.

NYSDEC 2010a. DER-10 – “Technical Guidance for Site Investigation and Remediation”. May 3.

NYSDEC 2010b. DER-31 – “Green Remediation”. August 11.

TABLES

Table 1
Groundwater Elevation Data
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Monitoring Well ID	Well Depth (feet below TOC)	TOC Elevation (feet NAVD 88)*	Depth to LNAPL (feet below TOC)	Depth to Groundwater (feet below TOC)	Groundwater Table Elevation (feet NAVD 88*)
Shallow Fill Unit Monitoring Wells					
AMW-3	12.42	9.05	ND	6.56	2.49
AMW-7R	13.83	9.95	ND	8.84	1.11
MW-18R	9.91	7.98	ND	4.96	3.02
D1 Horizon Monitoring Wells					
AMW-13-D1	33.39	9.87	ND	9.13	0.74
AMW-14-D1	33.13	9.38	ND	5.61	3.77
AMW-15-D1	36.19	9.74	ND	8.99	0.75
MW-23-D1R	25.81	9.84	ND	14.74	-4.90
MW-24-D1R	31.48	9.82	ND	9.04	0.78
MW-26-D1	20.29	9.95	ND	9.26	0.69
MW-27-D1R	32.30	9.01	ND	8.30	0.71
MW-28-D1	30.25	8.25	ND	NG	NG
MW-29-D1	23.21	5.21	ND	4.18	1.03
MW-30-D1	30.15	8.74	ND	8.43	0.31
MW-31-D1R	30.30	8.39	ND	7.92	0.47
MW-32D	36.25	8.85	ND	7.21	1.64
OW-2-D1	34.12	9.94	ND	8.59	1.35
D2 Horizon Monitoring Wells					
AMW-13-D2	43.51	9.76	ND	9.06	0.70
AMW-14-D2	43.13	9.37	ND	8.40	0.97
AMW-15-D2	21.61	9.71	ND	8.67	1.04
MW-23-D2R	16.77	10.52	ND	9.49	1.03
MW-24-D2	42.02	10.00	ND	9.21	0.79
MW-26-D2	NG	9.40	NG	NG	NG
MW-27-D2	46.87	9.09	ND	8.31	0.78
MW-28-D2R	47.23	8.40	ND	7.63	0.77
MW-29-D2	38.12	5.38	ND	4.61	0.77
MW-30-D2	40.66	8.72	ND	8.34	0.38
MW-31-D2R	46.59	8.35	ND	6.54	1.81
D3 Horizon Monitoring Wells					
AMW-15-D3	48.49	9.81	ND	9.17	0.64
VD Horizon Monitoring Wells					
AMW-13-VD	71.52	9.43	ND	9.43	0.00
AMW-14-VD	74.29	9.25	ND	8.16	1.09
AMW-15-VD	71.85	9.82	ND	8.57	1.25
MW-24-VDR	72.54	9.72	ND	8.49	1.23
MW-26-VD	68.49	9.99	ND	9.39	0.60
MW-29-VD	60.35	5.27	ND	4.24	1.03
MW-30-VD	83.51	8.70	ND	7.57	1.13

Notes:
*Top of casing elevations were surveyed by Borbas Surveying & Mapping, LLC, September 18, 2017 and re-drilled wells on June 1
in = Inches
TOC = top of casing
NAVD 88 = North America Vertical Datum of 1988
LNAPL = light non aqueous phase liquid
NM = not measured
ND = not detected
NG = not gauged; well was covered during event

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:					AMW-3	AMW-3	AMW-3	AMW-4	AMW-4	AMW-4	AMW-6
Historical Sample Depth(feet):					0 - 2	2 - 4	4 - 6	2 - 4	4 - 6	6 - 8	2 - 4
Current Estimated Sample Depth (feet)					4 - 6	6 - 8	8 - 10	6 - 8	8 - 10	10 - 12	6 - 8
Date Collected:					11/30/10	11/30/10	11/30/10	11/18/10	11/18/10	11/18/10	11/18/10
Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.13 U	0.12 U	***0.11 J***	0.0053 U	0.23 U	0.10 U	0.0055 U
Toluene	0.7	0.7	500	mg/kg	0.11 J	0.20	0.12 U	0.0053 U	0.23 U	0.10 U	0.0055 U
Ethylbenzene	1	1	390	mg/kg	***2.4***	***6.7***	***2.0***	0.0053 U	0.20 J	0.088 J	0.0055 U
Xylenes (total)	0.26	1.6	500	mg/kg	***5.2***	***6.1***	***0.26***	0.011 U	0.46 U	0.20 U	0.011 U
Acetone	0.05	0.05	500	mg/kg	0.64 U	0.59 U	0.62 U	0.027 U	1.2 U	0.51 U	0.027 U
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.13 U	0.12 U	0.12 U	0.0053 U	0.23 U	0.10 U	0.0055 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.13 UJ	0.12 UJ	***0.062 J***	0.0052 J	0.23 U	0.10 U	0.0062
Vinyl Chloride	0.02	0.02	13	mg/kg	0.13 U	0.12 U	0.12 U	0.0053 U	0.23 U	0.10 U	0.0055 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
2-Nitroaniline	- -	- -	- -	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 U	1.7 U	7.0 U
2-Nitrophenol	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	R	0.88 U	3.6 U
3-Nitroaniline	- -	- -	- -	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 UJ	1.7 U	7.0 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 UJ	1.7 U	7.0 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
4-Chloroaniline	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
4-Methylphenol	0.33	0.33	500	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 U	1.7 U	7.0 U
4-Nitroaniline	- -	- -	- -	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 U	1.7 U	7.0 U
4-Nitrophenol	- -	- -	- -	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 UJ	1.7 U	7.0 U
Acenaphthene	20	98	500	mg/kg	0.99 J	0.81 J	0.12 J	0.18 U	1.1	0.46 J	3.6 U
Acenaphthylene	100	107	500	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Acetophenone	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 UJ
Anthracene	100	1,000	500	mg/kg	0.37 J	0.43 J	0.050 J	0.18 U	1.0 U	0.88 U	3.6 U
Atrazine	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Benzaldehyde	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Benzo(a)anthracene	1	1	5.6	mg/kg	0.37 J	0.26 J	0.019 J	0.020 J	0.42 J	0.26 J	0.44 J
Benzo(a)pyrene	1	22	1	mg/kg	0.23 J	2.0 U	0.21 U	0.018 J	0.36 J	0.30 J	0.42 J
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.27 J	0.20 J	0.21 U	0.021 J	0.42 J	0.38 J	0.52 J
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.18 J	2.0 U	0.21 U	0.014 J	0.25 J	0.24 J	0.30 J
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	0.21 J	0.88 U	3.6 U
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	2.2 UB	2.0 UB	0.21 UB	0.18 U	1.0 U	0.88 U	3.6 U
Butylbenzylphthalate	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Caprolactam	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	R	0.88 U	3.6 U
Carbazole	- -	- -	- -	mg/kg	0.14 J	2.0 U	0.033 J	0.18 U	1.0 U	0.88 U	3.6 U
Chrysene	1	1	56	mg/kg	0.29 J	0.23 J	0.017 J	0.018 J	0.42 J	0.29 J	0.44 J
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Dibenzofuran	7	210	350	mg/kg	0.79 J	0.76 J	0.13 J	0.18 U	0.79 J	0.88 U	3.6 U
Diethylphthalate	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Dimethylphthalate	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	AMW-3 0 - 2 4 - 6 11/30/10 Shallow Sand Fill - Shallow	AMW-3 2 - 4 6 - 8 11/30/10 Shallow Sand Fill - Shallow	AMW-3 4 - 6 8 - 10 11/30/10 Shallow Sand Fill - Shallow	AMW-4 2 - 4 6 - 8 11/18/10 Shallow Sand Fill - Shallow	AMW-4 4 - 6 8 - 10 11/18/10 Shallow Sand Fill - Shallow	AMW-4 6 - 8 10 - 12 11/18/10 Shallow Sand Fill - Shallow	AMW-6 2 - 4 6 - 8 11/18/10 Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 UJ	0.88 U	3.6 U
Fluoranthene	100	1,000	500	mg/kg	1.0 J	0.69 J	0.059 J	0.036 J	1.3	0.77 J	1.0 J
Fluorene	30	386	500	mg/kg	1.1 J	1.3 J	0.29 J	0.18 U	1.5	0.66 J	3.6 U
Hexachlorobenzene	0.33	3.2	6	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Hexachloroethane	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	0.20 J	0.16 J	3.6 U
Isophorone	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Nitrobenzene	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	4.3 U	4.0 U	0.41 U	0.35 U	1.9 UJ	1.7 U	7.0 U
Phenanthrene	100	1,000	500	mg/kg	3.6	3.2	0.45	0.022 J	3.0	1.0	0.74 J
Phenol	0.33	0.33	500	mg/kg	2.2 U	2.0 U	0.21 U	0.18 U	1.0 U	0.88 U	3.6 U
Pyrene	100	1,000	500	mg/kg	0.94 J	0.67 J	0.058 J	0.029 J	1.3	1.0	0.83 J
Total SVOCs	- -	- -	- -	mg/kg	32 J	47 J	8.1 J	0.18 J	23 J	7.2 J	4.7 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	4,860 J	2,230 J	2,810 J	8,070 J	1,390 J	4,010 J	3,660 J
Antimony	- -	- -	- -	mg/kg	19.9 U	18.1 U	18.4 U	16.1 U	17.7 U	15.7 U	16.4 U
Arsenic	13	16	16	mg/kg	2.00 J	2.20 J	2.30 J	3.80	1.10 J	2.00 J	***16.2***
Barium	350	820	400	mg/kg	26.7	14.0	16.0	26.6	7.89	22.1	32.5
Beryllium	7.2	47	590	mg/kg	0.224 J	0.166 J	0.113 J	0.362	0.0530 J	0.186 J	0.174 J
Cadmium	2.5	7.5	9.3	mg/kg	0.282 J	0.231 J	0.246 UBJ	0.193 J	0.0550 J	0.0920 J	0.199 J
Calcium	- -	- -	- -	mg/kg	28,000	113,000	1,670	556	218	428	5,420
Chromium	- -	- -	- -	mg/kg	7.46	4.68	5.67	10.6	2.53	5.58	7.77
Cobalt	- -	- -	- -	mg/kg	2.44	1.76	1.76	4.27	0.924	2.64	2.04
Copper	50	1,720	270	mg/kg	14.5 J	7.00 J	7.40 J	4.80	1.50	4.00	11.5
Ferrous Iron	- -	- -	- -	mg/kg	0.600 J	1.60 J	0.500 J	R	R	1.70 J	R
Iron	- -	- -	- -	mg/kg	5,670 J	5,180 J	5,450 J	10,100 J	1,860 J	5,410 J	6,630 J
Lead	63	450	1,000	mg/kg	*69.6 J*	52.4 J	25.9 J	8.20 J	4.70 J	9.00 J	50.8 J
Magnesium	- -	- -	- -	mg/kg	5,250	63,000	1,330	1,070	309	638	2,300
Manganese	1,600	2,000	10,000	mg/kg	76.6 J	100 J	68.7 J	246	25.4	60.8	63.1
Mercury	0.18	0.73	2.8	mg/kg	0.0329	0.0525	0.0184 J	0.0173 J	0.0240 U	0.0226	0.0785
Nickel	30	130	310	mg/kg	7.11	4.78 J	5.19 J	6.07 J	1.58 J	4.47 J	4.81 J
Potassium	- -	- -	- -	mg/kg	548	490	498	305 J	202 J	298 J	432 J
Selenium	3.9	4	1,500	mg/kg	5.30 U	4.80 U	4.90 U	4.30 U	4.70 U	4.20 U	4.40 U
Silver	2	8.3	1,500	mg/kg	0.662 U	0.602 U	0.614 U	0.536 U	0.590 U	0.523 U	0.546 U
Sodium	- -	- -	- -	mg/kg	119 J	153 J	66.9 J	83.1 J	34.0 J	36.2 J	524
Thallium	- -	- -	- -	mg/kg	7.90 U	7.20 U	7.40 U	6.40 U	7.10 U	6.30 U	6.60 U
Vanadium	- -	- -	- -	mg/kg	8.76	11.5	8.45	13.6	3.38	7.78	9.48
Zinc	109	2,480	10,000	mg/kg	57.3 J	21.1 J	20.2 J	20.8	4.40	10.3	51.6
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	78 J	400	570 J	170	60 J	110 U	89 J
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	6,440	7,720	6,430 J	2,320	8,850	3,610	4,960

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	AMW-6 4 - 6 8 - 10 11/18/10 Shallow Sand Fill - Shallow	AMW-6 6 - 8 10 - 12 11/18/10 Shallow Sand Fill - Shallow	AMW-7 4 - 6 8 - 10 11/29/10 Shallow Sand Fill - Shallow	AMW-7 8 - 10 11/29/10 Shallow Sand Fill - Shallow	AMW-7 10 - 12 11/29/10 Shallow Sand Fill - Shallow	AMW-11 2 - 4 6 - 8 12/01/10 Shallow Sand Fill - Shallow	AMW-11 4 - 6 8 - 10 12/01/10 Shallow Sand Fill - Shallow
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.0057 U	0.036 U	0.0055 U	0.0055 U	0.0065 U	0.13 U	0.0058 U
Toluene	0.7	0.7	500	mg/kg	0.0057 U	0.036 U	0.0055 U	0.0055 U	0.0065 U	0.13 U	0.0058 U
Ethylbenzene	1	1	390	mg/kg	0.0057 U	0.036 U	0.0055 U	0.0055 U	0.0065 U	0.13 U	0.0058 U
Xylenes (total)	0.26	1.6	500	mg/kg	0.011 U	0.071 U	0.011 U	0.011 U	0.013 U	0.26 U	0.012 U
Acetone	0.05	0.05	500	mg/kg	***0.059***	***0.18***	0.0063 J	0.037	***0.050***	0.66 U	0.019 J
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.0057 U	0.036 U	0.0055 U	0.0055 U	0.0015 J	0.13 U	0.0058 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.0090	0.049	0.0076	0.016	0.023	0.13 UJ	0.0094 UB
Vinyl Chloride	0.02	0.02	13	mg/kg	0.0057 U	0.036 U	0.0055 U	0.0055 U	0.0032 J	0.13 U	0.0058 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
2-Nitroaniline	- -	- -	- -	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
2-Nitrophenol	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
3-Nitroaniline	- -	- -	- -	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
4-Chloroaniline	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
4-Methylphenol	0.33	0.33	500	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
4-Nitroaniline	- -	- -	- -	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
4-Nitrophenol	- -	- -	- -	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
Acenaphthene	20	98	500	mg/kg	0.14 J	0.026 J	0.18 U	0.19 U	0.22 U	0.90	0.36
Acenaphthylene	100	107	500	mg/kg	0.38 U	0.025 J	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Acetophenone	- -	- -	- -	mg/kg	0.38 UJ	0.24 UJ	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Anthracene	100	1,000	500	mg/kg	0.27 J	0.052 J	0.017 J	0.017 J	0.22 U	0.16 J	0.081 J
Atrazine	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Benzaldehyde	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Benzo(a)anthracene	1	1	5.6	mg/kg	0.56	0.15 J	0.088 J	0.054 J	0.024 J	0.079 J	0.048 J
Benzo(a)pyrene	1	22	1	mg/kg	0.54	0.16 J	0.087 J	0.056 J	0.025 J	0.037 J	0.027 J
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.63	0.19 J	0.093 J	0.064 J	0.028 J	0.067 JY	0.040 J
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.39	0.12 J	0.061 J	0.043 J	0.021 J	0.016 J	0.024 J
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.25 J	0.074 J	0.033 J	0.19 U	0.22 U	0.069 JY	0.20 U
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.96	0.63	0.42	0.11 J	0.098 J	0.23 UB	0.29 UB
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.15 J	0.19 U	0.22 U	0.23 U	0.20 U
Caprolactam	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Carbazole	- -	- -	- -	mg/kg	0.13 J	0.029 J	0.18 U	0.19 U	0.22 U	0.32	0.075 J
Chrysene	1	1	56	mg/kg	0.64	0.17 J	0.082 J	0.050 J	0.021 J	0.065 J	0.041 J
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.11 J	0.036 J	0.017 J	0.19 U	0.22 U	0.23 U	0.20 U
Dibenzofuran	7	210	350	mg/kg	0.11 J	0.027 J	0.18 U	0.19 U	0.22 U	0.56	0.20
Diethylphthalate	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Dimethylphthalate	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	AMW-6 4 - 6 8 - 10 11/18/10 Shallow Sand Fill - Shallow	AMW-6 6 - 8 10 - 12 11/18/10 Shallow Sand Fill - Shallow	AMW-7 4 - 6 8 - 10 11/29/10 Shallow Sand Fill - Shallow	AMW-7 8 - 10 11/29/10 Shallow Sand Fill - Shallow	AMW-7 10 - 12 11/29/10 Shallow Sand Fill - Shallow	AMW-11 2 - 4 6 - 8 12/01/10 Shallow Sand Fill - Shallow	AMW-11 4 - 6 8 - 10 12/01/10 Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Fluoranthene	100	1,000	500	mg/kg	1.1	0.28	0.17 J	0.11 J	0.041 J	0.48	0.25
Fluorene	30	386	500	mg/kg	0.28 J	0.064 J	0.18 U	0.19 U	0.22 U	0.53	0.20
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Hexachloroethane	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.34 J	0.10 J	0.049 J	0.033 J	0.22 U	0.23 U	0.20 U
Isophorone	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Nitrobenzene	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	0.74 U	0.47 U	0.36 U	0.37 U	0.42 U	0.44 U	0.38 U
Phenanthrene	100	1,000	500	mg/kg	1.1	0.27	0.090 J	0.041 J	0.22 U	1.3	0.58
Phenol	0.33	0.33	500	mg/kg	0.38 U	0.24 U	0.18 U	0.19 U	0.22 U	0.23 U	0.20 U
Pyrene	100	1,000	500	mg/kg	1.0	0.24	0.16 J	0.088 J	0.035 J	0.32	0.19 J
Total SVOCs	- -	- -	- -	mg/kg	8.9 J	2.8 J	1.5 J	0.67 J	0.29 J	6.2 J	2.6 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	3,620 J	8,470 J	4,490 J	3,290 J	4,510 J	5,460 J	4,040 J
Antimony	- -	- -	- -	mg/kg	17.1 U	20.9 U	16.4 U	16.8 U	19.3 U	20.0 U	17.6 U
Arsenic	13	16	16	mg/kg	***20.1***	10.6	3.10 J	2.00 J	4.10 J	4.70	4.50
Barium	350	820	400	mg/kg	44.4	44.6	26.0	28.5	13.2	26.3	18.6
Beryllium	7.2	47	590	mg/kg	0.185 J	0.448	0.200 J	0.142 J	0.195 J	0.264 J	0.173 J
Cadmium	2.5	7.5	9.3	mg/kg	0.356	0.468	0.463 J	0.224 UBJ	0.258 UBJ	0.267 UB	0.235 UBJ
Calcium	- -	- -	- -	mg/kg	1,520	2,140	875	743	1,450	1,770	1,560 B
Chromium	- -	- -	- -	mg/kg	6.12	22.7	7.94	7.96	12.1	12.9	9.82
Cobalt	- -	- -	- -	mg/kg	2.12	4.84	2.72	2.27	3.05	3.47	2.76
Copper	50	1,720	270	mg/kg	11.5	14.7	8.40	7.20	5.60	9.70 J	11.4 J
Ferrous Iron	- -	- -	- -	mg/kg	R	R	R	R	R	R	R
Iron	- -	- -	- -	mg/kg	5,890 J	18,200 J	10,600	5,780	9,990	12,000 J	9,160 J
Lead	63	450	1,000	mg/kg	*80.2 J*	43.8 J	22.4 J	18.5 J	6.60 J	15.1 J	14.0 J
Magnesium	- -	- -	- -	mg/kg	577	2,900	878	766	1,950	2,210	1,800
Manganese	1,600	2,000	10,000	mg/kg	52.6	180	119 J	55.2 J	82.8 J	111 J	92.4 J
Mercury	0.18	0.73	2.8	mg/kg	*0.199*	0.122	0.0492	*0.189*	0.0219 J	0.0285	0.0187 J
Nickel	30	130	310	mg/kg	4.56 J	13.0 J	5.49	4.87 J	7.91	9.80	7.78
Potassium	- -	- -	- -	mg/kg	332 J	1,630 J	541	420	1,010	1,210	825
Selenium	3.9	4	1,500	mg/kg	4.60 U	5.60 U	0.600 J	0.600 J	0.700 J	5.30 U	4.70 U
Silver	2	8.3	1,500	mg/kg	0.571 U	0.698 U	0.548 U	0.559 U	0.644 U	0.667 U	0.587 U
Sodium	- -	- -	- -	mg/kg	153 J	392	70.5 J	131 J	742	289	231
Thallium	- -	- -	- -	mg/kg	6.90 U	8.40 U	6.60 U	6.70 U	7.70 U	8.00 U	7.00 U
Vanadium	- -	- -	- -	mg/kg	7.67	24.8	9.26	7.66	13.7	17.9	12.9
Zinc	109	2,480	10,000	mg/kg	96.9	75.0	*120 J*	29.0 J	23.4 J	30.2 J	28.1 J
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	120 U	130 J	350	290	150	1,500	1,500
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	3,250	15,800	5,020	2,900	22,300	7,270	9,840

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	AMW-11 6 - 8 10 - 12 12/01/10 Shallow Sand Fill - Shallow	AMW-12A 2 - 2.5 6 - 6.5 02/21/13 Shallow Sand Fill - Shallow	ASB-1 23 - 25 - 06/07/16 Deep Sand Layer - D1 Unit	ASB-1 28 - 30 - 06/07/16 Deep Sand Layer - D1 Unit	ASB-2-SD 24 - 25 - 06/03/16 Deep Sand Layer - D1 Unit	ASB-2-SD 28 - 30 - 06/03/16 Deep Sand Layer - D1 Unit	ASB-3 20.5 - 21.5 - 06/08/16 Deep Sand Layer - D1 Unit
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.17 U	0.0027 J	0.0075 U	0.0077 U	0.00050 J	0.13 U	0.0011 J
Toluene	0.7	0.7	500	mg/kg	0.17 U	0.0027 JB	0.0075 U	0.0077 U	0.0065 U	0.13 U	0.0011 J
Ethylbenzene	1	1	390	mg/kg	0.17 U	0.016	0.0075 U	0.0077 U	0.0065 U	0.13 U	0.0011 J
Xylenes (total)	0.26	1.6	500	mg/kg	0.33 U	0.014	0.015 U	0.015 U	0.013 U	0.26 U	0.012 U
Acetone	0.05	0.05	500	mg/kg	0.83 U	0.032	0.037 U	0.038 U	0.033 U	0.66 U	0.029 U
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.17 U	0.0049 U	0.0075 U	0.0077 U	0.0065 U	0.13 U	0.0059 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.17 UJ	0.0049 U	0.0075 U	0.0077 U	0.0099 B	0.13 U	0.049
Vinyl Chloride	0.02	0.02	13	mg/kg	0.17 U	0.0049 U	0.0075 U	0.0077 U	0.0065 U	***0.067 J***	0.0059 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
2-Nitroaniline	- -	- -	- -	mg/kg	1.1 U	NA	0.46 U	NA	4.1 U	NA	NA
2-Nitrophenol	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.56 U	NA	0.46 U	NA	4.1 U	NA	NA
3-Nitroaniline	- -	- -	- -	mg/kg	1.1 U	NA	0.46 U	NA	4.1 U	NA	NA
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	1.1 U	NA	0.46 U	NA	4.1 U	NA	NA
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
4-Chloroaniline	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 UF2	NA	NA
4-Methylphenol	0.33	0.33	500	mg/kg	1.1 U	NA	0.46 U	NA	4.1 U	NA	NA
4-Nitroaniline	- -	- -	- -	mg/kg	1.1 U	NA	0.46 U	NA	4.1 U	NA	NA
4-Nitrophenol	- -	- -	- -	mg/kg	1.1 U	NA	0.46 U	NA	4.1 UF1	NA	NA
Acenaphthene	20	98	500	mg/kg	4.2	NA	0.24 U	NA	2.1 U	NA	NA
Acenaphthylene	100	107	500	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Acetophenone	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Anthracene	100	1,000	500	mg/kg	1.4	NA	0.24 U	NA	2.1 U	NA	NA
Atrazine	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Benzaldehyde	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 UF1	NA	NA
Benzo(a)anthracene	1	1	5.6	mg/kg	0.54 J	NA	0.24 U	NA	2.1 U	NA	NA
Benzo(a)pyrene	1	22	1	mg/kg	0.20 J	NA	0.24 U	NA	2.1 U	NA	NA
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.28 J	NA	0.24 U	NA	2.1 UF2	NA	NA
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.094 J	NA	0.24 U	NA	2.1 U	NA	NA
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.086 J	NA	0.24 U	NA	2.1 U	NA	NA
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 UF1F2	NA	NA
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.56 UB	NA	0.24 U	NA	2.1 U	NA	NA
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Caprolactam	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Carbazole	- -	- -	- -	mg/kg	1.6	NA	0.24 U	NA	2.1 U	NA	NA
Chrysene	1	1	56	mg/kg	0.46 J	NA	0.24 U	NA	2.1 U	NA	NA
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Dibenzofuran	7	210	350	mg/kg	3.0	NA	0.24 U	NA	2.1 U	NA	NA
Diethylphthalate	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Dimethylphthalate	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:					AMW-11	AMW-12A	ASB-1	ASB-1	ASB-2-SD	ASB-2-SD	ASB-3
Historical Sample Depth(feet):					6 - 8	2 - 2.5	23 - 25	28 - 30	24 - 25	28 - 30	20.5 - 21.5
Current Estimated Sample Depth (feet)					10 - 12	6 - 6.5	-	-	-	-	-
Date Collected:					12/01/10	02/21/13	06/07/16	06/07/16	06/03/16	06/03/16	06/08/16
Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Fluoranthene	100	1,000	500	mg/kg	4.0	NA	0.24 U	NA	2.1 U	NA	NA
Fluorene	30	386	500	mg/kg	3.4	NA	0.24 U	NA	2.1 U	NA	NA
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Hexachloroethane	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.074 J	NA	0.24 U	NA	2.1 U	NA	NA
Isophorone	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 UF2	NA	NA
Nitrobenzene	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.56 U	NA	0.24 U	NA	2.1 UF1	NA	NA
Pentachlorophenol	0.8	0.8	6.7	mg/kg	1.1 U	NA	0.46 U	NA	4.1 U	NA	NA
Phenanthrene	100	1,000	500	mg/kg	11	NA	0.24 U	NA	2.1 U	NA	NA
Phenol	0.33	0.33	500	mg/kg	0.56 U	NA	0.24 U	NA	2.1 U	NA	NA
Pyrene	100	1,000	500	mg/kg	2.6	NA	0.24 U	NA	2.1 U	NA	NA
Total SVOCs	- -	- -	- -	mg/kg	40 J	NA	ND	NA	ND	NA	NA
Inorganics											
Aluminum	- -	- -	- -	mg/kg	3,750 J	NA	2,810 F1	NA	3,130	NA	NA
Antimony	- -	- -	- -	mg/kg	25.1 U	NA	21.8 U	NA	18.8 U	NA	NA
Arsenic	13	16	16	mg/kg	8.40	NA	1.90 J	NA	0.950 J	NA	NA
Barium	350	820	400	mg/kg	32.7	NA	5.50	NA	10.1	NA	NA
Beryllium	7.2	47	590	mg/kg	0.254 J	NA	0.120 J	NA	0.0530 J	NA	NA
Cadmium	2.5	7.5	9.3	mg/kg	0.334 UBJ	NA	0.290 U	NA	0.250 U	NA	NA
Calcium	- -	- -	- -	mg/kg	1,500	NA	235	NA	286 B	NA	NA
Chromium	- -	- -	- -	mg/kg	17.2	NA	5.50	NA	6.30	NA	NA
Cobalt	- -	- -	- -	mg/kg	2.81	NA	0.930	NA	1.40	NA	NA
Copper	50	1,720	270	mg/kg	35.1 J	NA	2.60	NA	4.70	NA	NA
Ferrous Iron	- -	- -	- -	mg/kg	R	NA	NA	NA	NA	NA	NA
Iron	- -	- -	- -	mg/kg	15,500 J	NA	3,280 F1	NA	4,510	NA	NA
Lead	63	450	1,000	mg/kg	10.2 J	NA	2.60	NA	2.60	NA	NA
Magnesium	- -	- -	- -	mg/kg	1,330	NA	592	NA	878	NA	NA
Manganese	1,600	2,000	10,000	mg/kg	54.2 J	NA	28.5 BF1	NA	46.0	NA	NA
Mercury	0.18	0.73	2.8	mg/kg	0.0389	NA	0.0260 U	NA	0.0250 U	NA	NA
Nickel	30	130	310	mg/kg	5.83 J	NA	3.80 J	NA	4.20 J	NA	NA
Potassium	- -	- -	- -	mg/kg	801	NA	371	NA	595	NA	NA
Selenium	3.9	4	1,500	mg/kg	1.30 J	NA	0.940 JB	NA	5.00 U	NA	NA
Silver	2	8.3	1,500	mg/kg	0.835 U	NA	0.870 U	NA	0.750 U	NA	NA
Sodium	- -	- -	- -	mg/kg	406	NA	312	NA	325	NA	NA
Thallium	- -	- -	- -	mg/kg	10.0 U	NA	8.70 U	NA	7.50 U	NA	NA
Vanadium	- -	- -	- -	mg/kg	27.1	NA	7.30	NA	7.00	NA	NA
Zinc	109	2,480	10,000	mg/kg	19.7 J	NA	5.10	NA	7.60	NA	NA
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	2,600	NA	NA	NA	NA	NA	NA
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	4,430	NA	1,490 F2F1	NA	1,000 U	NA	NA

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	ASB-3	ASB-4	ASB-4	ASB-5	ASB-5	ASB-6	ASB-6
Historical Sample Depth(feet):					28 - 30	24 - 25	28 - 30	20.5 - 21	28 - 30	26 - 28	36 - 38
Current Estimated Sample Depth (feet)					-	-	-	-	-	-	-
Date Collected:					06/08/16	06/06/16	06/06/16	06/02/16	06/02/16	06/13/16	06/13/16
Sampling Event:					Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.0059 U	0.0059 U	0.15 U	0.12 U	0.0061 U	0.00096 J*	0.0055 U*
Toluene	0.7	0.7	500	mg/kg	0.0059 U	0.0059 U	0.15 U	0.12 U	0.00054 J	0.00084 J	0.0055 U
Ethylbenzene	1	1	390	mg/kg	0.0059 U	0.0059 U	0.15 U	0.12 U	0.0061 U	0.00051 J*	0.0055 U*
Xylenes (total)	0.26	1.6	500	mg/kg	0.012 U	0.012 U	0.29 U	0.25 U	0.012 U	0.011 U	0.011 U
Acetone	0.05	0.05	500	mg/kg	0.029 U	0.029 U	0.73 U	0.62 U*	0.030 U	0.029 U	0.028 U
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.027	0.0039 J	***0.96***	0.12 U	0.0017 J	0.0057 U*	0.0055 U*
Methylene Chloride	0.05	0.05	500	mg/kg	0.0048 J	0.0032 JB	***0.077 J***	0.12 U	0.0061 U	0.0057 U	0.0055 U
Vinyl Chloride	0.02	0.02	13	mg/kg	0.0013 J	0.0059 U	***0.45***	***0.14***	0.0040 J	***0.061 ****	0.0055 U*
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
2-Nitroaniline	- -	- -	- -	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
2-Nitrophenol	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
3-Nitroaniline	- -	- -	- -	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
4-Chloroaniline	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
4-Methylphenol	0.33	0.33	500	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
4-Nitroaniline	- -	- -	- -	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
4-Nitrophenol	- -	- -	- -	mg/kg	0.40 U	0.39 U	NA	0.40 U*	NA	0.38 U	NA
Acenaphthene	20	98	500	mg/kg	0.21 U	0.051 J	NA	0.21 U	NA	0.20 U	NA
Acenaphthylene	100	107	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Acetophenone	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Anthracene	100	1,000	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Atrazine	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Benzaldehyde	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Benzo(a)anthracene	1	1	5.6	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Benzo(a)pyrene	1	22	1	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Caprolactam	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Carbazole	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Chrysene	1	1	56	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Dibenzofuran	7	210	350	mg/kg	0.21 U	0.044 J	NA	0.21 U	NA	0.20 U	NA
Diethylphthalate	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Dimethylphthalate	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	ASB-3 28 - 30 - 06/08/16 Deep Sand Layer - D1 Unit	ASB-4 24 - 25 - 06/06/16 Deep Sand Layer - D1 Unit	ASB-4 28 - 30 - 06/06/16 Deep Sand Layer - D1 Unit	ASB-5 20.5 - 21 - 06/02/16 Deep Sand Layer - D1 Unit	ASB-5 28 - 30 - 06/02/16 Deep Sand Layer - D1 Unit	ASB-6 26 - 28 - 06/13/16 Deep Sand Layer - D1 Unit	ASB-6 36 - 38 - 06/13/16 Deep Sand Layer - D1 Unit
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Fluoranthene	100	1,000	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Fluorene	30	386	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Hexachloroethane	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Isophorone	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Nitrobenzene	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Pentachlorophenol	0.8	0.8	6.7	mg/kg	0.40 U	0.39 U	NA	0.40 U	NA	0.38 U	NA
Phenanthrene	100	1,000	500	mg/kg	0.21 U	0.12 J	NA	0.21 U	NA	0.20 U	NA
Phenol	0.33	0.33	500	mg/kg	0.21 U	0.20 U	NA	***0.58***	NA	0.20 U	NA
Pyrene	100	1,000	500	mg/kg	0.21 U	0.20 U	NA	0.21 U	NA	0.20 U	NA
Total SVOCs	- -	- -	- -	mg/kg	ND	0.22 J	NA	0.58	NA	ND	NA
Inorganics											
Aluminum	- -	- -	- -	mg/kg	1,610	NA	NA	5,540	NA	13,400	NA
Antimony	- -	- -	- -	mg/kg	17.8 U	NA	NA	17.9 U	NA	17.4 U	NA
Arsenic	13	16	16	mg/kg	1.10 J	NA	NA	1.00 J	NA	1.50 J	NA
Barium	350	820	400	mg/kg	8.50	NA	NA	4.70	NA	22.2	NA
Beryllium	7.2	47	590	mg/kg	0.0760 J	NA	NA	0.0420 J	NA	0.330	NA
Cadmium	2.5	7.5	9.3	mg/kg	0.240 U	NA	NA	0.240 U	NA	0.0560 J	NA
Calcium	- -	- -	- -	mg/kg	242	NA	NA	773 B	NA	295 B	NA
Chromium	- -	- -	- -	mg/kg	4.70	NA	NA	4.80	NA	18.8	NA
Cobalt	- -	- -	- -	mg/kg	1.10	NA	NA	0.350 J	NA	3.40	NA
Copper	50	1,720	270	mg/kg	2.20	NA	NA	1.20	NA	6.40	NA
Ferrous Iron	- -	- -	- -	mg/kg	NA	NA	NA	NA	NA	NA	NA
Iron	- -	- -	- -	mg/kg	1,760	NA	NA	3,120	NA	6,590	NA
Lead	63	450	1,000	mg/kg	1.60	NA	NA	3.00	NA	3.60	NA
Magnesium	- -	- -	- -	mg/kg	512	NA	NA	671	NA	2,040 B	NA
Manganese	1,600	2,000	10,000	mg/kg	26.9 B	NA	NA	33.7	NA	68.8 B	NA
Mercury	0.18	0.73	2.8	mg/kg	0.0250 U	NA	NA	0.0230 U	NA	0.0220 U	NA
Nickel	30	130	310	mg/kg	3.60 J	NA	NA	1.90 J	NA	16.6	NA
Potassium	- -	- -	- -	mg/kg	430	NA	NA	310	NA	1,710	NA
Selenium	3.9	4	1,500	mg/kg	0.760 JB	NA	NA	4.80 U	NA	4.70 U	NA
Silver	2	8.3	1,500	mg/kg	0.710 U	NA	NA	0.720 U	NA	0.700 U	NA
Sodium	- -	- -	- -	mg/kg	211	NA	NA	1,070	NA	735 B	NA
Thallium	- -	- -	- -	mg/kg	7.10 U	NA	NA	7.20 U	NA	7.00 U	NA
Vanadium	- -	- -	- -	mg/kg	5.10	NA	NA	7.40	NA	15.2	NA
Zinc	109	2,480	10,000	mg/kg	6.90	NA	NA	2.80	NA	22.8	NA
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	NA	NA	NA	NA	NA	NA	NA
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	1,110	NA	NA	16,600	NA	1,710	NA

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	ASB-7 21 - 23 - 06/01/16 Deep Sand Layer - D1 Unit	ASB-7 30 - 32 - 06/01/16 Deep Sand Layer - D1 Unit	ASB-8 20 - 21 - 06/14/16 Deep Sand Layer - D1 Unit	ASB-8 26 - 28 - 06/14/16 Deep Sand Layer - D1 Unit	ASB-8 36 - 38 - 06/14/16 Deep Sand Layer - D1 Unit	MW-23-D2R 18 - 20 22 - 24 12/07/10 Deep Sand Layer - D2 Unit	MW-25-D3 21 - 23 25 - 27 12/09/10 Deep Sand Layer - D3 Unit
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.019	0.0048 U	0.00060 J	0.0059 U	0.0059 U	0.0060 U	0.0059 U
Toluene	0.7	0.7	500	mg/kg	0.018	0.0048 U	0.0056 U	0.0059 U	0.0059 U	0.0060 U	0.0059 U
Ethylbenzene	1	1	390	mg/kg	0.011	0.0048 U	0.0056 U	0.0059 U	0.0059 U	0.0060 UJ	0.0059 U
Xylenes (total)	0.26	1.6	500	mg/kg	0.039	0.0096 U	0.011 U	0.012 U	0.012 U	0.012 U	0.012 U
Acetone	0.05	0.05	500	mg/kg	0.027 U	0.024 U	0.028 U	0.030 U	0.030 U	0.017 J	0.020 J
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	***2.7***	0.0048 U	0.00079 J	0.0059 U	0.0059 U	0.0060 U	0.010
Methylene Chloride	0.05	0.05	500	mg/kg	0.0053 U	0.0048 U	0.0028 JB	0.0065 B	0.0058 JB	0.019	***0.12 B***
Vinyl Chloride	0.02	0.02	13	mg/kg	***0.58***	0.0048 U	0.0056 U	0.0059 U	0.0059 U	0.0060 U	0.0020 J
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
2-Nitroaniline	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.38 U	0.39 U	0.39 U
2-Nitrophenol	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.38 U	0.20 U	0.20 U
3-Nitroaniline	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.38 U	0.39 U	0.39 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.38 U	0.39 UJ	0.39 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
4-Chloroaniline	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
4-Methylphenol	0.33	0.33	500	mg/kg	NA	NA	NA	NA	0.38 U	0.39 U	0.39 U
4-Nitroaniline	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.38 U	0.39 U	0.39 U
4-Nitrophenol	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.38 U	0.39 U	0.39 U
Acenaphthene	20	98	500	mg/kg	NA	NA	NA	NA	0.19 U	0.084 J	0.20 U
Acenaphthylene	100	107	500	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Acetophenone	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Anthracene	100	1,000	500	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Atrazine	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Benzaldehyde	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Benzo(a)anthracene	1	1	5.6	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Benzo(a)pyrene	1	22	1	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.25 UB	0.49
Butylbenzylphthalate	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Caprolactam	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Carbazole	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.078 J	0.20 U
Chrysene	1	1	56	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	NA	NA	NA	NA	0.19 U	0.20 UJ	0.20 U
Dibenzofuran	7	210	350	mg/kg	NA	NA	NA	NA	0.19 U	0.071 J	0.20 U
Diethylphthalate	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Dimethylphthalate	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:					ASB-7	ASB-7	ASB-8	ASB-8	ASB-8	MW-23-D2R	MW-25-D3
Historical Sample Depth(feet):					21 - 23	30 - 32	20 - 21	26 - 28	36 - 38	18 - 20	21 - 23
Current Estimated Sample Depth (feet)		Restricted Use SCO - Protection of Groundwater			-	-	-	-	-	22 - 24	25 - 27
Date Collected:			Restricted Use SCO - Commercial		06/01/16	06/01/16	06/14/16	06/14/16	06/14/16	12/07/10	12/09/10
Sampling Event:	Unrestricted Use SCOs			Units	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D1 Unit	Deep Sand Layer - D2 Unit	Deep Sand Layer - D3 Unit
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Fluoranthene	100	1,000	500	mg/kg	NA	NA	NA	NA	0.19 U	0.029 J	0.20 U
Fluorene	30	386	500	mg/kg	NA	NA	NA	NA	0.19 U	0.067 J	0.20 U
Hexachlorobenzene	0.33	3.2	6	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Hexachloroethane	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Isophorone	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Nitrobenzene	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	NA	NA	NA	NA	0.38 U	0.39 U	0.39 U
Phenanthrene	100	1,000	500	mg/kg	NA	NA	NA	NA	0.19 U	0.24	0.20 U
Phenol	0.33	0.33	500	mg/kg	NA	NA	NA	NA	0.19 U	0.20 U	0.20 U
Pyrene	100	1,000	500	mg/kg	NA	NA	NA	NA	0.19 U	0.016 J	0.20 U
Total SVOCs	- -	- -	- -	mg/kg	NA	NA	NA	NA	ND	0.59 J	0.49
Inorganics											
Aluminum	- -	- -	- -	mg/kg	NA	NA	NA	NA	244	2,270	2,410
Antimony	- -	- -	- -	mg/kg	NA	NA	NA	NA	17.3 U	17.4 U	18.1 U
Arsenic	13	16	16	mg/kg	NA	NA	NA	NA	0.490 J	1.00 J	2.30 J
Barium	350	820	400	mg/kg	NA	NA	NA	NA	0.930	7.26	10.5
Beryllium	7.2	47	590	mg/kg	NA	NA	NA	NA	0.230 U	0.157 J	0.225 J
Cadmium	2.5	7.5	9.3	mg/kg	NA	NA	NA	NA	0.0350 J	0.232 U	0.0660 J
Calcium	- -	- -	- -	mg/kg	NA	NA	NA	NA	22.1 JB	526	553
Chromium	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.750	6.70	8.06
Cobalt	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.300 J	1.01	1.99
Copper	50	1,720	270	mg/kg	NA	NA	NA	NA	1.20 U	4.10	3.40
Ferrous Iron	- -	- -	- -	mg/kg	NA	NA	NA	NA	NA	0.900 J	2.40 UJ
Iron	- -	- -	- -	mg/kg	NA	NA	NA	NA	444	3,640	5,350
Lead	63	450	1,000	mg/kg	NA	NA	NA	NA	0.750 J	1.80 J	2.30
Magnesium	- -	- -	- -	mg/kg	NA	NA	NA	NA	29.3 B	641	928
Manganese	1,600	2,000	10,000	mg/kg	NA	NA	NA	NA	2.00 B	31.6	37.5
Mercury	0.18	0.73	2.8	mg/kg	NA	NA	NA	NA	0.0240 U	0.0235 U	0.0229 J
Nickel	30	130	310	mg/kg	NA	NA	NA	NA	0.430 J	3.31 J	4.37 J
Potassium	- -	- -	- -	mg/kg	NA	NA	NA	NA	52.0	387	607
Selenium	3.9	4	1,500	mg/kg	NA	NA	NA	NA	0.760 JB	4.60 U	4.80 U
Silver	2	8.3	1,500	mg/kg	NA	NA	NA	NA	0.690 U	0.581 U	0.604 U
Sodium	- -	- -	- -	mg/kg	NA	NA	NA	NA	161 U	205	752
Thallium	- -	- -	- -	mg/kg	NA	NA	NA	NA	6.90 U	7.00 U	7.20 U
Vanadium	- -	- -	- -	mg/kg	NA	NA	NA	NA	0.750	5.91	10.7
Zinc	109	2,480	10,000	mg/kg	NA	NA	NA	NA	0.740 J	5.00	8.40
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	NA	NA	NA	NA	NA	320	400
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	NA	NA	NA	NA	1,950	1,210 U	1,220 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	MW-31-D1R	MW-31-D1R	MW-31-D1R	MW-31-D2R	MW-31-D2R	MW-31-D2R	MW-31-D2R
Historical Sample Depth(feet):					0 - 2	2 - 4	4 - 6	2 - 4	4 - 6	6 - 8	17 - 19
Current Estimated Sample Depth (feet)					4 - 6	6 - 8	8 - 10	6 - 8	8 - 10	10 - 12	21 -
Date Collected:					11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	11/17/10	12/07/10
Sampling Event:					Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Deep Sand Layer - D1 Unit
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.0052 U	0.0062 U	0.0059 U	0.0054 U	0.0061 U	0.0055 U	0.0060 U
Toluene	0.7	0.7	500	mg/kg	0.0052 U	0.0062 U	0.0059 U	0.0054 U	0.0061 U	0.0055 U	0.0060 U
Ethylbenzene	1	1	390	mg/kg	0.0052 U	0.0062 U	0.0059 U	0.0054 U	0.0061 U	0.0055 U	0.0060 U
Xylenes (total)	0.26	1.6	500	mg/kg	0.010 U	0.0048 J	0.011 J	0.011 U	0.0046 J	0.0026 J	0.012 U
Acetone	0.05	0.05	500	mg/kg	0.0049 J	0.013 J	0.017 J	0.027 U	0.017 J	0.014 J	0.020 J
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.0052 U	0.0062 U	0.0059 U	0.0054 U	0.0061 U	0.0055 U	0.0060 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.0080 J	0.031 UBJ	0.030 UBJ	0.025 UBJ	0.033 UBJ	0.022 UBJ	0.021
Vinyl Chloride	0.02	0.02	13	mg/kg	0.0052 U	0.0062 U	0.0059 U	0.0054 U	0.0061 U	0.0055 U	0.0060 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
2-Nitroaniline	- -	- -	- -	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
2-Nitrophenol	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
3-Nitroaniline	- -	- -	- -	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
4-Chloroaniline	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
4-Methylphenol	0.33	0.33	500	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
4-Nitroaniline	- -	- -	- -	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
4-Nitrophenol	- -	- -	- -	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
Acenaphthene	20	98	500	mg/kg	0.18 U	0.066 J	0.085 J	0.29 J	0.41	0.19 J	0.046 J
Acenaphthylene	100	107	500	mg/kg	0.18 U	0.21 U	0.20 U	0.029 J	0.21 U	1.9 U	0.21 U
Acetophenone	- -	- -	- -	mg/kg	0.18 UJ	0.21 UJ	0.20 UJ	0.37 U	0.21 U	1.9 UJ	0.21 U
Anthracene	100	1,000	500	mg/kg	0.18 U	0.10 J	0.12 J	0.60	0.40	0.89 J	0.12 J
Atrazine	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Benzaldehyde	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Benzo(a)anthracene	1	1	5.6	mg/kg	0.18 U	0.13 J	0.14 J	***3.3***	0.64	***8.9***	0.25
Benzo(a)pyrene	1	22	1	mg/kg	0.18 U	0.095 J	0.094 J	*3.0*	0.61	*11*	0.19 J
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.014 J	0.10 J	0.11 J	***3.9***	0.74	***11***	0.21
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.18 U	0.040 J	0.037 J	1.2	0.22	6.3	0.13 J
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.18 U	0.038 J	0.035 J	*1.2*	0.26	***4.5***	0.061 J
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.60	0.10 J	1.2 J	0.38 UB
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Caprolactam	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Carbazole	- -	- -	- -	mg/kg	0.18 U	0.017 J	0.045 J	0.050 J	0.044 J	1.9 U	0.072 J
Chrysene	1	1	56	mg/kg	0.18 U	0.094 J	0.096 J	***2.5***	0.50	***8.5***	0.19 J
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.18 U	0.21 U	0.20 U	0.27 J	0.053 J	*1.7 J*	0.029 J
Dibenzofuran	7	210	350	mg/kg	0.18 U	0.044 J	0.060 J	0.16 J	0.24	1.9 U	0.034 J
Diethylphthalate	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 UB
Dimethylphthalate	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	MW-31-D1R 0 - 2 4 - 6 11/17/10 Shallow Sand Fill - Shallow	MW-31-D1R 2 - 4 6 - 8 11/17/10 Shallow Sand Fill - Shallow	MW-31-D1R 4 - 6 8 - 10 11/17/10 Shallow Sand Fill - Shallow	MW-31-D2R 2 - 4 6 - 8 11/17/10 Shallow Sand Fill - Shallow	MW-31-D2R 4 - 6 8 - 10 11/17/10 Shallow Sand Fill - Shallow	MW-31-D2R 6 - 8 10 - 12 11/17/10 Shallow Sand Fill - Shallow	MW-31-D2R 17 - 19 21 - 12/07/10 Deep Sand Layer - D1 Unit
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Fluoranthene	100	1,000	500	mg/kg	0.18 U	0.41	0.43	5.6	1.5	11	0.59
Fluorene	30	386	500	mg/kg	0.18 U	0.084 J	0.11 J	0.32 J	0.43	0.22 J	0.066 J
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Hexachloroethane	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.18 U	0.037 J	0.035 J	*0.87*	0.16 J	*5.8*	0.091 J
Isophorone	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Nitrobenzene	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	0.34 U	0.41 U	0.40 U	0.73 U	0.41 U	3.7 U	0.40 U
Phenanthrene	100	1,000	500	mg/kg	0.18 U	0.45	0.56	1.5	1.7	1.4 J	0.39
Phenol	0.33	0.33	500	mg/kg	0.18 U	0.21 U	0.20 U	0.37 U	0.21 U	1.9 U	0.21 U
Pyrene	100	1,000	500	mg/kg	0.18 U	0.34	0.36	4.6	1.2	12	0.53
Total SVOCs	- -	- -	- -	mg/kg	0.014 J	2.1 J	2.4 J	30 J	9.5 J	85 J	3.0 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	4,400 J	1,180 J	901 J	4,020 J	1,340 J	2,720 J	2,330
Antimony	- -	- -	- -	mg/kg	15.9 U	18.6 U	17.8 U	16.7 U	18.4 U	17.0 U	17.2 U
Arsenic	13	16	16	mg/kg	1.90 J	0.700 J	0.500 J	2.20	1.00 J	1.60 J	1.80 J
Barium	350	820	400	mg/kg	16.0 J	4.91 J	4.69 J	15.1 J	4.83 J	14.1 J	7.98
Beryllium	7.2	47	590	mg/kg	0.179 J	0.0530 J	0.0420 J	0.158 J	0.0420 J	0.130 J	0.181 J
Cadmium	2.5	7.5	9.3	mg/kg	0.100 J	0.0550 J	0.0490 J	0.120 J	0.0750 J	0.171 J	0.229 U
Calcium	- -	- -	- -	mg/kg	369 J	368 J	232 J	2,220 J	304 J	9,650 J	237
Chromium	- -	- -	- -	mg/kg	4.92	2.08	2.19	5.73	2.88	5.37	6.07
Cobalt	- -	- -	- -	mg/kg	2.61	0.641	0.388 J	2.33	0.667	1.49	0.797
Copper	50	1,720	270	mg/kg	5.10	1.50	1.10 J	6.10	1.60	4.90	1.60
Ferrous Iron	- -	- -	- -	mg/kg	R	R	R	R	R	R	1.40 J
Iron	- -	- -	- -	mg/kg	5,520 J	1,950 J	1,370 J	5,650 J	2,130 J	4,420 J	5,180
Lead	63	450	1,000	mg/kg	11.8	2.80	1.80	17.7	2.50	15.6	1.50 J
Magnesium	- -	- -	- -	mg/kg	777 J	334 J	281 J	920 J	370 J	2,450 J	691
Manganese	1,600	2,000	10,000	mg/kg	154 J	26.2 J	12.4 J	84.4 J	21.1 J	55.7 J	36.9
Mercury	0.18	0.73	2.8	mg/kg	0.0202	0.0237 U	0.0217 U	0.0377	0.0228 U	0.0119 J	0.0186 J
Nickel	30	130	310	mg/kg	4.71 J	1.59 J	1.17 J	4.44 J	1.90 J	3.88 J	1.97 J
Potassium	- -	- -	- -	mg/kg	382 J	220 J	226 J	510 J	247 J	324 J	392
Selenium	3.9	4	1,500	mg/kg	4.20 U	5.00 U	4.80 U	4.50 U	4.90 U	4.50 U	4.60 U
Silver	2	8.3	1,500	mg/kg	0.530 U	0.620 U	0.594 U	0.557 U	0.614 U	0.565 U	0.573 U
Sodium	- -	- -	- -	mg/kg	29.6 J	31.3 J	48.2 J	128 J	53.7 J	52.4 J	662
Thallium	- -	- -	- -	mg/kg	6.40 U	7.40 U	7.10 U	6.70 U	7.40 U	6.80 U	6.90 U
Vanadium	- -	- -	- -	mg/kg	7.37	2.91	2.69	7.66	3.78	6.16	7.85
Zinc	109	2,480	10,000	mg/kg	15.2	4.70	4.00	20.6	6.60	21.0	5.20
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	84 J	98 J	100 J	110 U	130	110 U	400
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	2,780	2,090	2,320	1,780	3,760	5,630	1,260 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	P-18R 0 - 2 4 - 6 12/02/10 Shallow Sand Fill - Shallow	P-18R 4 - 6 8 - 10 12/02/10 Shallow Sand Fill - Shallow	P-18R 6 - 8 10 - 12 12/02/10 Shallow Sand Fill - Shallow	TP-1-1 4 8 11/29/10 Shallow Sand Fill - Shallow	TP-1-2 3 7 11/30/10 Shallow Sand Fill - Shallow	TP-1-3 3.5 7.5 11/30/10 Shallow Sand Fill - Shallow	TP-2-1 5.5 9.5 11/30/10 Shallow Sand Fill - Shallow
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.0056 U	0.0056 J	0.011	0.0059 U	0.0054 U	0.0057 U	0.0062 U
Toluene	0.7	0.7	500	mg/kg	0.0056 U	0.0062 U	0.0062 U	0.0014 J	0.0054 U	0.0057 U	0.0019 J
Ethylbenzene	1	1	390	mg/kg	0.0056 U	0.0062 U	0.0062 U	0.0059 U	0.0054 U	0.0057 U	0.0016 J
Xylenes (total)	0.26	1.6	500	mg/kg	0.011 U	0.0022 J	0.0025 J	0.011 J	0.011 U	0.011 U	0.0095 J
Acetone	0.05	0.05	500	mg/kg	0.028 U	0.038	0.030 J	0.018 J	0.020 J	0.015 J	0.035
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.0056 U	0.0062 U	0.0062 U	0.0059 U	0.0054 U	0.0057 U	0.0062 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.0077 UB	0.013 UB	0.022	0.0085	0.0097	0.011	0.012
Vinyl Chloride	0.02	0.02	13	mg/kg	0.0056 U	0.0062 U	0.0062 U	0.0059 U	0.0054 U	0.0057 U	0.0062 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
2-Nitroaniline	- -	- -	- -	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
2-Nitrophenol	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
3-Nitroaniline	- -	- -	- -	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
4-Chloroaniline	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
4-Methylphenol	0.33	0.33	500	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
4-Nitroaniline	- -	- -	- -	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
4-Nitrophenol	- -	- -	- -	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
Acenaphthene	20	98	500	mg/kg	7.1 J	0.092 J	0.15 J	0.018 J	0.19 U	0.20 U	0.21 U
Acenaphthylene	100	107	500	mg/kg	0.20 J	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Acetophenone	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Anthracene	100	1,000	500	mg/kg	0.76 J	0.022 J	0.038 J	0.060 J	0.19 U	0.20 U	0.21 U
Atrazine	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Benzaldehyde	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Benzo(a)anthracene	1	1	5.6	mg/kg	***2.0***	0.038 J	0.063 J	0.20	0.19 U	0.20 U	0.21 U
Benzo(a)pyrene	1	22	1	mg/kg	0.58 J	0.027 J	0.039 J	0.19 J	0.19 U	0.20 U	0.21 U
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.90 J	0.034 J	0.050 J	0.22	0.19 U	0.20 U	0.21 U
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.17 J	0.022 J	0.024 J	0.15 J	0.19 U	0.20 U	0.21 U
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.34 J	0.21 U	0.21 U	0.085 J	0.19 U	0.20 U	0.21 U
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Caprolactam	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Carbazole	- -	- -	- -	mg/kg	0.082 J	0.21 U	0.21 U	0.032 J	0.19 U	0.20 U	0.21 U
Chrysene	1	1	56	mg/kg	***1.8***	0.040 J	0.065 J	0.19 J	0.19 U	0.20 U	0.21 U
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.96 U	0.21 U	0.21 U	0.029 J	0.19 U	0.20 U	0.21 U
Dibenzofuran	7	210	350	mg/kg	0.53 J	0.031 J	0.039 J	0.20 U	0.19 U	0.20 U	0.21 U
Diethylphthalate	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Dimethylphthalate	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	P-18R 0 - 2 4 - 6 12/02/10 Shallow Sand Fill - Shallow	P-18R 4 - 6 8 - 10 12/02/10 Shallow Sand Fill - Shallow	P-18R 6 - 8 10 - 12 12/02/10 Shallow Sand Fill - Shallow	TP-1-1 4 8 11/29/10 Shallow Sand Fill - Shallow	TP-1-2 3 7 11/30/10 Shallow Sand Fill - Shallow	TP-1-3 3.5 7.5 11/30/10 Shallow Sand Fill - Shallow	TP-2-1 5.5 9.5 11/30/10 Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Fluoranthene	100	1,000	500	mg/kg	16	0.14 J	0.30	0.48	0.19 U	0.20 U	0.019 J
Fluorene	30	386	500	mg/kg	1.6 J	0.081 J	0.099 J	0.026 J	0.19 U	0.20 U	0.21 U
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Hexachloroethane	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.17 J	0.21 U	0.21 U	0.12 J	0.19 U	0.20 U	0.21 U
Isophorone	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Nitrobenzene	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.21 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	1.9 U	0.40 U	0.41 U	0.40 U	0.36 U	0.39 U	0.41 U
Phenanthrene	100	1,000	500	mg/kg	3.8 J	0.15 J	0.26	0.29	0.19 U	0.20 U	0.024 J
Phenol	0.33	0.33	500	mg/kg	0.96 U	0.21 U	0.21 U	0.20 U	0.19 U	0.20 U	0.11 J
Pyrene	100	1,000	500	mg/kg	13	0.13 J	0.28	0.36	0.19 U	0.20 U	0.21 U
Total SVOCs	- -	- -	- -	mg/kg	49 J	0.84 J	1.4 J	2.5 J	ND	ND	0.15 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	7,410 J	505 J	1,770 J	1,830 J	2,370 J	1,250 J	1,320 J
Antimony	- -	- -	- -	mg/kg	16.9 UJ	17.9 UJ	17.6 UJ	17.5 U	16.4 U	17.6 U	18.5 U
Arsenic	13	16	16	mg/kg	3.80 J	2.40 UJ	0.900 J	1.40 J	1.50 J	2.30 UJ	1.30 J
Barium	350	820	400	mg/kg	21.7	2.37	8.06	18.4	9.88	6.17	10.1
Beryllium	7.2	47	590	mg/kg	0.299 J	0.238 UJ	0.0890 J	0.0580 J	0.104 J	0.234 U	0.246 U
Cadmium	2.5	7.5	9.3	mg/kg	0.123 J	0.238 U	0.0450 J	0.250 J	0.218 UBJ	0.234 UBJ	0.246 UBJ
Calcium	- -	- -	- -	mg/kg	2,080 J	91.1 J	455 J	5,090	1,440 B	687	306
Chromium	- -	- -	- -	mg/kg	8.36	0.961	3.62	4.59	6.17	3.51	3.69
Cobalt	- -	- -	- -	mg/kg	3.45	0.329 J	0.671	0.927	1.32	0.491 J	0.825
Copper	50	1,720	270	mg/kg	7.30	0.600 J	2.30	3.50	3.30	1.40	5.90
Ferrous Iron	- -	- -	- -	mg/kg	2.60 J	1.80 J	2.50 J	R	R	R	R
Iron	- -	- -	- -	mg/kg	9,100 J	805 J	3,130 J	3,540	4,430	2,380	3,240
Lead	63	450	1,000	mg/kg	28.5	1.30	8.90	12.0 J	3.80 J	1.60 J	2.10 J
Magnesium	- -	- -	- -	mg/kg	2,060 J	132 J	567 J	709	752	422	441
Manganese	1,600	2,000	10,000	mg/kg	138 J	7.50 J	27.1 J	40.4 J	26.0 J	15.2 J	27.5 J
Mercury	0.18	0.73	2.8	mg/kg	0.0269	0.0250 U	0.0239 U	0.0234 U	0.0218 U	0.0227 U	0.0119 J
Nickel	30	130	310	mg/kg	6.33	0.616 J	1.86 J	2.56 J	3.77 J	1.63 J	2.00 J
Potassium	- -	- -	- -	mg/kg	347	94.4	258	504	516	352	355
Selenium	3.9	4	1,500	mg/kg	4.50 U	4.80 U	4.70 U	4.70 U	4.40 U	4.70 U	4.90 U
Silver	2	8.3	1,500	mg/kg	0.563 U	0.596 U	0.586 U	0.585 U	0.546 U	0.586 U	0.616 U
Sodium	- -	- -	- -	mg/kg	49.9 J	16.8 J	35.0 J	87.6 J	58.2 J	38.8 J	65.0 J
Thallium	- -	- -	- -	mg/kg	6.80 U	7.10 U	7.00 U	7.00 U	6.60 U	7.00 U	7.40 U
Vanadium	- -	- -	- -	mg/kg	12.7	1.16	4.58	5.77	7.31	4.28	3.92
Zinc	109	2,480	10,000	mg/kg	22.1	1.60 J	8.10	32.6 J	10.5 J	4.90 J	6.10 J
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	87 J	67 J	140	850	480	270	310
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	3,800	2,420	5,560	3,800	1,320 U	1,200 U	1,250 U

See Notes on Page 23.

Table 2

Hisotrical Soil Analytical Results

Chevron Facility #6518040

Former Gulf Oil Terminal

Oceanside, Township of Hempstead, New York

Location ID:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	TP-2-2	TP-3-1	TP-3-2	TP-3-3	TP-4-B-1	TP-4-D-1	TP-4-F-1
Historical Sample Depth(feet):					5.5	5	6.8	6.5	1.5	7	4
Current Estimated Sample Depth (feet)					9.5	9	10.8	10.5	5.5	11	8
Date Collected:					11/30/10	12/01/10	12/01/10	12/01/10	12/02/10	12/02/10	12/02/10
Sampling Event:					Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.0064 U	0.0073 U	0.0071 U	0.0073 U	0.0055 U	0.0053 U	0.0059 U
Toluene	0.7	0.7	500	mg/kg	0.0064 U	0.0073 U	0.0071 U	0.0073 U	0.0055 U	0.0053 U	0.0059 U
Ethylbenzene	1	1	390	mg/kg	0.0064 U	0.0073 U	0.0071 U	0.0073 U	0.0055 U	0.0053 U	0.0059 U
Xylenes (total)	0.26	1.6	500	mg/kg	0.0014 J	0.015 U	0.014 U	0.015 U	0.011 U	0.011 U	0.012 U
Acetone	0.05	0.05	500	mg/kg	0.015 J	0.032 J	0.026 J	0.017 J	0.0062 J	0.0067 J	0.022 J
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.0064 U	0.0073 U	0.0071 U	0.0073 U	0.0055 U	0.0053 U	0.0059 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.013	0.0094	0.012	0.0082	0.013	0.0097	0.017
Vinyl Chloride	0.02	0.02	13	mg/kg	0.0064 U	0.0073 U	0.0071 U	0.0073 U	0.0055 U	0.0053 U	0.0059 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
2-Nitroaniline	- -	- -	- -	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
2-Nitrophenol	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
3-Nitroaniline	- -	- -	- -	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
4-Chloroaniline	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
4-Methylphenol	0.33	0.33	500	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
4-Nitroaniline	- -	- -	- -	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
4-Nitrophenol	- -	- -	- -	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
Acenaphthene	20	98	500	mg/kg	0.22 U	0.11 J	0.24 U	0.25 U	0.057 J	0.18 U	0.20 U
Acenaphthylene	100	107	500	mg/kg	0.22 U	0.022 J	0.24 U	0.25 U	0.031 J	0.18 U	0.20 U
Acetophenone	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Anthracene	100	1,000	500	mg/kg	0.22 U	0.040 J	0.24 U	0.25 U	0.10 J	0.18 U	0.20 U
Atrazine	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Benzaldehyde	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Benzo(a)anthracene	1	1	5.6	mg/kg	0.22 U	0.16 J	0.24 U	0.25 U	0.34	0.18 U	0.20 U
Benzo(a)pyrene	1	22	1	mg/kg	0.22 U	0.16 J	0.24 U	0.25 U	0.41	0.18 U	0.20 U
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.22 U	0.17 J	0.24 U	0.25 U	0.50	0.18 U	0.20 U
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.22 U	0.11 J	0.24 U	0.25 U	0.24	0.18 U	0.20 U
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.22 U	0.055 J	0.24 U	0.25 U	0.17 J	0.18 U	0.20 U
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.22 U	0.24 UB	0.24 UB	0.25 UB	0.21 UB	0.18 UB	0.20 UB
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Caprolactam	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Carbazole	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.042 J	0.18 U	0.20 U
Chrysene	1	1	56	mg/kg	0.22 U	0.15 J	0.24 U	0.25 U	0.35	0.18 U	0.20 U
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Dibenzofuran	7	210	350	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Diethylphthalate	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Dimethylphthalate	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	TP-2-2 5.5 9.5 11/30/10 Shallow Sand Fill - Shallow	TP-3-1 5 9 12/01/10 Shallow Sand Fill - Shallow	TP-3-2 6.8 10.8 12/01/10 Shallow Sand Fill - Shallow	TP-3-3 6.5 10.5 12/01/10 Shallow Sand Fill - Shallow	TP-4-B-1 1.5 5.5 12/02/10 Shallow Sand Fill - Shallow	TP-4-D-1 7 11 12/02/10 Shallow Sand Fill - Shallow	TP-4-F-1 4 8 12/02/10 Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Fluoranthene	100	1,000	500	mg/kg	0.22 U	0.21 J	0.24 U	0.25 U	0.71	0.18 U	0.20 U
Fluorene	30	386	500	mg/kg	0.22 U	0.15 J	0.24 U	0.25 U	0.031 J	0.18 U	0.20 U
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Hexachloroethane	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.22 U	0.083 J	0.24 U	0.25 U	0.21	0.18 U	0.20 U
Isophorone	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Nitrobenzene	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	0.43 U	0.47 U	0.47 U	0.49 U	0.36 U	0.34 U	0.38 U
Phenanthrene	100	1,000	500	mg/kg	0.22 U	0.049 J	0.24 U	0.25 U	0.29	0.037 J	0.019 J
Phenol	0.33	0.33	500	mg/kg	0.22 U	0.24 U	0.24 U	0.25 U	0.19 U	0.18 U	0.20 U
Pyrene	100	1,000	500	mg/kg	0.22 U	0.23 J	0.24 U	0.25 U	0.70	0.18 U	0.20 U
Total SVOCs	- -	- -	- -	mg/kg	ND	1.7 J	ND	ND	4.2 J	0.037 J	0.019 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	927 J	2,710 J	11,000 J	1,600 J	3,710 J	404 J	745 J
Antimony	- -	- -	- -	mg/kg	18.9 U	21.7 U	20.6 U	22.5 U	15.9 UJ	14.7 UJ	17.2 UJ
Arsenic	13	16	16	mg/kg	2.50 UJ	1.50 J	10.1	1.00 J	4.10 J	0.400 J	2.30 UJ
Barium	350	820	400	mg/kg	8.32	15.9	25.2	8.27	17.6	1.28	2.18
Beryllium	7.2	47	590	mg/kg	0.252 U	0.124 J	0.513	0.0510 J	0.278 J	0.195 U	0.229 UJ
Cadmium	2.5	7.5	9.3	mg/kg	0.252 UBJ	0.289 UBJ	0.314 J	0.300 UBJ	0.284	0.0300 J	0.229 U
Calcium	- -	- -	- -	mg/kg	464	983	1,630	426	4,140 J	65.8 J	165 J
Chromium	- -	- -	- -	mg/kg	2.14	6.76	28.5	3.59	7.72	0.701	1.26
Cobalt	- -	- -	- -	mg/kg	0.331 J	1.54	5.86	1.14	2.42	0.142 J	0.468 J
Copper	50	1,720	270	mg/kg	0.700 J	3.60 J	12.5 J	2.60 J	14.2	0.600 J	1.10
Ferrous Iron	- -	- -	- -	mg/kg	R	R	R	R	1.90 J	1.40 J	R
Iron	- -	- -	- -	mg/kg	1,170	5,200 J	22,200 J	2,770 J	6,560 J	764 J	1,070 J
Lead	63	450	1,000	mg/kg	1.10 J	3.00 J	11.4 J	1.80 J	28.7	0.600 J	1.90
Magnesium	- -	- -	- -	mg/kg	269	1,040	4,380	632	2,230 J	56.2 J	122 J
Manganese	1,600	2,000	10,000	mg/kg	11.1 J	44.4 J	192 J	25.6 J	77.9 J	3.80 J	7.60 J
Mercury	0.18	0.73	2.8	mg/kg	0.0250 U	0.0270 U	0.0166 J	0.0273 U	*0.606*	0.0198 U	0.0226 U
Nickel	30	130	310	mg/kg	1.20 J	4.38 J	18.0	3.04 J	5.97	0.531 J	1.20 J
Potassium	- -	- -	- -	mg/kg	225	751	2,290	479	456	59.5	115
Selenium	3.9	4	1,500	mg/kg	5.00 U	5.80 U	0.800 J	6.00 U	4.20 U	3.90 U	4.60 U
Silver	2	8.3	1,500	mg/kg	0.629 U	0.722 U	0.688 U	0.751 U	*3.32*	0.489 U	0.574 U
Sodium	- -	- -	- -	mg/kg	39.2 J	117 J	1,150	161 J	121 J	15.6 J	19.2 J
Thallium	- -	- -	- -	mg/kg	7.60 U	8.70 U	8.30 U	9.00 U	6.40 U	5.90 U	6.90 U
Vanadium	- -	- -	- -	mg/kg	2.15	9.50	35.7	4.39	11.1	0.704	1.33
Zinc	109	2,480	10,000	mg/kg	3.70 J	12.5 J	43.6 J	7.20 J	62.8	1.40 J	2.10 J
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	260	810	2,300	520	220	110 U	140
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	1,200 U	1,900	7,750	1,410	2,740	1,100 U	1,160 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	TP-5-1 5 9 12/02/10 Shallow Sand Fill - Shallow	TP-5-2 5.5 9.5 12/02/10 Shallow Sand Fill - Shallow	TP-5-3 6 10 12/02/10 Shallow Sand Fill - Shallow	TP-6-1 5 9 12/03/10 Shallow Sand Fill - Shallow	TP-6-2 5.5 9.5 12/03/10 Shallow Sand Fill - Shallow	TP-6-3 5.5 9.5 12/03/10 Shallow Sand Fill - Shallow	TP-7-1 5 9 12/06/10 Shallow Sand Fill - Shallow
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.15 U	0.032 U	0.10 U	0.0053 U	0.0056 U	0.57 U	0.0055 U
Toluene	0.7	0.7	500	mg/kg	0.15 U	0.032 U	0.10 U	0.0053 U	0.0056 U	0.57 U	0.0055 U
Ethylbenzene	1	1	390	mg/kg	0.15 U	0.032 U	0.10 U	0.0053 U	0.0056 U	0.57 U	0.0055 U
Xylenes (total)	0.26	1.6	500	mg/kg	0.21 J	0.064 U	0.21 U	0.011 U	0.011 U	1.1 U	0.0031 J
Acetone	0.05	0.05	500	mg/kg	0.77 U	0.16 U	0.52 U	***0.080***	0.018 J	2.9 U	0.026 J
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.15 U	0.032 U	0.10 U	0.0053 U	0.0056 U	0.57 U	0.0055 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.15 U	***0.11***	0.10 U	0.038 J	0.041 J	0.57 U	0.017
Vinyl Chloride	0.02	0.02	13	mg/kg	0.15 U	0.032 U	0.10 U	0.0053 U	0.0056 U	0.57 U	0.0055 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
2-Nitroaniline	- -	- -	- -	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
2-Nitrophenol	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
3-Nitroaniline	- -	- -	- -	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
4-Chloroaniline	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
4-Methylphenol	0.33	0.33	500	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
4-Nitroaniline	- -	- -	- -	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
4-Nitrophenol	- -	- -	- -	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
Acenaphthene	20	98	500	mg/kg	0.27 U	0.11 J	0.22 J	1.8 U	0.19 U	0.94 J	0.020 J
Acenaphthylene	100	107	500	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.021 J
Acetophenone	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Anthracene	100	1,000	500	mg/kg	0.27 U	0.086 J	1.8 U	0.17 J	0.19 U	0.82 J	0.035 J
Atrazine	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Benzaldehyde	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Benzo(a)anthracene	1	1	5.6	mg/kg	0.27 U	0.27	1.8 U	0.50 J	0.019 J	***2.7 J***	0.099 J
Benzo(a)pyrene	1	22	1	mg/kg	0.27 U	0.27	1.8 U	0.48 J	0.019 J	*2.7 J*	0.10 J
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.27 U	0.34	1.8 U	0.50 J	0.023 J	***2.8 J***	0.12 J
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.27 U	0.13 J	1.8 U	0.44 J	0.017 J	1.5 J	0.081 J
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.27 U	0.11 J	1.8 U	1.8 U	0.19 U	*1.2 J*	0.034 J
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.27 UB	0.20 UB	1.8 UB	1.8 UB	0.19 UB	4.8 U	0.19 UB
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Caprolactam	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Carbazole	- -	- -	- -	mg/kg	0.27 U	0.046 J	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Chrysene	1	1	56	mg/kg	0.27 U	0.27	1.8 U	0.52 J	0.024 J	***2.3 J***	0.11 J
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Dibenzofuran	7	210	350	mg/kg	0.27 U	0.081 J	1.8 U	1.8 U	0.19 U	4.8 U	0.021 J
Diethylphthalate	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 UB	4.8 U	0.19 UB
Dimethylphthalate	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U

See Notes on Page 23.

Location ID:					TP-5-1	TP-5-2	TP-5-3	TP-6-1	TP-6-2	TP-6-3	TP-7-1
Historical Sample Depth(feet):					5	5.5	6	5	5.5	5.5	5
Current Estimated Sample Depth (feet)					9	9.5	10	9	9.5	9.5	9
Date Collected:					12/02/10	12/02/10	12/02/10	12/03/10	12/03/10	12/03/10	12/06/10
Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Fluoranthene	100	1,000	500	mg/kg	0.27 U	0.66	0.20 J	1.2 J	0.046 J	4.8	0.19
Fluorene	30	386	500	mg/kg	0.27 U	0.13 J	0.21 J	1.8 U	0.19 U	1.1 J	0.025 J
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Hexachloroethane	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.27 U	0.12 J	1.8 U	0.31 J	0.19 U	*1.1 J*	0.059 J
Isophorone	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Nitrobenzene	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.19 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	0.52 U	0.38 U	3.5 U	3.5 U	0.36 U	9.4 U	0.36 U
Phenanthrene	100	1,000	500	mg/kg	0.039 J	0.63	0.40 J	1.2 J	0.042 J	1.7 J	0.14 J
Phenol	0.33	0.33	500	mg/kg	0.27 U	0.20 U	1.8 U	1.8 U	0.19 U	4.8 U	0.035 J
Pyrene	100	1,000	500	mg/kg	0.27 U	0.69	0.23 J	1.1 J	0.039 J	4.8	0.19
Total SVOCs	- -	- -	- -	mg/kg	0.32 J	4.1 J	1.3 J	6.4 J	0.23 J	28 J	1.3 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	9,740 J	3,430 J	4,230 J	4,640	637	3,000	3,500
Antimony	- -	- -	- -	mg/kg	23.0 UJ	17.0 UJ	15.5 UJ	15.7 U	16.7 U	16.4 U	16.2 U
Arsenic	13	16	16	mg/kg	11.0 J	2.70 J	1.50 J	***28.1***	0.500 J	1.90 J	6.50
Barium	350	820	400	mg/kg	34.4	113	16.8	43.2	6.25	14.0	22.7
Beryllium	7.2	47	590	mg/kg	0.595 J	0.228 J	0.225 J	0.241	0.223 U	0.157 J	0.278
Cadmium	2.5	7.5	9.3	mg/kg	0.366	0.218 J	0.115 J	0.660	0.223 U	0.0790 J	0.0760 J
Calcium	- -	- -	- -	mg/kg	3,570 J	5,800 J	140 J	10,800	490	1,040	3,010
Chromium	- -	- -	- -	mg/kg	26.4	7.41	6.06	9.72	1.57	6.88	4.99
Cobalt	- -	- -	- -	mg/kg	6.33	2.08	3.48	2.68	0.285 J	2.26	2.62
Copper	50	1,720	270	mg/kg	11.3	6.10	4.50	11.9	0.700 J	4.00	5.70
Ferrous Iron	- -	- -	- -	mg/kg	1.70 J	1.30 J	4.40 J	22.1 J	R	0.700 J	R
Iron	- -	- -	- -	mg/kg	25,100 J	6,100 J	6,640 J	8,290	917	4,740	6,380
Lead	63	450	1,000	mg/kg	13.1	28.3	3.60	57.9	0.600 J	9.70	17.8 J
Magnesium	- -	- -	- -	mg/kg	3,850 J	1,870 J	694 J	2,270	230	1,170	714
Manganese	1,600	2,000	10,000	mg/kg	240 J	76.0 J	49.2 J	110	8.30	36.9	91.7
Mercury	0.18	0.73	2.8	mg/kg	0.0306 U	0.0155 J	0.0209 U	0.0732	0.0220 U	0.0224 U	0.0256
Nickel	30	130	310	mg/kg	15.7	4.59 J	4.67 J	5.61	0.810 J	5.40 J	3.98 J
Potassium	- -	- -	- -	mg/kg	2,170	521	299	436	259	705	436
Selenium	3.9	4	1,500	mg/kg	6.10 U	4.50 U	4.10 U	4.20 U	4.50 U	4.40 U	4.30 U
Silver	2	8.3	1,500	mg/kg	0.767 U	0.568 U	0.518 U	0.524 U	0.556 U	0.546 U	0.541 U
Sodium	- -	- -	- -	mg/kg	171 J	107 J	60.9 J	303	44.3 J	107 J	132 J
Thallium	- -	- -	- -	mg/kg	9.20 U	6.80 U	6.20 U	6.30 U	6.70 U	6.60 U	6.50 U
Vanadium	- -	- -	- -	mg/kg	31.4	9.55	8.11	12.1	1.75	7.97	7.37
Zinc	109	2,480	10,000	mg/kg	48.6	68.6	10.5	67.6	2.00 J	15.9	31.4
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	620	65 J	370	380	110 U	70 J	110 U
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	19,100	26,100	6,310	12,800	1,210 U	14,000	1,700

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:					TP-7-2	TP-8-1	TP-8-2	TP-9-1	TP-9-2	TP-9-3	TP-10-1
Historical Sample Depth(feet):					5	4.5	4	6.5	6	6.5	6
Current Estimated Sample Depth (feet)					9	8.5	8	10.5	10	10.5	10
Date Collected:					12/06/10	12/06/10	12/06/10	12/07/10	12/07/10	12/07/10	12/07/10
Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow
Volatile Organics											
Benzene	0.06	0.06	44	mg/kg	0.54 U	0.10 U	0.0054 U	0.22 U	0.23 U	0.0079 U	0.0056 U
Toluene	0.7	0.7	500	mg/kg	0.54 U	0.10 U	0.0054 U	0.22 U	0.23 U	0.0079 U	0.0056 U
Ethylbenzene	1	1	390	mg/kg	0.54 U	0.10 U	0.0054 U	0.22 U	0.23 U	0.0079 U	0.0056 U
Xylenes (total)	0.26	1.6	500	mg/kg	1.1 U	0.21 U	0.011 U	0.44 U	0.45 U	0.016 U	0.011 U
Acetone	0.05	0.05	500	mg/kg	2.7 U	0.51 U	0.010 J	1.1 U	1.1 U	***0.055***	0.025 J
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.54 U	0.10 U	0.0054 U	0.22 U	0.23 U	0.0079 U	0.0056 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.54 U	***0.082 J***	0.016	0.22 U	0.23 U	0.020	0.017
Vinyl Chloride	0.02	0.02	13	mg/kg	0.54 U	0.10 U	0.0054 U	0.22 U	0.23 U	0.0079 U	0.0056 U
Semivolatile Organics											
2-Methylphenol	0.33	0.33	500	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
2-Nitroaniline	- -	- -	- -	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
2-Nitrophenol	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
3-Nitroaniline	- -	- -	- -	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
4-Chloroaniline	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
4-Methylphenol	0.33	0.33	500	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
4-Nitroaniline	- -	- -	- -	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
4-Nitrophenol	- -	- -	- -	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
Acenaphthene	20	98	500	mg/kg	1.7 J	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Acenaphthylene	100	107	500	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Acetophenone	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Anthracene	100	1,000	500	mg/kg	1.5 J	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Atrazine	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Benzaldehyde	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Benzo(a)anthracene	1	1	5.6	mg/kg	***3.7 J***	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	0.18 J
Benzo(a)pyrene	1	22	1	mg/kg	*3.7 J*	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	0.17 J
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	***4.1 J***	0.072 J	0.18 U	0.99 U	0.94 U	0.26 U	0.15 J
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	2.1 J	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	0.13 J
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	*1.1 J*	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	4.7 UB	0.95 UB	0.18 UB	0.99 UB	0.94 U	0.26 UB	1.0 UB
Butylbenzylphthalate	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Caprolactam	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Carbazole	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Chrysene	1	1	56	mg/kg	***3.5 J***	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	0.13 J
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Dibenzofuran	7	210	350	mg/kg	1.1 J	0.95 U	0.18 U	0.99 U	0.88 J	0.26 U	1.0 U
Diethylphthalate	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 UB	0.99 U	0.94 U	0.26 UB	1.0 U
Dimethylphthalate	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	TP-7-2 5 9 12/06/10 Shallow Sand Fill - Shallow	TP-8-1 4.5 8.5 12/06/10 Shallow Sand Fill - Shallow	TP-8-2 4 8 12/06/10 Shallow Sand Fill - Shallow	TP-9-1 6.5 10.5 12/07/10 Shallow Sand Fill - Shallow	TP-9-2 6 10 12/07/10 Shallow Sand Fill - Shallow	TP-9-3 6.5 10.5 12/07/10 Shallow Sand Fill - Shallow	TP-10-1 6 10 12/07/10 Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)											
Di-n-Butylphthalate	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Fluoranthene	100	1,000	500	mg/kg	7.0	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	0.23 J
Fluorene	30	386	500	mg/kg	1.9 J	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Hexachlorobenzene	0.33	3.2	6	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Hexachloroethane	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	*1.8 J*	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	0.094 J
Isophorone	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Nitrobenzene	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	9.1 U	1.8 U	0.36 U	1.9 U	1.8 U	0.51 U	1.9 U
Phenanthrene	100	1,000	500	mg/kg	4.2 J	0.95 U	0.18 U	0.99 U	1.5	0.26 U	0.11 J
Phenol	0.33	0.33	500	mg/kg	4.7 U	0.95 U	0.18 U	0.99 U	0.94 U	0.26 U	1.0 U
Pyrene	100	1,000	500	mg/kg	7.7	0.11 J	0.18 U	0.077 J	0.94 U	0.26 U	0.30 J
Total SVOCs	- -	- -	- -	mg/kg	45 J	0.18 J	ND	0.077 J	2.4 J	ND	1.5 J
Inorganics											
Aluminum	- -	- -	- -	mg/kg	2,280	728	545	4,520	564	11,200	1,730
Antimony	- -	- -	- -	mg/kg	16.1 U	17.7 U	16.5 U	17.5 U	16.0 U	23.2 U	16.8 U
Arsenic	13	16	16	mg/kg	3.60	2.40 U	2.20 U	2.40	2.10 U	10.3	7.90
Barium	350	820	400	mg/kg	21.4	3.31	2.64	19.5	2.12	32.4	37.4
Beryllium	7.2	47	590	mg/kg	0.218	0.0470 J	0.0430 J	0.283	0.0440 J	0.822	0.155 J
Cadmium	2.5	7.5	9.3	mg/kg	0.258	0.235 U	0.220 U	0.234 U	0.213 U	0.362	0.109 J
Calcium	- -	- -	- -	mg/kg	9,740	229	150	800	106	2,480	1,890
Chromium	- -	- -	- -	mg/kg	5.83	1.82	1.27	13.4	1.35	31.9	3.01
Cobalt	- -	- -	- -	mg/kg	1.36	0.406 J	0.247 J	1.95	0.411 J	5.96	1.38
Copper	50	1,720	270	mg/kg	13.4	1.00 J	0.700 J	22.3	0.700 J	11.4	6.00
Ferrous Iron	- -	- -	- -	mg/kg	8.30 J	0.900 J	R	1.10 J	0.400 J	2.20 J	0.700 J
Iron	- -	- -	- -	mg/kg	3,860	973	628	6,920	778	27,900	5,430
Lead	63	450	1,000	mg/kg	35.0 J	2.80 J	0.700 J	4.70 J	0.700 J	7.70 J	*200 J*
Magnesium	- -	- -	- -	mg/kg	2,320	214	165	1,610	108	4,700	570
Manganese	1,600	2,000	10,000	mg/kg	49.7	9.50	6.60	61.6	6.70	361	50.4
Mercury	0.18	0.73	2.8	mg/kg	0.104	0.0220 U	0.0216 U	0.0213 U	0.0230 U	0.0313 U	0.0325
Nickel	30	130	310	mg/kg	5.85	1.08 J	0.792 J	5.55 J	0.964 J	18.5	2.78 J
Potassium	- -	- -	- -	mg/kg	359	196	148	1,170	110	2,680	243
Selenium	3.9	4	1,500	mg/kg	4.30 U	4.70 U	4.40 U	4.70 U	4.30 U	6.20 U	4.50 U
Silver	2	8.3	1,500	mg/kg	0.537 U	0.589 U	0.549 U	0.584 U	0.533 U	0.774 U	0.561 U
Sodium	- -	- -	- -	mg/kg	115 J	41.6 J	48.9 J	148 J	32.3 J	351	840
Thallium	- -	- -	- -	mg/kg	6.40 U	7.10 U	6.60 U	7.00 U	6.40 U	9.30 U	6.70 U
Vanadium	- -	- -	- -	mg/kg	7.57	2.72	1.40	14.4	1.42	38.4	4.74
Zinc	109	2,480	10,000	mg/kg	75.1	2.40	1.80 J	24.0	1.50 J	47.1	60.6
Miscellaneous											
Sulfate	- -	- -	- -	mg/kg	110 U	94 J	110 U	120 U	110 U	810	440
TOC											
Total Organic Carbon	- -	- -	- -	mg/kg	8,210	1,160 U	1,100 U	1,120 U	1,090 U	21,200	2,730

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

ARCADIS Design & Consultancy for natural and built assets

Location ID: Historical Sample Depth(feet): Current Estimated Sample Depth (feet) Date Collected: Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	TP-10-2 6 10 12/07/10 Shallow Sand Fill - Shallow	TP-10-3 6.5 10.5 12/07/10 Shallow Sand Fill - Shallow	TP-11-1 5 9 12/07/10 Shallow Sand Fill - Shallow	TP-12-1 4.7 8.7 12/07/10 Shallow Sand Fill - Shallow
Volatile Organics								
Benzene	0.06	0.06	44	mg/kg	0.0056 U	0.0062 U	0.040 U	0.12 U
Toluene	0.7	0.7	500	mg/kg	0.0056 U	0.0062 U	0.040 U	0.12 U
Ethylbenzene	1	1	390	mg/kg	0.0056 U	0.0062 U	0.040 U	0.12 U
Xylenes (total)	0.26	1.6	500	mg/kg	0.011 U	0.012 U	0.020 J	0.23 U
Acetone	0.05	0.05	500	mg/kg	0.028 U	0.018 J	***0.058 J***	0.58 U
cis-1,2-Dichloroethene	0.25	0.25	500	mg/kg	0.0056 U	0.0062 U	0.040 U	0.12 U
Methylene Chloride	0.05	0.05	500	mg/kg	0.018	0.015	***0.086***	0.12 U
Vinyl Chloride	0.02	0.02	13	mg/kg	0.0056 U	0.0062 U	0.040 U	0.12 U
Semivolatile Organics								
2-Methylphenol	0.33	0.33	500	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
2-Nitroaniline	- -	- -	- -	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
2-Nitrophenol	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
3,3'-Dichlorobenzidine	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
3-Nitroaniline	- -	- -	- -	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
4,6-Dinitro-2-methylphenol	- -	- -	- -	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
4-Bromophenyl-phenylether	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
4-Chloro-3-Methylphenol	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
4-Chloroaniline	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
4-Chlorophenyl-phenylether	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
4-Methylphenol	0.33	0.33	500	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
4-Nitroaniline	- -	- -	- -	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
4-Nitrophenol	- -	- -	- -	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
Acenaphthene	20	98	500	mg/kg	0.94 U	0.31	0.10 J	0.69 J
Acenaphthylene	100	107	500	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Acetophenone	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Anthracene	100	1,000	500	mg/kg	0.068 J	0.11 J	0.099 J	0.78 U
Atrazine	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Benzaldehyde	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Benzo(a)anthracene	1	1	5.6	mg/kg	0.24 J	0.026 J	0.039 J	0.26 J
Benzo(a)pyrene	1	22	1	mg/kg	0.26 J	0.21 U	0.024 J	0.23 J
Benzo(b)fluoranthene	1	1.7	5.6	mg/kg	0.25 J	0.017 J	0.029 J	0.39 JY
Benzo(g,h,i)perylene	100	1,000	500	mg/kg	0.14 J	0.21 U	0.23 U	0.19 J
Benzo(k)fluoranthene	0.8	1.7	56	mg/kg	0.94 U	0.21 U	0.23 U	0.48 JY
bis(2-Chloroethoxy)methane	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
bis(2-Chloroethyl)ether	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
bis(2-Ethylhexyl)phthalate	- -	- -	- -	mg/kg	0.94 UB	0.21 UB	0.23 UB	0.34 J
Butylbenzylphthalate	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Caprolactam	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Carbazole	- -	- -	- -	mg/kg	0.94 U	0.020 J	0.033 J	0.78 U
Chrysene	1	1	56	mg/kg	0.23 J	0.024 J	0.030 J	0.22 J
Dibenzo(a,h)anthracene	0.33	1,000	0.56	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Dibenzofuran	7	210	350	mg/kg	0.94 U	0.19 J	0.093 J	0.78 U
Diethylphthalate	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 UB	0.78 U
Dimethylphthalate	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID:					TP-10-2	TP-10-3	TP-11-1	TP-12-1
Historical Sample Depth(feet):					6	6.5	5	4.7
Current Estimated Sample Depth (feet)					10	10.5	9	8.7
Date Collected:					12/07/10	12/07/10	12/07/10	12/07/10
Sampling Event:	Unrestricted Use SCOs	Restricted Use SCO - Protection of Groundwater	Restricted Use SCO - Commercial	Units	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow	Shallow Sand Fill - Shallow
Semivolatile Organics (Cont.)								
Di-n-Butylphthalate	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Di-n-Octylphthalate	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Fluoranthene	100	1,000	500	mg/kg	0.42 J	0.21 U	0.13 J	0.58 J
Fluorene	30	386	500	mg/kg	0.94 U	0.23	0.15 J	1.6
Hexachlorobenzene	0.33	3.2	6	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Hexachlorobutadiene	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Hexachlorocyclopentadiene	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Hexachloroethane	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Indeno(1,2,3-cd)pyrene	0.5	8.2	5.6	mg/kg	0.11 J	0.21 U	0.23 U	0.16 J
Isophorone	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Nitrobenzene	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
N-Nitroso-di-n-propylamine	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
N-Nitrosodiphenylamine	- -	- -	- -	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Pentachlorophenol	0.8	0.8	6.7	mg/kg	1.8 U	0.41 U	0.45 U	1.5 U
Phenanthrene	100	1,000	500	mg/kg	0.94 U	0.21	0.27	3.3
Phenol	0.33	0.33	500	mg/kg	0.94 U	0.21 U	0.23 U	0.78 U
Pyrene	100	1,000	500	mg/kg	0.41 J	0.15 J	0.11 J	0.75 J
Total SVOCs	- -	- -	- -	mg/kg	2.1 J	1.3 J	1.6 J	22 J
Inorganics								
Aluminum	- -	- -	- -	mg/kg	2,440	5,570	3,760	3,550
Antimony	- -	- -	- -	mg/kg	15.7 U	17.7 U	20.4 U	17.6 U
Arsenic	13	16	16	mg/kg	***20.7***	1.00 J	3.00	1.70 J
Barium	350	820	400	mg/kg	44.9	16.8	14.6	13.0
Beryllium	7.2	47	590	mg/kg	0.182 J	0.369	0.304	0.277
Cadmium	2.5	7.5	9.3	mg/kg	0.222	0.0400 J	0.382	0.0870 J
Calcium	- -	- -	- -	mg/kg	8,390	387	1,190	4,180
Chromium	- -	- -	- -	mg/kg	4.57	6.72	10.4	9.55
Cobalt	- -	- -	- -	mg/kg	1.61	1.70	2.72	1.69
Copper	50	1,720	270	mg/kg	9.40	5.00	8.10	5.60
Ferrous Iron	- -	- -	- -	mg/kg	2.70 J	2.10 J	1.00 J	1.20 J
Iron	- -	- -	- -	mg/kg	4,600	6,830	7,510	6,210
Lead	63	450	1,000	mg/kg	41.8 J	8.30 J	13.4 J	7.70 J
Magnesium	- -	- -	- -	mg/kg	2,420	823	1,480	2,050
Manganese	1,600	2,000	10,000	mg/kg	74.6	50.0	73.7	46.6
Mercury	0.18	0.73	2.8	mg/kg	0.0675	0.0251 U	0.0279 U	***1.35***
Nickel	30	130	310	mg/kg	3.98 J	5.02 J	6.14 J	6.08
Potassium	- -	- -	- -	mg/kg	268	365	910	853
Selenium	3.9	4	1,500	mg/kg	4.20 U	4.70 U	5.40 U	4.70 U
Silver	2	8.3	1,500	mg/kg	0.523 U	0.589 U	0.679 U	0.587 U
Sodium	- -	- -	- -	mg/kg	83.2 J	116 J	57.9 J	78.5 J
Thallium	- -	- -	- -	mg/kg	6.30 U	7.10 U	8.20 U	7.00 U
Vanadium	- -	- -	- -	mg/kg	6.75	9.88	12.5	11.6
Zinc	109	2,480	10,000	mg/kg	80.7	14.0	24.2	17.1
Miscellaneous								
Sulfate	- -	- -	- -	mg/kg	230	390	140 U	220
TOC								
Total Organic Carbon	- -	- -	- -	mg/kg	3,350	1,730	1,250 U	1,470

See Notes on Page 23.

Table 2
Hisotrical Soil Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Notes:

1. Unrestricted use SCO, Restricted use SCO for commercial use and protection of groundwater are from 6 NYCRR Part 375-6.8.
2. Field duplicate sample results are presented in brackets, [ ].
3. Designations:
   - Gray font = Analyte was not detected.
   - Italic font = Analyte was detected above unrestricted use SCO.
   - Black Bold Italic font = Analyte detected above restricted - protection of groundwater SCO.
   - Gray Shading = Analyte detected above restricted - commercial use SCO.
4. Abbreviations:
   - - - = 6 NYCRR SCO not available.
   - 6 NYCRR = Title 6 of the Official Compilation of Codes, Rules, and Regulations of the State of New York.
   - ft = feet.
   - LCS/LCSD = Laboratory Control Sample/Laboratory Control Sample Duplicate.
   - mg/kg = milligrams per kilogram or part per million.
   - NA = Not Analyzed.
   - SCO = Soil Cleanup Objectives.
   - VOC = Volatile Organic Compounds.
   - SVOC = Semi-Volatile Organic Compounds.
5. Qualifier Definitions:
   - B = Analyte was detected in the blank and sample.
   - E = Analyte exceeded calibration range.
   - J = Estimated value. Result is greater than the RL but less than the MDL.
   - R = Rejected results.
   - U = Analyte not detected at listed reporting detection limit.
   - * = LCS/LCSD or relative percent difference of LCS/LCSD exceeds the control limits.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloro-ethene	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1,2-Trichlorotri-fluoroethane (Freon 113)	1,1-Dichloro-ethane	1,2,4-Trichloro-benzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromo-ethane	1,2-Dichloro-benzene (o-Dichloro-benzene)	1,2-Dichloro-ethane	1,2-Dichloro-propane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
	Units	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
AMW-12	01/14/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
AMW-13-D1	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
AMW-13-D2	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
AMW-13-VD	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
AMW-14-D1	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.91 J**	**0.46 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 4.0	< 4.0		< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/12/2018	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	**0.62 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.36 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.54 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.180 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.606 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	11/04/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.790 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	**0.561 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
AMW-14-D2	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/12/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<50.0	<10.0	<10.0	<10.0	<10.0
	08/19/2020	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<50.0	<10.0	<10.0	<10.0	<10.0
	11/05/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
AMW-14-VD	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/12/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloro-ethene	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1,2-Trichlorotri-fluoroethane (Freon 113)	1,1-Dichloro-ethane	1,2,4-Trichloro-benzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromo-ethane	1,2-Dichloro-benzene (o-Dichloro-benzene)	1,2-Dichloro-ethane	1,2-Dichloro-propane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
AMW-14-VD (cont.)	05/10/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	09/13/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**0.43 J**	<1.0
	12/05/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**0.45 J**	<1.0
	02/12/2020	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**0.46 J**	<1.0
	06/10/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/20/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	**0.350 J**	<1.00
	11/05/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	**0.119 J**	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	**0.221 J**	<1.00
AMW-15-D1	06/23/2016	< 1.0	< 1.0	< 1.0	<1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	10/26/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/26/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**1.5 J**	< 5.0	< 50	< 5.0	< 5.0	< 5.0	< 5.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	**0.89 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.75 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.87 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0 *	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<5.00	<5.00
	08/19/2020	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00 J4	<5.00	<5.00
	11/04/2020	<1.00	<1.00	<1.00	<1.00	<1.00	0.325 J	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<5.00	<5.00
AMW-15-D2	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00
	11/04/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
AMW-15-D3	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloro-ethene	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1,2-Trichlorotri-fluoroethane (Freon 113)	1,1-Dichloro-ethane	1,2,4-Trichloro-benzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromo-ethane	1,2-Dichloro-benzene (o-Dichloro-benzene)	1,2-Dichloro-ethane	1,2-Dichloro-propane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
AMW-15-D3 (cont.)	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/13/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	**0.187 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.104 J**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00
	11/04/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.139 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
AMW-15-VD	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/13/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00 J4	**0.144 J**	<1.00
	11/04/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
AMW-3	01/13/2016	< 5.0	< 5.0	< 5.0	**4.8 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
AMW-7R	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/11/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
ASB-2	06/06/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
ASB-3	06/08/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
ASB-4	06/07/2016	**4.2 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
ASB-5	06/02/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
ASB-7	06/02/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloro-ethene	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1,2-Trichlorotri-fluoroethane (Freon 113)	1,1-Dichloro-ethane	1,2,4-Trichloro-benzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromo-ethane	1,2-Dichloro-benzene (o-Dichloro-benzene)	1,2-Dichloro-ethane	1,2-Dichloro-propane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
MW-18R	06/22/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	07/11/2018	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
	10/17/2018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 50	< 5.0	< 5.0	< 5.0	< 5.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<5.00	<5.00	<5.00	<5.00 J4	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<5.00	<5.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-23-D1R	10/26/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/26/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/20/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/12/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/12/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0 *	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00
	11/05/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-23-D2R	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/20/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/12/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/12/2018	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00
	11/05/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/18/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-24-D1R	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.56 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.74 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/12/2018	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/16/2018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 50	< 5.0	< 5.0	< 5.0	< 5.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**0.72 J [0.69 J]**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloro-ethene	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1,2-Trichlorotri-fluoroethane (Freon 113)	1,1-Dichloro-ethane	1,2,4-Trichloro-benzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromo-ethane	1,2-Dichloro-benzene (o-Dichloro-benzene)	1,2-Dichloro-ethane	1,2-Dichloro-propane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
MW-24-D1R (cont.)	12/05/2019	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**0.36 J [0.71 J]**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]
	02/11/2020	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 * [<1.0]	< 1.0 * [<1.0]	< 1.0 [<1.0]	**0.46 J [0.59 J**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]
	06/09/2020	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]
	08/19/2020	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 J4 [<5.00 J4]	<5.00 [<5.00]	<5.00 [<5.00]
	11/05/2020	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]
	03/19/2021	<1.00 [<5.00]	<1.00 [<5.00]	<1.00 [<5.00]	<1.00 [<5.00]	<1.00 [<5.00]	**0.457 J [<5.00]**	<1.00 [<5.00]	<5.00 [<25.0]	<1.00 [<5.00]	<1.00 [<5.00]	<1.00 [<5.00]	<1.00 [<5.00]
MW-24-D2	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/25/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/25/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	07/05/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	08/27/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/12/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	**0.293 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/18/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.210 J**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00
	11/05/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.553 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	**0.611 J**	<1.00	<5.00	<1.00	<1.00	<1.00	**1.08**
MW-24-VDR	07/12/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/18/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00
	11/05/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/19/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-26-D1	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/22/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/25/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/25/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/05/2017	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	08/27/2017	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/13/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloroethene	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1,2-Trichlorotrifluoroethane (Freon 113)	1,1-Dichloroethane	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromoethane	1,2-Dichlorobenzene (o-Dichlorobenzene)	1,2-Dichloroethane	1,2-Dichloropropane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
MW-26-D1 (cont.)	02/11/2020	< 1.0	< 1.0	< 1.0 *	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.285 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.218 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.159 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-26-D2	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 5.0	< 5.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/25/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/25/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.102 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-26-VD	01/13/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-27-D1R	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	08/27/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/13/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/18/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.29 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.36 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/19/2020	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<5.00	<5.00
	11/06/2020	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<5.00	<5.00
	03/20/2021	<1.00	<1.00	<1.00	<1.00	<1.00	**0.359 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-27-D2	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/12/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/18/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.28 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.29 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.38 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.4 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	1,1 Dichloroethene	1,1,1-Trichloroethane	1,1,2,2-Tetrachloroethane	1,1,2-Trichloroethane	1,1,2-Trichlorotrifluoroethane (Freon 113)	1,1-Dichloroethane	1,2,4-Trichlorobenzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromoethane	1,2-Dichlorobenzene (o-Dichlorobenzene)	1,2-Dichloroethane	1,2-Dichloropropane
		Volatile Organics											
NYSDEC TOGS 1.1.1		5	5	5	1	5	5	5	0.04	0.0006	3	0.6	1
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-27-D2 (cont.)	06/10/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	**0.430 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.483 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.118 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/20/2021	<1.00	<1.00	<1.00	<1.00	<1.00	**0.242 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-28-D1	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.76 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/28/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.58 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.69 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.67 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.4 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.52 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	**0.209 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.172 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.741 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-28-D2R	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.48 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.21 J**	< 1.0
	07/28/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.67 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 1.0	0.74 J	< 1.0	**0.79 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.74 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	**0.155 J**	<1.00	<5.00	<1.00	**0.205 J**	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.186 J**	<1.00	<5.00	<1.00	**0.251 J**	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<1.00	<1.00	<1.00	**0.342 J**	<1.00	<5.00	<1.00	**0.109 J**	<1.00	<1.00
	03/20/2021	<1.00	<1.00	<1.00	<1.00	<1.00	**0.217 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-29-D1	01/14/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	08/27/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/12/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/18/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,1 Dichloro-ethene	1,1,1-Trichloro-ethane	1,1,2,2-Tetrachloro-ethane	1,1,2-Trichloro-ethane	1,1,2-Trichlorotri-fluoroethane (Freon 113)	1,1-Dichloro-ethane	1,2,4-Trichloro-benzene	1,2-Dibromo-3-chloropropane (DBCP)	1,2-Dibromo-ethane	1,2-Dichloro-benzene (o-Dichloro-benzene)	1,2-Dichloro-ethane	1,2-Dichloro-propane
NYSDEC TOGS 1.1.1		**5**	**5**	**5**	**1**	**5**	**5**	**5**	**0.04**	**0.0006**	**3**	**0.6**	**1**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	ug/L	**ug/L**	**ug/L**
MW-29-D1 (cont.)	02/12/2020	< 1.0	< 1.0	< 1.0 *	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
	03/20/2021	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00
MW-29-D2	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**7.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**4.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-29-VD	01/14/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-30-D1	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.9**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-30-D2	01/14/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**3.2 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	01/14/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**2.9**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.87 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-30-VD	01/14/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-31-D1R	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-31-D2R	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.94 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichlorobenzene	1,4-Dichlorobenzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromodichloromethane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		3	3	50	50	NE	50	1	50	50	5	60	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-12	01/14/2016	< 5.0	< 5.0	< 50	< 25	< 25	**25 J**	**80**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
AMW-13-D1	06/24/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**6.5 J**	< 1.0	**0.99 J**	**3.4**	< 1.0	**2.7**	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.4 J**	**4.5**	< 1.0	**1.1**	< 1.0	**2.8**	< 1.0
AMW-13-D2	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	**3.3 J**	**3.2 J**	< 1.0	**0.97 J**	**4.2**	< 1.0	**0.66 J**	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**4.8 J**	< 1.0	< 1.0	**0.62 J**	< 1.0	**12**	< 1.0
AMW-13-VD	06/23/2016	< 1.0	< 1.0	**3.2 J**	< 5.0	< 5.0	**18**	< 1.0	< 1.0	**3.1**	< 1.0	**1.5**	< 1.0
	07/27/2016	< 1.0	< 1.0	**5.8 J**	< 5.0	**2.4 J**	**46**	< 1.0	< 1.0	< 1.0	< 1.0	**7.9**	< 1.0
AMW-14-D1	06/24/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**4.6 J**	< 1.0	**0.85 J**	**2.5**	< 1.0	**2.6**	< 1.0
	07/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.9 J**	**4.3**	< 1.0	< 1.0	< 1.0	**2.8**	< 1.0
	07/05/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**2.0 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**4.7**	< 2.0	< 2.0	< 2.0	**1.3 J**	< 2.0
	07/12/2018	< 8.0	< 8.0	< 80	< 40	< 40	< 80	**5.3 J**	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	**0.98 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**7.0**	< 1.0	< 1.0	< 1.0	**0.79 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**0.64 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**1.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**3.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.533 J**	<1.00	<1.00	<5.00	**0.294 J**	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	**5.40**	<1.00	<1.00	<5.00	**0.615 J**	<1.00
	11/04/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**7.94**	<1.00	<1.00 C3 J4	<5.00	**<1.00**	<1.00 C3
	03/19/2021	<1.00	<1.00	<10.0	<10.0	**1.41 J**	<50.0	**3.41**	<1.00	<1.00 C3	<5.00	<1.00	<1.00
AMW-14-D2	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	**3.2 J**	**3.3 J**	< 1.0	**0.99 J**	**4.6**	< 1.0	**5.5**	< 1.0
	07/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.1 J**	**0.88 J**	< 1.0	**1.3**	< 1.0	**12**	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**9.6 J**	< 1.0	< 1.0	< 1.0	< 1.0	**8.4**	< 1.0
	08/27/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**2.7**	< 1.0
	10/11/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.94 J**	< 1.0
	07/12/2018	< 2.0	< 2.0	< 20	< 10	< 10	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.32 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<10.0	<10.0	<100	<100	<100	<500	<10.0	<10.0	<10.0	<50.0	<10.0	<10.0
	08/19/2020	<10.0 J4	<10.0 J4	<100	<100	<100	<500	<10.0	<10.0	<10.0	<50.0	<10.0	<10.0
	11/05/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.533 J**	<1.00
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3	<5.00	<1.00	<1.00
AMW-14-VD	06/23/2016	< 1.0	< 1.0	**3.9 J**	< 5.0	**2.1 J**	**22**	< 1.0	**0.87 J**	**3**	< 1.0	**0.63 J**	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**8.9 J**	< 1.0	< 1.0	< 1.0	< 1.0	**9.9**	< 1.0
	07/05/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.7 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.25 J**	< 1.0
	08/27/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/11/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**1.6**	< 1.0
	07/12/2018	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		3	3	50	50	NE	50	1	50	50	5	60	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-14-VD (cont.)	05/10/2019	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	09/13/2019	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	12/05/2019	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	02/12/2020	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	08/20/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	11/05/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3 J4	<5.00	<1.00	<1.00 C3
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.120 J**	<1.00
AMW-15-D1	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	**2.1 J**	**4.2 J**	**0.48 J**	< 1.0	**2.2**	< 1.0	**0.46 J**	< 1.0
	07/27/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	**3.9 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	10/26/2016	< 10	< 10	< 100	< 50	< 50	< 100	**11**	< 10	< 10	< 10	< 10	< 10
	10/26/2016	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**5.1**	< 4.0	< 4.0	< 4.0	**1.7 J**	< 4.0
	07/05/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**12**	< 4.0	< 4.0	< 4.0	**2.7 J**	< 4.0
	10/11/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**11**	< 2.0	< 2.0	< 2.0	**2**	< 2.0
	10/17/2018	< 5.0	< 5.0	< 250	< 50	< 50	< 130	**12**	< 5.0	< 5.0	< 5.0	**1.7 J**	< 5.0
	05/09/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**6.3**	< 1.0	< 1.0	< 1.0	**1.3**	< 1.0
	09/13/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**6.2**	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**6.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**1.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<5.00	<5.00	<50.0	<50.0	<50.0	<250	**6.35**	<5.00	<5.00	<25.0	<5.00	<5.00
	08/19/2020	<5.00	<5.00	<50.0	<50.0	<50.0	<250	**4.70 J**	<5.00	<5.00	<25.0	6.45	<5.00
	11/04/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**3.55**	<1.00	<1.00	<5.00	**0.777 J**	<1.00
	03/19/2021	<5.00	<5.00	<50.0	<50.0	<50.0	<250	**5.80**	<5.00	<5.00 C3	<25.0	<5.00	<5.00
AMW-15-D2	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**9.3 J**	< 1.0	< 1.0	< 1.0	< 1.0	**1.8**	< 1.0
	06/23/2016	< 1.0	< 1.0	**1.3 J**	< 5.0	< 5.0	**11**	< 1.0	< 1.0	< 1.0	< 1.0	**1.6**	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.8 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.42 J**	< 1.0
	10/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**13**	< 1.0	< 1.0	< 1.0	< 1.0	**0.75 J**	< 1.0
	10/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**5.1 J**	**0.47 J**	< 1.0	< 1.0	< 1.0	**0.42 J**	< 1.0
	07/05/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**9.8**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**2.7 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	**0.34 J**	< 1.0
	05/10/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.25 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.123 J**	<1.00	<1.00	<5.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.102 J**	<1.00	<1.00	<5.00	**2.33**	<1.00
	11/04/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.529 J**	<1.00	<1.00 C3 J4	<5.00	<1.00	<1.00 C3
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.230 J**	<1.00
AMW-15-D3	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**6.9 J**	< 1.0	< 1.0	< 1.0	< 1.0	**4.4**	< 1.0
	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**7.3 J**	< 1.0	< 1.0	< 1.0	< 1.0	**4.6**	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.6 J**	< 1.0	< 1.0	< 1.0	< 1.0	**1.4**	< 1.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	**36 J**	**3.7 J**	< 4.0	< 4.0	< 4.0	**1.8 J**	< 4.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		**3**	**3**	**50**	**50**	**NE**	**50**	**1**	**50**	**50**	**5**	**60**	**5**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
AMW-15-D3 (cont.)	10/11/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/13/2018	< 2.0	< 2.0	< 20	< 10	< 10	**16 J**	< 2.0	< 2.0	< 2.0	< 2.0	**0.70 J**	< 2.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	**0.42 J**	< 1.0
	05/10/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.29 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**0.29 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.318 J**	<1.00
	08/19/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.664 J**	<1.00	<1.00	<5.00	**1.93**	<1.00
	11/04/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.430 J**	<1.00	<1.00 C3 J4	<5.00	<1.00	<1.00 C3
	03/19/2021	<1.00	<1.00	**11.0**	<10.0	**0.640 J**	**62.4**	**12.8**	<1.00	<1.00	<5.00	**1.23**	<1.00
AMW-15-VD	06/23/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.2 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/27/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**8.3 J**	< 1.0	< 1.0	**2.4**	< 1.0	< 1.0	< 1.0
	08/27/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/11/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**5.0 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/13/2018	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	11/04/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3 J4	<5.00	<1.00	<1.00 C3
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
AMW-3	01/13/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	**280**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	**3.4 J**	< 5.0	< 5.0	**21**	< 1.0	< 1.0	< 1.0	< 1.0	**0.51 J**	< 1.0
AMW-7R	01/12/2016	< 5.0	< 5.0	< 50	< 25	< 25	**30 J**	**5.7**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**6.2 J**	**1.1**	< 1.0	< 1.0	< 1.0	**0.43 J**	< 1.0
	07/11/2018	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**0.82 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	**8.1 J**	**0.78 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**0.69 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**0.39 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**0.89 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	<5.0	<5.0	<5.0	<5.0	**0.82 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.926 J**	<1.00	<1.00	<5.00	<1.00	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	**0.566 J**	<1.00	<1.00	<5.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.214 J**	<1.00	<1.00 C3	<5.00 C3	**0.271 J**	<1.00
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.0960 J**	<1.00	<1.00	<5.00	**0.140 J**	<1.00
ASB-2	06/06/2016	< 1.0	< 1.0	< 10	< 5.0	**6**	**20**	**1.8**	**1.9**	< 1.0	< 1.0	**1.1**	< 1.0
ASB-3	06/08/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**5.5 J**	< 1.0	**0.75 J**	**2.4**	< 1.0	**0.27 J**	< 1.0
ASB-4	06/07/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	**3.0 J**	< 5.0	< 5.0	< 5.0	**0.95 J**	< 5.0
ASB-5	06/02/2016	< 1.0	< 1.0	**1.4 J**	< 5.0	**5**	**12**	< 1.0	**1.5**	< 1.0	< 1.0	**0.53 J**	< 1.0
ASB-7	06/02/2016	< 2.0	< 2.0	< 20	< 10	**5.3 J**	< 20	< 2.0	**3.3**	< 2.0	< 2.0	**1.1 J**	< 2.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		Volatile Organics											
Location ID	Date Sampled	1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		3	3	50	50	NE	50	1	50	50	5	60	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-18R	06/22/2016	< 10	< 10	< 100	< 50	< 50	< 100	**310**	< 10	< 10	< 10	< 10	< 10
	07/11/2018	< 20	< 20	**74 J**	< 100	< 100	**330**	**48**	< 20	< 20	< 20	**6.2 J**	< 20
	10/17/2018	< 5.0	< 5.0	**70 J**	< 50	< 50	**230**	**69**	< 5.0	< 5.0	< 5.0	**2.4 J**	< 5.0
	09/14/2019	< 1.0	< 1.0	**10**	< 5.0	**2.2 J**	**47**	**85**	< 1.0	< 1.0	< 1.0	**3.2**	< 1.0
	12/05/2019	< 1.0	< 1.0	**33**	**3.7 J**	**2.9 J**	**130**	**74**	< 1.0	< 1.0	< 1.0	**2**	< 1.0
	02/12/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	**19**	**0.29 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<5.00	<5.00	**10.7 J**	<50.0	<50.0	<250	**27.0**	<5.00	<5.00	<25.0	**1.26 J**	<5.00
	03/19/2021	<1.00	<1.00	**12.6**	**1.62 J**	**1.76 J**	**44.4 J**	**8.34**	<1.00	<1.00	<5.00	**1.28**	<1.00
MW-23-D1R	10/26/2016	< 2.0	< 2.0	< 20	< 10	< 10	< 20	< 2.0	< 2.0	< 2.0	< 2.0	**0.53 J**	< 2.0
	10/26/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	01/12/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/20/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**6.4 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/12/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/12/2018	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**2.7 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	**3.8**	< 1.0	< 1.0	< 1.0	**0.29 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**1.5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**1.4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.56 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.408 J**	<1.00	<1.00	<5.00	<1.00	<1.00
	08/19/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.312 J**	<1.00	<1.00	<5.00	**0.671 J**	<1.00
	11/05/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.0955 J**	<1.00	<1.00 C3	<5.00 C3	**0.400 J**	<1.00
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.150 J**	<1.00	<1.00	<5.00	**0.142 J**	<1.00
MW-23-D2R	01/12/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/20/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**23**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/05/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**4.0 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/12/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.44 J**	< 1.0
	07/12/2018	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	**2.3**	<1.0	<1.0	<1.0	<1.0	<1.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**1.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/19/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.407 J**	<1.00	<1.00	<5.00	**0.253 J**	<1.00
	11/05/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3	<5.00 C3	**0.447 J**	<1.00
	03/18/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.110 J**	<1.00	<1.00	<5.00	**0.119 J**	<1.00
MW-24-D1R	01/13/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**5.4**	< 4.0	< 4.0	< 4.0	**1.6 J**	< 4.0
	10/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**4.1**	< 1.0	< 1.0	< 1.0	**1.7**	< 1.0
	10/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**4.9**	< 1.0	< 1.0	< 1.0	**1.3**	< 1.0
	10/26/2016	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/12/2018	< 8.0	< 8.0	< 80	< 40	< 40	< 80	**11**	< 8.0	< 8.0	< 8.0	**2.1 J**	< 8.0
	10/16/2018	< 5.0	< 5.0	< 250	< 50	< 50	< 130	**8.3**	< 5.0	< 5.0	< 5.0	**1.4 J**	< 5.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**1.5**	< 1.0	< 1.0	< 1.0	**0.62 J**	< 1.0
	09/13/2019	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	<5.0 [<5.0]	<5.0 [<5.0]	**13 [13]**	< 1.0 [<1.0]	<1.0* [<1.0*]	< 1.0 [<1.0]	**3.2 [1.8]**	< 1.0 [<1.0]

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		3	3	50	50	NE	50	1	50	50	5	60	5
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-24-D1R (cont.)	12/05/2019	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	<5.0 [<5.0]	**9.4**	**5.7 [11]**	< 1.0 [<1.0]	<1.0 [<1.0]	< 1.0 [<1.0]	1.0 [1.0]	< 1.0 [<1.0]
	02/11/2020	< 1.0 [<1.0]	< 1.0 [<1.0]	<5.0 [<5.0]	<5.0 [<5.0]	<5.0 [<5.0]	**6[<5.0]**	**8.9 [13]**	< 1.0 [<1.0]	<1.0 [<1.0]	< 1.0 [<1.0]	**1.5 [1.4]**	< 1.0 [<1.0]
	06/09/2020	<5.00 [<5.00]	<5.00 [<5.00]	<50.0 [<50.0]	<50.0 [<50.0]	<50.0 [<50.0]	<250 [<250]	**10.3 [11.7]**	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 [<5.00]
	08/19/2020	<5.00 [<5.00]	<5.00 [<5.00]	<50.0 [<50.0]	<50.0 [<50.0]	<50.0 [<50.0]	<250 [<250]	**10.2 [9.74]**	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	**8.28 [3.68 J]**	<5.00 [<5.00]
	11/05/2020	<5.00 [<5.00]	<5.00 [<5.00]	<50.0 [<50.0]	<50.0 [<50.0]	<50.0 [<50.0]	<250 [<250]	**10.9 [8.99]**	<5.00 [<5.00]	<5.00 C3 [<5.00 C3]	<25.0 C3 [<25.0 C3]	**2.27 J [2.18 J]**	<5.00 [<5.00]
	03/19/2021	<1.00 [<5.00]	<1.00 [<5.00]	<10.0 [<50.0]	<10.0 [<50.0]	**0.587 J[<50.0]**	<50.0 [<250]	**11.3 [11.5]**	<1.00 [<5.00]	1.00 [<5.00] [<5.00 C	<5.00 [<25.0]	**0.811 J [<5.00**	<1.00 [<5.00]
MW-24-D2	01/13/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	**3.3 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	01/13/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	**3.1 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**0.97 J**	< 1.0	< 1.0	< 1.0	**0.31 J**	< 1.0
	10/25/2016	< 4.0	< 4.0	< 40	< 20	< 20	**62**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/25/2016	< 5.0	< 5.0	< 50	< 25	< 25	**56**	**3.0 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	07/05/2017	< 8.0	< 8.0	< 80	< 40	< 40	< 80	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	08/27/2017	< 8.0	< 8.0	< 80	< 40	< 40	< 80	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/11/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/12/2018	< 2.0	< 2.0	< 20	< 10	< 10	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	**2.8 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.24 J**	< 1.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**5.2**	**1.4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.4 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.367 J**	<1.00	<1.00	<5.00	**0.167 J**	<1.00
	08/18/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.227 J**	<1.00	<1.00	<5.00	**0.266 J**	<1.00
	11/05/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.581 J**	<1.00	<1.00 C3	<5.00 C3	**0.931 J**	<1.00
	03/19/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.662 J**	<1.00	<1.00	<5.00	**0.376 J**	<1.00
MW-24-VDR	07/12/2018	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	**0.64 J**	< 1.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.30 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.4**	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	**5.5**	**7.2**	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.347 J**	<1.00
	08/18/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.394 J**	<1.00
	11/05/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3	<5.00 C3	**0.423 J**	<1.00
	03/19/2021	<1.00	<1.00	<10.0	<10.0	**2.68 J**	**139**	<1.00	<1.00	<1.00	<5.00	**0.150 J**	<1.00
MW-26-D1	01/12/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	**9.1**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/22/2016	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**9.3**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/25/2016	< 10	< 10	< 100	< 50	< 50	< 100	**8.6 J**	< 10	< 10	< 10	< 10	< 10
	10/25/2016	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**12**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/05/2017	< 10	< 10	< 100	< 50	< 50	< 100	**8.7 J**	< 10	< 10	< 10	< 10	< 10
	08/27/2017	< 10	< 10	< 100	< 50	< 50	< 100	**9.5 J**	< 10	< 10	< 10	< 10	< 10
	10/11/2017	< 2.0	< 2.0	< 20	< 10	< 10	**6.5 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/13/2018	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**17**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	**4.9**	< 1.0	< 1.0	< 1.0	**0.45 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**9.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**6.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		**3**	**3**	**50**	**50**	**NE**	**50**	**1**	**50**	**50**	**5**	**60**	**5**
	Units	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-26-D1 (cont.)	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**7.5**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**8.93**	<1.00	<1.00	<5.00	**0.773 J**	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	**6.46**	<1.00	<1.00	<5.00	**0.360 J**	<1.00
	11/06/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**5.88**	<1.00	<1.00 C3	<5.00 C3	**0.582 J**	<1.00
MW-26-D2	01/12/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**1.4**	< 1.0
	10/25/2016	< 2.0	< 2.0	< 20	< 10	< 10	**9.4 J**	< 2.0	< 2.0	< 2.0	< 2.0	**0.60 J**	< 2.0
	10/25/2016	< 2.0	< 2.0	< 20	< 10	< 10	**37**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/05/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.37 J**	< 1.0
	08/27/2017	< 8.0	< 8.0	< 80	< 40	< 40	< 80	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
	10/11/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	**0.69 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.79 J**	< 1.0	< 1.0	< 1.0	**0.25 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.46 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.204 J**	<1.00
MW-26-VD	01/13/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**170**	< 1.0	< 1.0	< 1.0	< 1.0	**0.19 J**	< 1.0
MW-27-D1R	01/13/2016	< 5.0	< 5.0	< 50	< 25	< 25	**53**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	**1.7 J**	< 5.0	< 5.0	**5.0 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.66 J**	< 1.0
	07/05/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**1.1 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	08/27/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**1.6 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	07/13/2018	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**7.8**	< 2.0	< 2.0	< 2.0	**0.64 J**	< 2.0
	10/18/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	**3.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.4**	< 1.0	< 1.0	< 1.0	**1.0**	< 1.0
	09/14/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**4.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**6.4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/19/2020	<5.00 J4	<5.00 J4	<50.0	<50.0	<50.0	<250	**3.12 J**	<5.00	<5.00	<25.0	**0.852 J**	<5.00
	11/06/2020	<5.00	<5.00	<50.0	<50.0	<50.0	<250	**2.58 J**	<5.00	<5.00 C3	<25.0 C3	**1.74 J**	<5.00
	03/20/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**2.56**	<1.00	<1.00 C3	<5.00	<1.00	<1.00
MW-27-D2	01/13/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 4.0	< 4.0	**8.2 J**	< 20	< 20	**38 J**	**160**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/05/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	08/27/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/12/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/13/2018	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/18/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/12/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
NYSDEC TOGS 1.1.1		**3**	**3**	**50**	**50**	**NE**	**50**	**1**	**50**	**50**	**5**	**60**	**5**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-27-D2 (cont.)	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.133 J**	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3	<5.00 C3	<1.00	<1.00
	03/20/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.155 J**	<1.00
MW-28-D1	06/24/2016	< 1.0	< 1.0	**2.3 J**	< 5.0	< 5.0	**45**	**2.1**	< 1.0	< 1.0	< 1.0	**1**	< 1.0
	07/28/2016	< 10	< 10	< 100	< 50	< 50	**280**	< 10	< 10	< 10	< 10	< 10	< 10
	07/05/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**8.9**	< 1.0	< 1.0	< 1.0	**0.40 J**	< 1.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**2.7 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**3.7 J**	< 4.0	< 4.0	< 4.0	**4.9**	< 4.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	**9.3 J**	**5.6**	< 1.0	< 1.0	< 1.0	**0.47 J**	< 1.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.4**	< 1.0	< 1.0	< 1.0	**0.34 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**9.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/05/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**11.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**17.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**9.35**	<1.00	<1.00	<5.00	<1.00	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	**5.03**	<1.00	<1.00	<5.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**24.3**	<1.00	<1.00 C3	<5.00 C3	<1.00	<1.00
MW-28-D2R	06/24/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**3.3 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	07/28/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**4.4 J**	< 1.0	**1.2**	**5.6**	< 1.0	**0.52 J**	< 1.0
	07/05/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.38 J**	< 1.0
	08/27/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/11/2017	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.95 J**	< 1.0
	07/13/2018	< 4.0	< 4.0	< 40	< 20	< 20	< 40	< 4.0	< 4.0	< 4.0	< 4.0	**1.0 J**	< 4.0
	10/17/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/09/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.50 J**	< 1.0	< 1.0	< 1.0	**0.27 J**	< 1.0
	09/13/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.24 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/09/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.781 J**	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.404 J**	<1.00
	11/06/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00 C3	<5.00 C3	**0.424 J**	<1.00
	03/20/2021	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.102 J**	<1.00
MW-29-D1	01/14/2016	< 5.0	< 5.0	< 50	< 25	< 25	**25 J**	**81**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	06/21/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**9.5 J**	**6.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**32**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	10/26/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**5.5**	< 1.0	< 1.0	< 1.0	**0.21 J**	< 1.0
	07/05/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**9.7**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	08/27/2017	< 2.0	< 2.0	< 20	< 10	< 10	< 20	**19**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	10/12/2017	< 4.0	< 4.0	< 40	< 20	< 20	< 40	**4.3**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	07/13/2018	< 4.0	< 4.0	< 40	**9.1 J**	< 20	< 40	**5.2**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
	10/18/2018	< 1.0	< 1.0	< 50	< 10	< 10	< 25	**3.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	05/10/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**9.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	09/14/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.67 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	12/06/2019	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		1,3-Dichloro-benzene	1,4-Dichloro-benzene	2-Butanone (Methyl ethyl ketone)	2-Hexanone	4-Methyl-2-pentanone	Acetone	Benzene	Bromo-dichloro-methane	Bromoform	Bromomethane (Methyl bromide)	Carbon disulfide	Carbon Tetrachloride
	NYSDEC TOGS 1.1.1	3	3	50	50	NE	50	1	50	50	5	60	5
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-29-D1 (cont.)	02/12/2020	< 1.0	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/10/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	**0.307 J**	<1.00
	08/19/2020	<1.00 J4	<1.00 J4	<10.0	<10.0	<10.0	<50.0	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00
	11/06/2020	<1.00	<1.00	<10.0	<10.0	<10.0	<50.0	**0.110 J**	<1.00	<1.00 C3	<5.00 C3	**0.364 J**	<1.00
	03/20/2021	<1.00	<1.00	<10.0	<10.0	**0.488 J**	<50.0	<1.00	<1.00	<1.00	<5.00	**0.130 J**	<1.00
MW-29-D2	01/14/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/21/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.62 J**	< 1.0
MW-29-VD	01/14/2016	< 10	< 10	< 100	< 50	< 50	< 100	< 10	< 10	< 10	< 10	< 10	< 10
	06/21/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-30-D1	01/14/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	**1.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	**0.19 J**	< 1.0
MW-30-D2	01/14/2016	< 5.0	< 5.0	< 50	< 25	< 25	< 50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
	01/14/2016	< 2.0	< 2.0	< 20	< 10	< 10	< 20	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-30-VD	01/14/2016	< 10	< 10	< 100	< 50	< 50	< 100	< 10	< 10	< 10	< 10	< 10	< 10
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**5.9 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MW-31-D1R	01/14/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	**11**	**1.1**	< 1.0	< 1.0	< 1.0	**0.32 J**	< 1.0
MW-31-D2R	01/14/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	06/22/2016	< 1.0	< 1.0	< 10	< 5.0	< 5.0	< 10	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		Volatile Organics											
Location ID	Date Sampled	Chlorobenzene	Chloroethane	Chloroform	Chloro-methane (Methyl chloride)	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Cyclohexane	Dibromo-chloro-methane	Dichloro-difluoromethane (Freon 12)	Ethylbenzene	Isopropyl-benzene	Methyl acetate
NYSDEC TOGS 1.1.1		5	5	7	5	5	0.4	NE	50	5	5	5	NE
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-12	01/14/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**12**	< 5.0	< 5.0	< 5.0	**24**	< 13
AMW-13-D1	06/24/2016	< 1.0	< 1.0	**0.37 J**	< 1.0	< 1.0	< 1.0	< 1.0	**2.4**	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.82 J**	< 1.0	**1.8**	< 1.0	< 2.5
AMW-13-D2	06/23/2016	< 1.0	< 1.0	**0.36 J**	< 1.0	< 1.0	< 1.0	< 1.0	**2.6**	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.41 J**	< 1.0	< 1.0	< 1.0	< 2.5
AMW-13-VD	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.1**	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
AMW-14-D1	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2**	< 1.0	< 1.0	< 1.0	< 2.5
	07/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	**1**	< 1.0	**1.9**	< 1.0	< 1.0	**3.6**	< 1.0	< 2.5
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**3**	< 2.0	< 2.0	**7.2**	< 2.0	< 5.0
	07/12/2018	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	**7.5 J**	< 8.0	< 20
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	**1**	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.1**	< 1.0	< 1.0	**5.9**	**1.0**	<5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.43 J**	< 1.0	<5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.5**	< 1.0	<5.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	**0.3 J**	< 1.0 *	**0.88 J**	< 1.0 *	< 1.0	**2.7**	**0.44 J**	<5.0
	06/10/2020	<1.00	<5.00	<5.00	<2.50	**0.427 J**	<1.00	<1.00	<1.00	<5.00	**0.486 J**	**0.172 J**	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	**6.29**	**1.08**	<20.0
	11/04/2020	<1.00	<5.00	<5.00	<2.50	**0.221 J**	<1.00	**2.02**	<1.00	<5.00	**6.53**	**1.18**	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50 C3	**0.214 J**	<1.00	**1.33**	<1.00	<5.00	**3.34**	**0.698 J**	<20.0
AMW-14-D2	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.6**	< 1.0	< 1.0	< 1.0	< 2.5
	07/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.79 J**	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/12/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	**0.35 J**	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	<5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	06/10/2020	<10.0	<50.0	<50.0	<25.0	<10.0	<10.0	<10.0	<10.0	<50.0	<10.0	<10.0	<200
	08/19/2020	<10.0	<50.0	<50.0	<25.0	**2.50 J**	<10.0	<10.0	<10.0	<50.0	<10.0	<10.0	<200
	11/05/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50 C3	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
AMW-14-VD	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.32 J**	**2**	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	**0.37 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/12/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Chlorobenzene	Chloroethane	Chloroform	Chloromethane (Methyl chloride)	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane (Freon 12)	Ethylbenzene	Isopropylbenzene	Methyl acetate
NYSDEC TOGS 1.1.1		5	5	7	5	5	0.4	NE	50	5	5	5	NE
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-14-VD (cont.)	05/10/2019	<1.0	<1.0	<1.0	<1.0*	<1.0	<1.0	<1.0	<1.0	<1.0*	<1.0	<1.0	<5.0
	09/13/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
	12/05/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
	02/12/2020	<1.0	<1.0	<1.0	<1.0	<1.0	< 1.0 *	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
	06/10/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/20/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/05/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
AMW-15-D1	06/23/2016	< 1.0	< 1.0	**0.51 J**	< 1.0	**20**	< 1.0	< 1.0	**1.1**	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 5.0	< 5.0	< 5.0	< 5.0	**220**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	10/26/2016	< 10	< 10	< 10	< 10	**81**	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	10/26/2016	< 4.0	< 4.0	< 4.0	< 4.0	**38**	< 4.0	**2.0 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	**5.1**	< 4.0	< 4.0	< 4.0	< 4.0	**4.1**	< 4.0	< 10
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	**1.6 J**	< 2.0	< 2.0	< 2.0	< 2.0	**4.3**	< 2.0	< 5.0
	10/17/2018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.8 J**	< 5.0	< 5.0	**5**	< 5.0	< 50
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.79 J**	< 1.0	< 1.0	**2.6**	< 1.0	<5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.36 J**	< 1.0	**0.66 J**	< 1.0	< 1.0	**2.3**	< 1.0	<5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.63 J**	< 1.0	**0.77 J**	< 1.0	< 1.0	**2.8**	< 1.0	<5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	**0.33 J**	< 1.0 *	< 1.0	**0.99 J**	< 1.0	<5.0
	06/10/2020	<5.00	<25.0	<25.0	<12.5	<5.00	<5.00	**<5.00**	<5.00	<25.0	**4.05 J**	0.535 J	<100
	08/19/2020	<5.00	<25.0	<25.0	<12.5	<5.00	<5.00	**<5.00**	<5.00	<25.0	**2.57 J**	<5.00	<100
	11/04/2020	<1.00	<5.00	<5.00	<2.50	**0.362 J**	<1.00	<1.00	<1.00	<5.00	**1.80**	**0.216 J**	<20.0
	03/19/2021	<5.00	<25.0	<25.0	<12.5 C3	<5.00	<5.00	<5.00	<5.00	<25.0	**4.74 J**	<5.00	<100
AMW-15-D2	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	**3.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	**3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	**1.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	**0.86 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**5.1**	< 4.0	< 10
	10/11/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	**0.26 J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.34 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	06/09/2020	<1.00	<5.00	<5.00	<2.50	**0.310 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/04/2020	<1.00	<5.00	<5.00	<2.50	**0.188 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	**0.157 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
AMW-15-D3	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	**19**	< 4.0	< 4.0	< 4.0	< 4.0	**3.4 J**	< 4.0	< 10

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Chlorobenzene	Chloroethane	Chloroform	Chloro-methane (Methyl chloride)	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Cyclohexane	Dibromo-chloro-methane	Dichloro-difluoromethane (Freon 12)	Ethylbenzene	Isopropyl-benzene	Methyl acetate
	NYSDEC TOGS 1.1.1	5	5	7	5	5	0.4	NE	50	5	5	5	NE
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-15-D3 (cont.)	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	07/13/2018	< 2.0	< 2.0	< 2.0	< 2.0	**3.1**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	**0.44 J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	**0.99 J**	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<5.0
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	**1.73**	<1.00	<1.00	<1.00	<5.00	**0.161 J**	<1.00	<20.0
	11/04/2020	<1.00	<5.00	<5.00	<2.50	**0.951 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	**13.0**	<1.00	**0.672 J**	<1.00	<5.00	**1.97**	**0.672 J**	<20.0
AMW-15-VD	06/23/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/27/2016	< 1.0	< 1.0	**0.74 J**	< 1.0	< 1.0	< 1.0	< 1.0	**1**	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/13/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/04/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
AMW-3	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**57**	< 5.0	< 5.0	**29**	**65**	< 13
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
AMW-7R	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**18**	< 1.0	< 1.0	< 1.0	**2.8**	< 2.5
	07/11/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**16**	< 2.0	< 2.0	< 2.0	**7.1**	< 5.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**29**	< 1.0	< 1.0	**0.19 J**	**4.9**	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	**19**	< 1.0	< 1.0	**0.39 J**	**4.2**	<5.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**16**	< 1.0	< 1.0	< 1.0	**4.4**	<5.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**11**	< 1.0	< 1.0	**0.49 J**	**1.9**	<5.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	**17**	< 1.0	< 1.0	**0.49 J**	**3.9**	< 5.0
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	**13.5**	<1.00	<5.00	**0.805 J**	**4**	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	**14.6**	<1.00	<5.00	**0.331 J**	**3.11**	<20.0
	11/06/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	**11.6**	<1.00	<5.00	<1.00	**3.27**	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	**2.77**	<1.00	<5.00	<1.00	**0.968 J**	<20.0
ASB-2	06/06/2016	< 1.0	< 1.0	**14**	< 1.0	**5.6**	< 1.0	< 1.0	**0.35 J**	< 1.0	< 1.0	< 1.0	< 2.5
ASB-3	06/08/2016	< 1.0	< 1.0	**0.92 J**	< 1.0	**2.8**	< 1.0	< 1.0	**1.5**	< 1.0	< 1.0	< 1.0	< 2.5
ASB-4	06/07/2016	< 5.0	< 5.0	< 5.0	< 5.0	**1600 E**	< 5.0	**5**	< 5.0	< 5.0	**6.7**	< 5.0	< 13
ASB-5	06/02/2016	< 1.0	< 1.0	**19**	< 1.0	**2.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
ASB-7	06/02/2016	< 2.0	< 2.0	**21**	< 2.0	**67**	< 2.0	< 2.0	**0.65 J**	< 2.0	< 2.0	< 2.0	< 5.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		Volatile Organics											
Location ID	**Date Sampled**	**Chlorobenzene**	**Chloroethane**	**Chloroform**	**Chloro-methane (Methyl chloride)**	**cis-1,2-Dichloro-ethene**	**cis-1,3-Dichloro-propene**	**Cyclohexane**	**Dibromo-chloro-methane**	**Dichloro-difluoromethane (Freon 12)**	**Ethylbenzene**	**Isopropyl-benzene**	**Methyl acetate**
NYSDEC TOGS 1.1.1		**5**	**5**	**7**	**5**	**5**	**0.4**	**NE**	**50**	**5**	**5**	**5**	**NE**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-18R	06/22/2016	< 10	< 10	< 10	< 10	**14**	< 10	**20**	< 10	< 10	< 10	**14**	< 25
	07/11/2018	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 50
	10/17/2018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**8.3 J**	< 5.0	< 5.0	**1.2 J**	**6.8**	< 50
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.38 J**	< 1.0	**6.7**	< 1.0	< 1.0	**1.4**	**7.4**	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.28 J**	< 1.0	**7.2**	< 1.0	< 1.0	**1.6**	**4.8**	< 5.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	**0.66 J**	< 1.0	< 1.0	< 1.0	**0.35 J**	< 5.0
	06/09/2020	<5.00 J4	<25.0	<25.0	<12.5	<5.00	<5.00	**2.51 J**	<5.00	<25.0	**1.27 J**	**4.03 J**	<100
	03/19/2021	<1.00	<5.00	<5.00	<2.50	**0.268 J**	<1.00	**4.84**	<1.00	<5.00	**0.672 J**	**3.93**	**1.31 J**
MW-23-D1R	10/26/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**0.40 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	10/26/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/20/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/05/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/12/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	07/12/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	**1.7**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	**0.56 J**	< 10
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.73 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.35 J**	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.72 J**	< 1.0	**0.41 J**	< 1.0	< 1.0	< 1.0	**0.44 J**	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	**0.35 J**	< 1.0 *	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 5.0
	06/10/2020	<1.00	<5.00	<5.00	<2.50	**0.382 J**	<1.00	<1.00	<1.00	<5.00	<1.00	**0.439 J**	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	**0.517 J**	<1.00	**0.267 J**	<1.00	<5.00	<1.00	**0.414 J**	<20.0
	11/05/2020	<1.00	<5.00	<5.00	<2.50	**0.267 J**	<1.00	**0.259 J**	<1.00	<5.00	<1.00	**0.314 J**	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	**0.196 J**	<1.00	<1.00	<1.00	<5.00	<1.00	**0.163 J**	<20.0
MW-23-D2R	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/20/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/12/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/12/2018	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/05/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/18/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
MW-24-D1R	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	**10**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/21/2016	< 4.0	< 4.0	< 4.0	< 4.0	**4.9**	< 4.0	**1.9 J**	< 4.0	< 4.0	**3.1 J**	< 4.0	< 10
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	**4**	< 1.0	**1.6**	< 1.0	< 1.0	**2.3**	< 1.0	< 2.5
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	**6.1**	< 1.0	**1.4**	< 1.0	< 1.0	**2.2**	< 1.0	< 2.5
	10/26/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	07/12/2018	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	**7.1 J**	< 8.0	< 20
	10/16/2018	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 25	< 5.0	< 5.0	**6.1**	< 5.0	< 50
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.0**	< 1.0	< 5.0
	09/13/2019	< 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**	< 1.0 [<1.0]	< 1.0 [<1.0]	**7.9 [7.2]**	**0.97 J [0.86 J]**	<5.0 [<5.0]

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Chlorobenzene	Chloroethane	Chloroform	Chloro-methane (Methyl chloride)	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Cyclohexane	Dibromo-chloro-methane	Dichloro-difluoromethane (Freon 12)	Ethylbenzene	Isopropyl-benzene	Methyl acetate
NYSDEC TOGS 1.1.1		**5**	**5**	**7**	**5**	**5**	**0.4**	**NE**	**50**	**5**	**5**	**5**	**NE**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-24-D1R (cont.)	12/05/2019	< 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 **[0.99 J]**	< 1.0 [<1.0]	< 1.0 [<1.0]	**2.4 [7.2]**	1.0	<5.0 [<5.0]
	02/11/2020	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 * [<1.0]	**0.65 J [1.]**	< 1.0 * [<1.0]	< 1.0 [<1.0]	**5.7 [8.9]**	**0.61 J [1.0]**	<5.0 [<5.0]
	06/09/2020	<5.00 [<5.00]	<25.0 [<25.0]	<25.0 [<25.0]	<12.5 [<12.5]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	**8.28 [8.90]**	**0.954 J [1.08 J]**	<100 [<100]
	08/19/2020	<5.00 [<5.00]	<25.0 [<25.0]	<25.0 [<25.0]	<12.5 [<12.5]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	**6.80 [6.57]**	**0.712 J [0.681 J]**	<100 [<100]
	11/05/2020	<5.00 [<5.00]	<25.0 [<25.0]	<25.0 [<25.0]	<12.5 [<12.5]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	**7.18 [5.76]**	**0.771 J [0.560 J]**	<100 [<100]
	03/19/2021	<1.00 [<5.00]	<5.00 [<25.0]	<5.00 [<25.0]	<2.50 [<12.5 C3]	**0.131 J [<5.00]**	<1.00 [<5.00]	**0.766 J [<5.00]**	<1.00 [<5.00]	<5.00 [<25.0]	**8.35 [9.32]**	**1.04 [0.940 J]**	<20.0 [<100]
MW-24-D2	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	**0.84 J**	< 1.0	< 2.5
	10/25/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/25/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	07/05/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 20
	08/27/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 20
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	07/12/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	**0.52 J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.0 U
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	**0.467 J**	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/18/2020	<1.00	<5.00	<5.00	<2.50	**0.364 J**	<1.00	<1.00	<1.00	<5.00	<1.00	**0.141 J**	<20.0
	11/05/2020	<1.00	<5.00	<5.00	<2.50	**0.809 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	**0.197 J**	<2.50	**0.652 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
MW-24-VDR	07/12/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	**0.28 J**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	**0.206 J**	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/18/2020	<1.00	<5.00	<5.00	<2.50	**0.140 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/05/2020	<1.00	<5.00	<5.00	<2.50	**0.218 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/19/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
MW-26-D1	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/22/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/25/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	10/25/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**3.0 J**	< 4.0	< 10
	07/05/2017	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	08/27/2017	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	07/13/2018	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**3.5**	< 2.0	< 5.0
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	**0.42 J**	< 1.0	< 5.0	< 1.0	< 1.0	**0.95 J**	**0.43 J**	< 10
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	**1.8**	**0.73 J**	< 5.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.75 J**	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	**0.56 J**	< 5.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Chlorobenzene	Chloroethane	Chloroform	Chloromethane (Methyl chloride)	cis-1,2-Dichloroethene	cis-1,3-Dichloropropene	Cyclohexane	Dibromochloromethane	Dichlorodifluoromethane (Freon 12)	Ethylbenzene	Isopropylbenzene	Methyl acetate
NYSDEC TOGS 1.1.1		5	5	7	5	5	0.4	NE	50	5	5	5	NE
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-26-D1 (cont.)	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0 *	< 1.0	< 1.0 *	< 1.0	**1.3**	**0.67 J**	< 5.0
	06/10/2020	<1.00	<5.00	<5.00	<2.50	**3.28**	<1.00	<1.00	<1.00	<5.00	**2.47**	**1.06**	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	**1.45**	<1.00	<1.00	<1.00	<5.00	**1.38**	**0.555 J**	<20.0
	11/06/2020	<1.00	<5.00	<5.00	<2.50	**0.903 J**	<1.00	**0.189 J**	<1.00	<5.00	**1.05**	**0.459 J**	<20.0
MW-26-D2	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	**0.86 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/25/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	10/25/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 20
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	**0.39 J**	< 1.0	< 10
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	**0.44 J**	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	**0.37 J**	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	06/10/2020	<1.00	<5.00	<5.00	<2.50	**0.254 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	**0.398 J**	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
MW-26-VD	01/13/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-27-D1R	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	**1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/05/2017	< 2.0	< 2.0	< 2.0	< 2.0	**2.2**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	08/27/2017	< 2.0	< 2.0	< 2.0	< 2.0	**3.2**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	07/13/2018	< 2.0	< 2.0	< 2.0	< 2.0	**2**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	10/18/2018	< 1.0	< 1.0	< 1.0	< 1.0	**1**	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.57 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.80 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.40 J**	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	**0.95 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.48 J**	< 1.0	< 5.0
	08/19/2020	<5.00	<25.0	<25.0	<12.5	**0.855 J**	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<100
	11/06/2020	<5.00	<25.0	<25.0	<12.5	**1.13 J**	<5.00	<5.00	<5.00	<25.0	<5.00	<5.00	<100
	03/20/2021	<1.00	<5.00	<5.00	<2.50 C3	**0.751 J**	<1.00	<1.00	<1.00	<5.00	**0.263 J**	<1.00	<20.0
MW-27-D2	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	06/21/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**22 J**	< 4.0	< 4.0	**92**	**38**	< 10
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	10/12/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/18/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Chlorobenzene	Chloroethane	Chloroform	Chloro-methane (Methyl chloride)	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Cyclohexane	Dibromo-chloro-methane	Dichloro-difluoromethane (Freon 12)	Ethylbenzene	Isopropyl-benzene	Methyl acetate
	NYSDEC TOGS 1.1.1	5	5	7	5	5	0.4	NE	50	5	5	5	NE
	Units	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-27-D2 (cont.)	06/10/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/06/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/20/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
MW-28-D1	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/28/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0	< 2.5
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/11/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	**1.4**	**0.33 J**	< 10
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	**0.49 J**	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.7**	**0.56 J**	< 5.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.1**	1.0 U	5.0 U
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	**2.1**	**0.34 J**	< 5.0
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	**0.164 J**	<1.00	<1.00	<1.00	<5.00	**2.5**	**0.440 J**	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	**0.750 J**	<1.00	<20.0
	11/06/2020	<1.00	<5.00	<5.00	<2.50	**0.305 J**	<1.00	**0.296 J**	<1.00	<5.00	**3.68**	**0.548 J**	<20.0
MW-28-D2R	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/28/2016	< 1.0	< 1.0	**0.51 J**	< 1.0	< 1.0	< 1.0	< 1.0	**3.2**	< 1.0	< 1.0	< 1.0	< 2.5
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 10
	10/17/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 10
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	< 5.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0
	06/09/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00 J4	<1.00 J4	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/06/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	03/20/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
MW-29-D1	01/14/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**13**	< 5.0	< 5.0	< 5.0	**24**	< 13
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**8**	< 1.0	< 1.0	< 1.0	**5.4**	< 2.5
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**21**	< 1.0	< 1.0	< 1.0	**16**	< 2.5
	10/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**11**	< 1.0	< 1.0	< 1.0	**6.4**	< 2.5
	07/05/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**7.6**	< 2.0	< 2.0	< 2.0	**7.7**	< 5.0
	08/27/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**12**	< 2.0	< 2.0	< 2.0	**9.3**	< 5.0
	10/12/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**5.4**	< 4.0	< 4.0	< 4.0	**5.8**	< 10
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**24**	< 4.0	< 4.0	< 4.0	**19**	< 10
	10/18/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**20**	< 1.0	< 1.0	**0.31 J**	**16**	< 10
	05/10/2019	< 1.0	< 1.0	< 1.0	< 1.0*	< 1.0	< 1.0	**24**	< 1.0	< 1.0*	**0.34 J**	**18**	< 5.0
	09/14/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.8**	< 1.0	< 1.0	< 1.0	**2.2**	< 5.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.47 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 5.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Chlorobenzene	Chloroethane	Chloroform	Chloro-methane (Methyl chloride)	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Cyclohexane	Dibromo-chloro-methane	Dichloro-difluoromethane (Freon 12)	Ethylbenzene	Isopropyl-benzene	Methyl acetate
NYSDEC TOGS 1.1.1		**5**	**5**	**7**	**5**	**5**	**0.4**	**NE**	**50**	**5**	**5**	**5**	**NE**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-29-D1 (cont.)	02/12/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 *	< 1.0	< 1.0 *	< 1.0	< 1.0	< 1.0	< 5.0
	06/10/2020	<1.00 J4	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00 J4	**0.107 J**	<20.0
	08/19/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<1.00	<20.0
	11/06/2020	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	**0.536 J**	<1.00	<5.00	<1.00	<1.00	<20.0
	03/20/2021	<1.00	<5.00	<5.00	<2.50	<1.00	<1.00	**0.452 J**	<1.00	<5.00	<1.00	<1.00	<20.0
MW-29-D2	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-29-VD	01/14/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	06/21/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-30-D1	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.39 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.27 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-30-D2	01/14/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 13
	01/14/2016	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 5.0
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-30-VD	01/14/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 25
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-31-D1R	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
MW-31-D2R	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5
	06/22/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.5

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		Volatile Organics											
Location ID	Date Sampled	Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-12	01/14/2016	**32**	**5.4**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
AMW-13-D1	06/24/2016	**10**	< 1.0	< 1.0	< 1.0	**0.38 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.3**	< 2.0
	07/27/2016	**63 F1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**9.9**	< 2.0
AMW-13-D2	06/23/2016	**3.5**	< 1.0	< 1.0	< 1.0	**0.57 J**	**1.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/27/2016	**41**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
AMW-13-VD	06/23/2016	**5**	< 1.0	< 1.0	< 1.0	**1.5**	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/27/2016	**3.4**	< 1.0	< 1.0	< 1.0	**1**	**1.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
AMW-14-D1	06/24/2016	**12**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.4**	< 2.0
	07/26/2016	**140 E**	**0.97 J**	< 1.0	< 1.0	< 1.0	**7.1**	**7.8**	< 1.0	< 1.0	< 1.0	**1600 E**	**11**
	07/05/2017	**170**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**78**	**3.2 J**
	08/27/2017	**170**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**7.6**	< 8.0
	10/11/2017	**170**	**2.4**	**0.95 J**	< 2.0	< 2.0	**1.0 J**	**13**	< 2.0	< 2.0	< 2.0	**3.2**	**20**
	07/12/2018	**160**	**1.7 J**	< 8.0	< 8.0	< 8.0	< 8.0	**8.6**	< 8.0	< 8.0	< 8.0	< 8.0	**16**
	10/17/2018	**120**	**0.40 J**	< 5.0	< 1.0	< 1.0	**0.27 J**	< 1.0	< 1.0	< 1.0	< 1.0	**32**	**1.6 J**
	05/10/2019	**250**	**3.0**	< 1.0	< 1.0	< 1.0	**0.84 J**	**11**	< 1.0	< 1.0	< 1.0*	**2.1**	**16**
	09/13/2019	**50**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.5**	< 1.0	< 1.0	< 1.0	**9**	< 2.0
	12/05/2019	**94**	**0.74 J**	< 1.0	< 1.0	< 1.0	< 1.0	**9.0**	< 1.0	**0.44 J**	< 1.0	**22**	**1.8 J**
	02/12/2020	**130**	**1.2**	< 1.0	< 1.0	< 1.0	**0.58 J**	**12.0**	< 1.0	**0.46 J**	< 1.0	**40**	**5.7**
	06/10/2020	**37.6**	<1.00	<5.00	<1.00	<1.00	<1.00	**3.79**	<1.00	**0.218 J**	<5.00	**5.59**	**0.780 J**
	08/19/2020	**181**	**3.18**	<5.00	<1.00	<1.00	**0.465 J**	**10.8**	<1.00	<1.00	<5.00	**4.74**	**4.86**
	11/04/2020	**190**	**3.97**	<5.00	<1.00	<1.00	**0.552 J**	**12.1**	<1.00	**0.290 J**	<5.00	**6.16**	**3.95**
	03/19/2021	**53.9**	**1.86**	<5.00	<1.00	<1.00	**0.439 J**	**14.3**	<1.00	**0.342 J**	<5.00	**25.3**	**3.77**
AMW-14-D2	06/23/2016	**3.1**	< 1.0	< 1.0	< 1.0	< 1.0	**0.81 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/26/2016	**24**	< 1.0	< 1.0	< 1.0	< 1.0	**0.64 J**	**0.90 J**	< 1.0	< 1.0	< 1.0	**3.6**	< 2.0
	07/27/2016	**0.58 J**	< 1.0	< 1.0	< 1.0	**0.38 J**	**7.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	**14**	**0.27 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/11/2017	**48**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/12/2018	**62**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	10/17/2018	**44**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	05/10/2019	**33**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.85 J**	< 1.0	< 1.0	< 1.0	**0.32 J**	<2.0
	09/13/2019	**37**	< 1.0	**0.59 J**	< 1.0	< 1.0	< 1.0	**0.52 J**	< 1.0	< 1.0	< 1.0	**0.65 J**	<2.0
	12/05/2019	**29**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.33 J**	<2.0
	02/12/2020	**36**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.51 J**	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	06/10/2020	**33.2**	<10.0	<50.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<50.0	<10.0	**4.00 J**
	08/19/2020	**32.0**	<10.0	<50.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<50.0	<10.0	<30.0
	11/05/2020	**31.1**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/19/2021	**20.8**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
AMW-14-VD	06/23/2016	**0.91 J**	**0.36 J**	< 1.0	< 1.0	**0.59 J**	**10**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.79 J**
	07/27/2016	**0.59 J**	< 1.0	< 1.0	< 1.0	**0.41 J**	**8.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/05/2017	**0.51 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	**0.42 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/11/2017	**0.65 J**	**0.58 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.2**
	07/12/2018	**0.49 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/17/2018	< 1.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-14-VD (cont.)	05/10/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
	09/13/2019	**0.54 J**	<1.0	**0.36 J**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
	12/05/2019	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
	02/12/2020	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
	06/10/2020	**0.317 J**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	<3.00
	08/20/2020	**0.303 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/05/2020	**0.434 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/19/2021	**0.270 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
AMW-15-D1	06/23/2016	**29**	< 1.0	**9.9**	< 1.0	**0.43 J**	**3**	< 1.0	< 1.0	**5.5**	< 1.0	**70**	< 2.0
	07/27/2016	**51**	< 5.0	**140**	< 5.0	< 5.0	**7.5**	< 5.0	< 5.0	**73**	< 5.0	**410**	**6.5 J**
	10/26/2016	**110**	**3.3 J**	**8.9 J**	< 10	< 10	**18**	< 10	< 10	**48**	< 10	**600 F1**	**15 J**
	10/26/2016	**180**	**0.87 J**	**4.1**	< 4.0	< 4.0	**6.6**	< 4.0	< 4.0	**18**	< 4.0	**240**	**5.5 J**
	07/05/2017	**170**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**10**	< 8.0
	08/27/2017	**200**	< 4.0	**2.2 J**	< 4.0	< 4.0	**17**	**28**	< 4.0	< 4.0	< 4.0	**76**	**17**
	10/11/2017	**300 E**	< 2.0	< 2.0	< 2.0	< 2.0	**5.9**	**13**	< 2.0	< 2.0	< 2.0	**24**	**12**
	10/17/2018	**170**	**1.2 J**	< 25	< 5.0	< 5.0	**1.5 J**	**21**	< 5.0	< 5.0	< 5.0	< 5.0	**19**
	05/09/2019	**120**	**0.50 J**	< 1.0	< 1.0	< 1.0	< 1.0	**7.4**	< 1.0	< 1.0	< 1.0*	**1.1**	**6.3**
	09/13/2019	**100**	**0.51 J**	< 1.0	< 1.0	< 1.0	< 1.0	**6.7**	< 1.0	< 1.0	< 1.0	**2**	**5.1**
	12/05/2019	**120**	< 1.0	**0.41 J**	< 1.0	< 1.0	**0.43 J**	**7.1**	< 1.0	< 1.0	< 1.0	**2.2**	**5.8**
	02/11/2020	**37**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.5**	< 1.0	< 1.0	< 1.0	< 1.0	**1.6 J**
	06/10/2020	**171**	<5.00	<25.0	<5.00	<5.00	<5.00	**5.47**	<5.00	<5.00	<25.0	<5.00	**6.20 J**
	08/19/2020	**94.3**	<5.00	<25.0	<5.00	<5.00	<5.00	**4.20 J**	<5.00	<5.00	<25.0	<5.00	**2.96 J**
	11/04/2020	**76.7**	<1.00	<5.00	<1.00	<1.00	<1.00	**2.53**	<1.00	<1.00	<5.00	<1.00	**1.61 J**
	03/19/2021	**127**	<5.00	<25.0	<5.00	<5.00	<5.00	**5.63**	<5.00	<5.00	<25.0	<5.00	**5.23 J**
AMW-15-D2	06/23/2016	**68**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.8**	< 2.0
	06/23/2016	**66**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.7**	< 2.0
	07/27/2016	**43**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.5**	< 2.0
	10/26/2016	**42**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**4.7**	< 2.0
	10/26/2016	**110 E**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**30**	< 2.0
	07/05/2017	**120**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	08/27/2017	**350**	< 4.0	< 4.0	< 4.0	< 4.0	**7.8**	**5.5**	< 4.0	< 4.0	< 4.0	**300**	**12**
	10/11/2017	**160**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**25**	< 8.0
	10/17/2018	**120**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	05/10/2019	**61**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	09/13/2019	**100**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.39 J**	<2.0
	12/05/2019	**96**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	02/11/2020	**91**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	06/09/2020	**126**	<1.00	<5.00	<1.00	<1.00	<1.00	**0.209 J**	<1.00	<1.00	<5.00	<1.00	**0.225 J**
	08/19/2020	**11.0**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/04/2020	**57.1**	<1.00	<5.00	<1.00	<1.00	<1.00	**0.430 J**	<1.00	<1.00	<5.00	<1.00	<3.00
	03/19/2021	**74.6**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	**7.82**	<3.00
AMW-15-D3	06/23/2016	**2.4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/23/2016	**2.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/27/2016	**23**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	**64**	< 4.0	**2.4 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**140**	< 4.0	**16**	**17**

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
AMW-15-D3 (cont.)	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	07/13/2018	**22**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**20**	< 2.0	< 2.0	< 4.0
	10/17/2018	**10**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.5**	< 1.0	< 1.0	< 3.0
	05/10/2019	**16**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.39 J**	< 1.0	< 1.0	<2.0
	09/13/2019	**14**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.54 J**	< 1.0	< 1.0	<2.0
	12/05/2019	**7.7**	< 1.0	**0.32 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	02/11/2020	**51**	<5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**4.3**	< 1.0	**0.57 J**	<2.0
	06/09/2020	**10.1**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	08/19/2020	**72.8**	<1.00	<5.00	<1.00	<1.00	<1.00	**0.226 J**	<1.00	**8.84**	<5.00	<1.00	**0.376 J**
	11/04/2020	**80.6**	<1.00	<5.00	<1.00	<1.00	<1.00	**<1.00**	<1.00	**4.31**	<5.00	<1.00	**0.174 J**
	03/19/2021	**63.6**	<1.00	<5.00	**0.147 J**	<1.00	**2.41**	**0.435 J**	<1.00	**51.1**	<5.00	**7.44**	**4.59**
AMW-15-VD	06/23/2016	**1.1**	< 1.0	< 1.0	< 1.0	< 1.0	**0.52 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/27/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**15**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	**1.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/11/2017	**0.94 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3**
	07/13/2018	**0.44 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/17/2018	**1.3**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	05/10/2019	**1.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	09/13/2019	**1.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	12/05/2019	**1.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	02/11/2020	**1.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	<2.0
	06/09/2020	**0.856 J**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	<3.00
	08/19/2020	**0.684 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/04/2020	**0.581 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/19/2021	**0.437 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
AMW-3	01/13/2016	< 5.0	**27**	**15**	< 5.0	< 5.0	**6.9**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**20**
	06/21/2016	**0.40 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
AMW-7R	01/12/2016	**1.4 J**	**1.5 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/21/2016	**0.23 J**	**9.4**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.79 J**
	07/11/2018	< 2.0	**29**	**1.1 J**	< 2.0	< 2.0	**1.0 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	10/17/2018	< 1.0	**50**	< 5.0	< 1.0	< 1.0	**0.60 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.61 J**
	05/10/2019	< 1.0	**31**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.3 J**
	09/14/2019	< 1.0	**29**	**0.53 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	12/06/2019	< 1.0	**7.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.73 J**
	02/12/2020	< 1.0	**24**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.86 J**
	06/09/2020	<1.00	**14.9**	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	**1.66 J**
	08/19/2020	<1.00	**25.1**	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	**0.990 J**
	11/06/2020	<1.00	**18.9**	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	**0.241 J**
	03/19/2021	<1.00	**7.03**	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
ASB-2	06/06/2016	**55**	< 1.0	< 1.0	< 1.0	**1.4**	**0.87 J**	< 1.0	< 1.0	**4.4**	< 1.0	**6**	< 2.0
ASB-3	06/08/2016	**8.5**	< 1.0	**0.60 J**	< 1.0	**1.3**	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0	**81**	< 2.0
ASB-4	06/07/2016	**13**	**4.5 J**	**330**	< 5.0	**6.7**	**9**	**13**	< 5.0	**1500 E**	< 5.0	**400**	**36**
ASB-5	06/02/2016	**4.6**	< 1.0	< 1.0	< 1.0	**1.2**	< 1.0	< 1.0	< 1.0	**4.8**	< 1.0	**11**	**0.89 J**
ASB-7	06/02/2016	**5.5**	< 2.0	< 2.0	< 2.0	**1.2 J**	< 2.0	< 2.0	< 2.0	**1.7 J**	< 2.0	**31**	< 4.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-18R	06/22/2016	**65**	**4.4 J**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 20
	07/11/2018	**11 J**	**5.1 J**	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 40
	10/17/2018	**28**	**6.2 J**	< 25	< 5.0	< 5.0	**4.1 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**5.2 J**
	09/14/2019	**40**	**5.6**	**0.68 J**	< 1.0	< 1.0	**4.9**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**7.1**
	12/05/2019	**14**	**3.3**	**0.62 J**	< 1.0	< 1.0	**4.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**5.2**
	02/12/2020	< 1.0	**0.56 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/09/2020	**3.42 J**	<5.00	<25.0	<5.00	<5.00 J4	**3.31 J**	<5.00	<5.00	<5.00 J4	<25.0	<5.00	**5.52 J**
	03/19/2021	**0.765 J**	**5.86**	<5.00	<1.00	<1.00	**2.36**	<1.00	<1.00	<1.00	<5.00	<1.00	**4.41**
MW-23-D1R	10/26/2016	**140**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	10/26/2016	**180**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	01/12/2016	**210**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/20/2016	**30**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/05/2017	**140**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	08/27/2017	**130**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/12/2017	**150**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	07/12/2018	**91**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/17/2018	**94**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1**	< 3.0
	09/13/2019	**92**	< 1.0	**0.53 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.26 J**	< 2.0
	12/05/2019	**83**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	02/11/2020	**35**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/10/2020	**106**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	**0.190 J**
	08/19/2020	**85.5**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/05/2020	**98.5**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/19/2021	**38.7**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-23-D2R	01/12/2016	**130**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/20/2016	**26**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/05/2017	**8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	**72**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/12/2017	**150 E**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 2.0
	07/12/2018	**8.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<2.0
	05/09/2019	**8.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	09/13/2019	**63**	< 1.0	**0.47 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	12/05/2019	**14**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/19/2020	**42.2**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/05/2020	**71.1**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/18/2021	**57.0**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-24-D1R	01/13/2016	**220**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**99**	< 10
	06/21/2016	**160**	**1.3 J**	< 4.0	< 4.0	< 4.0	< 4.0	**11**	< 4.0	< 4.0	< 4.0	**35**	**9.3**
	10/26/2016	**140 E**	**0.64 J**	< 1.0	< 1.0	< 1.0	**0.68 J**	**6.5**	< 1.0	< 1.0	< 1.0	**33**	**7.2**
	10/26/2016	**120 E**	**0.66 J**	< 1.0	< 1.0	< 1.0	**0.64 J**	**6.8**	< 1.0	< 1.0	< 1.0	**15**	**6.6**
	10/26/2016	**81**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	07/12/2018	**290**	< 8.0	< 8.0	< 8.0	< 8.0	**23**	**22**	< 8.0	< 8.0	< 8.0	**160**	**29**
	10/16/2018	**270**	< 25	< 25	< 5.0	< 5.0	**17**	**12**	< 5.0	< 5.0	< 5.0	**22**	**25**
	05/09/2019	**65**	< 1.0	< 1.0	< 1.0	< 1.0	**1.5**	**2.0**	< 1.0	< 1.0	< 1.0	**1.5**	**3.6**
	09/13/2019	**210 [200]**	**0.63 J [0.57 J]**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**7.2 [6.4]**	**16**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**8.0 [9.2]**	**33 [30]**

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-24-D1R (cont.)	12/05/2019	**180 [210]**	1.0 [0.56 J]	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**1.4 [2.3]**	**7.0 [16]**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**3.4 [5.4]**	**11 [29]**
	02/11/2020	**210 [220]**	< 1.0 **[0.57 J]**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**0.9 J [2.5]**	**9.5 [14]**	< 1.0 [<1.0]	< 1.0 [<1.0]	< 1.0 [<1.0]	**2.3 [7.9]**	**24 [37]**
	06/09/2020	**195 [255]**	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 [<5.00]	**1.62 J [<5.00]**	**12.2 [13.8]**	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	**2.86 J [<5.00]**	**31.1 [34.4]**
	08/19/2020	**220 [206]**	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	**12.9 [13.2]**	<5.00	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	**26.9 [26.3]**
	11/05/2020	**207 [180]**	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	<5.00 [<5.00]	<5.00 [<5.00]	**12.8 [9.50]**	<5.00 [<5.00]	<5.00 [<5.00]	<25.0 [<25.0]	<5.00 [<5.00]	**24.1 [18.6]**
	03/19/2021	**201 [213]**	<1.00 [<5.00]	<5.00 [<25.0]	<1.00 [<5.00]	<1.00 [<5.00]	**1.42 [<5.00]**	**12.6 [11.4]**	<1.00 [<5.00]	<1.00 [<5.00]	<5.00 [<25.0]	<1.00 [<5.00]	**23.8 [22.7]**
MW-24-D2	01/13/2016	**260**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**180**	< 10
	01/13/2016	**250**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**170**	< 10
	06/21/2016	**140 E**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.98 J**	< 1.0	< 1.0	< 1.0	**38**	< 2.0
	10/25/2016	**120**	< 4.0	**120**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**20**	< 8.0
	10/25/2016	**270**	< 5.0	**84 F1**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**280 F1**	< 10
	07/05/2017	**220**	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	**250 F1**	< 16
	08/27/2017	**87**	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	**72**	< 16
	10/11/2017	**60**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**18**	< 4.0
	07/12/2018	**2.5**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	10/17/2018	**2**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.23 J**	< 3.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	12/05/2019	**13**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	02/11/2020	**47**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/09/2020	**136**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	**0.716 J**	<1.00	<1.00 J4	<5.00	**0.269 J**	<3.00
	08/18/2020	**76.4**	<1.00	<5.00	<1.00	<1.00	<1.00	**0.359 J**	<1.00	<1.00	<5.00	<1.00	<3.00
	11/05/2020	**296**	<1.00	<5.00	<1.00	<1.00	<1.00	**1.13**	<1.00	**0.244 J**	<5.00	<1.00	<3.00
	03/19/2021	**448**	<1.00	<5.00	<1.00	<1.00	<1.00	**1.19**	<1.00	<1.00	<5.00	<1.00	<3.00
MW-24-VDR	07/12/2018	**4.2**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/17/2018	**2.9**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.55 J**	< 3.0
	05/09/2019	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.40 J**	< 2.0
	09/13/2019	**0.75 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.35 J**	< 2.0
	12/05/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	02/11/2020	**1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/09/2020	**0.998 J**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	<3.00
	08/18/2020	**1.16**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/05/2020	**0.944 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/19/2021	**1.01**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-26-D1	01/12/2016	**380**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**16**	< 10
	06/22/2016	**340**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**20**	< 8.0
	10/25/2016	**310**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	**18**	< 20
	10/25/2016	**390**	< 4.0	**3.6 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**51**	< 8.0
	07/05/2017	**290**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	**28**	< 20
	08/27/2017	**240**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 20
	10/11/2017	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	07/13/2018	**220 E**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**13**	< 4.0
	10/17/2018	**110**	< 5.0	< 5.0	< 1.0	< 1.0	**0.23 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	09/13/2019	**86**	< 1.0	< 1.0	< 1.0	< 1.0	**0.67 J**	**1.0**	< 1.0	< 1.0	< 1.0	**19**	< 2.0
	12/06/2019	**77**	< 1.0	< 1.0	< 1.0	< 1.0	**0.4 J**	**0.74 J**	< 1.0	< 1.0	< 1.0	**12**	< 2.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-26-D1 (cont.)	02/11/2020	**80**	< 1.0	< 1.0	< 1.0	< 1.0	**0.46 J**	**0.92 J**	< 1.0	< 1.0	< 1.0	**26**	< 2.0
	06/10/2020	**115**	<1.00	<5.00	<1.00	<1.00	**0.516 J**	**2.36**	<1.00	<1.00	<5.00	**79.3**	**1.74 J**
	08/19/2020	**97.4**	<1.00	<5.00	<1.00	<1.00	<1.00	**1.57**	<1.00	<1.00	<5.00	**39**	**1.02 J**
	11/06/2020	**84.1**	<1.00	<5.00	<1.00	<1.00	<1.00	**1.42**	<1.00	<1.00	<5.00	**38.8 C5**	**0.793 J**
MW-26-D2	01/12/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/22/2016	**59**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	< 2.0
	10/25/2016	**85**	< 2.0	**15**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	10/25/2016	**43**	< 2.0	**81**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0	< 16
	10/11/2017	**14**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/17/2018	**76**	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	05/09/2019	**84**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.90 J**	< 1.0	**0.50 J**	< 1.0	**1.5**	< 2.0
	09/13/2019	**60**	< 1.0	**0.44 J**	< 1.0	< 1.0	< 1.0	**0.56 J**	< 1.0	< 1.0	1.0 U	< 1.0	< 2.0
	12/06/2019	**29**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
	02/11/2020	**52**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/10/2020	**105**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	**0.218 J**
	08/19/2020	**64.4**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-26-VD	01/13/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/22/2016	**0.96 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-27-D1R	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/21/2016	**10**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.97 J**	< 2.0
	07/05/2017	**84**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**28**	< 4.0
	08/27/2017	**100**	< 2.0	**0.94 J**	< 2.0	< 2.0	< 2.0	**5**	< 2.0	< 2.0	< 2.0	**110**	< 4.0
	07/13/2018	**62**	< 2.0	< 2.0	< 2.0	< 2.0	**1.6 J**	**4.1**	< 2.0	< 2.0	< 2.0	**88**	< 4.0
	10/18/2018	**38**	< 5.0	< 5.0	< 1.0	< 1.0	**1**	< 1.0	< 1.0	**0.26 J**	< 1.0	**70**	< 3.0
	05/10/2019	**18**	< 1.0	< 1.0	< 1.0	< 1.0	**0.44 J**	**0.96 J**	< 1.0	< 1.0	< 1.0	**17**	< 2.0
	09/14/2019	**33**	< 1.0	< 1.0	< 1.0	< 1.0	**1.2**	**2.3**	< 1.0	< 1.0	< 1.0	**25**	**1.2 J**
	12/05/2019	**39**	< 1.0	< 1.0	< 1.0	< 1.0	**1.7**	**3.6**	< 1.0	**0.37 J**	1.0 U	**61**	**1.6 J**
	08/19/2020	**26.0**	<5.00	<25.0	<5.00	<5.00	<5.00	**1.52 J**	<5.00	<5.00	<25.0	**33.6**	**1.12 J**
	11/06/2020	**22.2**	<5.00	<25.0	<5.00	<5.00	<5.00	**2.01 J**	<5.00	<5.00	<25.0	**26.0 C5**	<15.0
	03/20/2021	**21.1**	<1.00	<5.00	<1.00	<1.00	**0.450 J**	**1.82**	<1.00	<1.00	<5.00	**26.9**	**0.593 J**
MW-27-D2	01/13/2016	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/21/2016	**8.1**	**26**	**5.7**	< 4.0	< 4.0	**17**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**68**
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	10/12/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/13/2018	**3.4 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/18/2018	< 1.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	05/10/2019	**7.9**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	09/14/2019	**9.0**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	12/05/2019	**4.9**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	02/12/2020	**4.7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	Volatile Organics											
		Methyl-t-butyl ether	Methyl-cyclohexane	Methylene chloride (Dichloro-methane)	Styrene	Tetrachloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Dichloro-propene	Trichloro-ethene (Trichloro-ethylene)	Trichloro-fluoromethane (Freon 11)	Vinyl Chloride (Chloroethene)	Xylene (total)
NYSDEC TOGS 1.1.1		10	NE	5	5	5	5	5	0.4	5	5	2	5
Units		ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-27-D2 (cont.)	06/10/2020	**0.843 J**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	**0.181 J**
	08/19/2020	**1.21**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/06/2020	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/20/2021	**0.380 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-28-D1	06/24/2016	**6.2**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/28/2016	**4.7 J**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 20
	07/05/2017	**19**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	**6.6**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/11/2017	**4.8**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/17/2018	**9.5**	< 5.0	< 5.0	< 1.0	< 1.0	**0.39 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2.6 J**
	05/09/2019	**7**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.47 J**
	09/13/2019	**22**	< 1.0	**0.42 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.0**	**2.2**
	12/05/2019	**21**	< 1.0	< 1.0	< 1.0	< 1.0	**0.53 J**	**0.25 J**	< 1.0	< 1.0	< 1.0	**0.68 J**	**1.9 J**
	02/11/2020	**34**	< 1.0	< 1.0	< 1.0	< 1.0	**0.62 J**	**0.35 J**	< 1.0	< 1.0	< 1.0	**1.7**	**3**
	06/09/2020	**20.1**	<1.00	<5.00	<1.00	<1.00 J4	**0.578 J**	**0.205 J**	<1.00	<1.00 J4	<5.00	**0.625 J**	**3.11**
	08/19/2020	**16.5**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	**1.02 J**
	11/06/2020	**28.8**	<1.00	<5.00	<1.00	<1.00	**0.497 J**	**0.362 J**	<1.00	<1.00	<5.00	<1.00	**4.11**
MW-28-D2R	06/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/28/2016	**0.25 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/05/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	08/27/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/11/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	07/13/2018	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 8.0
	10/17/2018	< 1.0	< 5.0	< 5.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 3.0
	05/09/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	09/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	12/06/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	02/11/2020	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/09/2020	<1.00	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	<3.00
	08/19/2020	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/06/2020	**0.108 J**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/20/2021	<1.00	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-29-D1	01/14/2016	**34**	**5.5**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	06/21/2016	**23**	**3.8**	< 1.0	< 1.0	< 1.0	**1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**2**
	10/26/2016	**44**	**10**	< 1.0	< 1.0	< 1.0	**3.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**9.7**
	10/26/2016	**23**	**2.5**	< 1.0	< 1.0	< 1.0	**1.6**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**4**
	07/05/2017	**71**	**1.8 J**	< 2.0	< 2.0	< 2.0	**2.3**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**3.7 J**
	08/27/2017	**28**	**5.8**	< 2.0	< 2.0	< 2.0	**1.7 J**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	**4.3**
	10/12/2017	**20**	**1.5 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**4.3 J**
	07/13/2018	**39**	**11**	< 4.0	< 4.0	< 4.0	**3.0 J**	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0	**5.5 J**
	10/18/2018	**33**	**11**	< 5.0	< 1.0	< 1.0	**2.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**8.1**
	05/10/2019	**51**	**8.6**	< 1.0	< 1.0	< 1.0	**2.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.3**
	09/14/2019	**18**	**1.2**	**0.48 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	12/06/2019	**12**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		Volatile Organics											
Location ID	**Date Sampled**	**Methyl-t-butyl ether**	**Methyl-cyclohexane**	**Methylene chloride (Dichloro-methane)**	**Styrene**	**Tetrachloro-ethene**	**Toluene**	**trans-1,2-Dichloro-ethene**	**trans-1,3-Dichloro-propene**	**Trichloro-ethene (Trichloro-ethylene)**	**Trichloro-fluoromethane (Freon 11)**	**Vinyl Chloride (Chloroethene)**	**Xylene (total)**
NYSDEC TOGS 1.1.1		**10**	**NE**	**5**	**5**	**5**	**5**	**5**	**0.4**	**5**	**5**	**2**	**5**
Units		**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-29-D1 (cont.)	02/12/2020	**3.1**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/10/2020	**22.7**	<1.00	<5.00	<1.00	<1.00 J4	<1.00	<1.00	<1.00	<1.00 J4	<5.00	<1.00	<3.00
	08/19/2020	**29.5**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	11/06/2020	**28.7**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
	03/20/2021	**26.4**	<1.00	<5.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<5.00	<1.00	<3.00
MW-29-D2	01/14/2016	**66**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/21/2016	**51**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-29-VD	01/14/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 20
	06/21/2016	**0.42 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-30-D1	01/14/2016	**100 E**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/22/2016	**53**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-30-D2	01/14/2016	**7.3**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10
	01/14/2016	**8.1**	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 4.0
	06/22/2016	**3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-30-VD	01/14/2016	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 20
	06/22/2016	**0.47 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-31-D1R	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/22/2016	**3.3**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
MW-31-D2R	01/14/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0
	06/22/2016	**0.32 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 2.0

See Notes on Page 49.

Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	GC Volatiles - RSK-175				Inorganics			General Chemistry			
		Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
NYSDEC TOGS 1.1.1		NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
Units		mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
AMW-12	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AMW-13-D1	06/24/2016	NA	NA	NA	NA	3,500	510 B	NA	569,000 B	5,69,000 B	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AMW-13-D2	06/23/2016	NA	NA	NA	NA	2,700	740 B	NA	1100 B	7,32,000 B	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AMW-13-VD	06/23/2016	NA	NA	NA	NA	26,100	1100 B	NA	1100 B	7,32,000 B	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
AMW-14-D1	06/24/2016	NA	NA	NA	NA	410	370 B	NA	< 140	8,86,000 B	NA	NA
	07/26/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/05/2017	130	< 150	< 140	1,100	4,700	48	16,90,000 ^	NA	7,16,000 B	3,060	4.5
	08/27/2017	79	< 330	200 J	550	5,200	49 B	1,730,000	NA	5,63,000 B	3,130	5.2
	10/11/2017	23	< 170	190	580	4,400	48 B	1,590,000	NA	563,000	1,860	4.4
	07/12/2018	42	< 660	260 J	2,000	1,600	14 B	975,000	NA	6,23,000 B	2,970	1.5
	10/17/2018	120 B	< 330	< 310	1,600	5,000	55 B	1,560,000	NA	673,000	3,620	4.7
	05/10/2019	73	150 J	440	1,900	5,780	94.9	1,740,000	NA	805,000	3,700	5.8
	09/13/2019	150	<83	<77	3,600	3,630	70.2	1,680,000	NA	779,000	3,000	3.1
	12/05/2019	160	13	210	3,800	6,940	59	1,100,000	NA	582,000	2,100	6.9
	02/12/2020	100 B	160	690	3,000 B	5,170	41.1	967,000	NA	386,000	2,400	5
	06/10/2020	43.1 T8	<13.0	86.3	3,200	1,800	33.3	1,380,000	NA	613,000	2,750	0.334 T8
	08/19/2020	42,500 T8	378	176	3,340	8,480	131	1,930,000	NA	678	2,950	6.97 T8
	11/04/2020	28.2 T8	816	225	5,990	3,130	22.0	986,000	NA	581,000	3,030	2.71 T8
	03/19/2021	61.8 P1 T8	110	661	5,200	12,500	150	1,950,000	NA	808,000	3,950	10.1 T8
AMW-14-D2	06/23/2016	NA	NA	NA	NA	6,600	510 B	NA	740 B	7,40,000 B	NA	NA
	07/26/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/27/2017	18	< 83	< 77	210	34 J	16 B	13,500	NA	4,39,000 B	4,930	< 0.10
	10/11/2017	100	< 170	< 150	1,200	17,300	760 B	3,260,000	NA	830,000	4,070	17.3
	07/12/2018	120	< 330	< 310	970	2,500	78 B	2,210,000	NA	7,85,000 B	4,380	2.5
	10/17/2018	150 B	< 330	< 310	2,200	2,700	100 B	2,230,000	NA	4,85,000 B	4,510	2.7
	05/10/2019	150	< 330	< 310	1,900	548	80.1	2,080,000	NA	822,000	4,200	<0.10
	09/13/2019	160	<83	<77	2,600	1,870	86.3	2,070,000	NA	823,000	3,400	1.3
	12/05/2019	170	0.74 J	< 3.0	2,200	6,830	135	2,380,000	NA	727,000	4,200	6.5
	02/12/2020	120 B	1.1 J	< 3.0	1,800 B	5,590	116	1,630,000	NA	810,000	4,500	4.7
	06/10/2020	69.7 T8	<13.0	<13.0	2,070	5,070	119	1,990,000	NA	744,000	4,190	2.71 T8
	08/19/2020	55,800 T8	<13.0	<13.0	1670	17,800	340	2,510,000	NA	832	4,380	16.9 T8
	11/05/2020	26.3 T8	<13.0	<13.0	1,970	3,290	104	1,950,000	NA	692,000	4,330	2.96 T8
	03/19/2021	44.6 T8	<13.0	<13.0	1,820	28,300	506	2,530,000	NA	750,000	5,310	27.4 T8
AMW-14-VD	06/23/2016	NA	<13.0	<13.0	1,820	28,300	506	2,530,000	427	427,000	NA	NA
	07/27/2016	NA	<13.0	<13.0	1,820	28,300	506	2,530,000	NA	NA	NA	NA
	07/05/2017	120	<13.0	<13.0	1,820	28,300	506	2,530,000	NA	4,40,000 B	15,200	11.3
	08/27/2017	100	<13.0	<13.0	1,820	28,300	506	2,530,000	NA	4,15,000 B	15,400	12.3
	10/11/2017	82	<13.0	<13.0	1,820	28,300	506	2,530,000	NA	454,000	16,200	14.8
	07/12/2018	120	< 7.5	< 7.0	27	18,400	410 B	8,660,000	NA	4,72,000 B	19,400	18.4
	10/17/2018	110 B	< 7.5	< 7.0	24	18,500	390 B	9,100,000	NA	4,09,000 B	16,300	18.5

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		GC Volatiles - RSK-175				Inorganics			General Chemistry			
Location ID	Date Sampled	Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
	NYSDEC TOGS 1.1.1	NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
	Units	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
AMW-14-VD (cont.)	05/10/2019	**130**	<7.5 H	<7.0 H	**12 H**	**14,700**	**387**	**71,50,000 B**	NA	**493,000**	**110,000**	**14.4**
	09/13/2019	**140**	<7.5	<7.0	**20**	**15,200**	**376**	**6,810,000**	NA	**493,000**	**14,000**	**13.8**
	12/05/2019	**130**	< 4.0	<3.0	**33**	**18,800**	**432**	**8,960,000**	NA	**493,000**	**17,000**	**18.7**
	02/12/2020	**100 B**	< 4.0	< 3.0	**28 B**	**12,800**	**339**	**5,740,000**	NA	**495,000**	**15,000**	**12.1**
	06/10/2020	**88.9 T8**	<13.0	<13.0	**467**	**17,600**	**381**	**8,070,000**	NA	**528,000**	**18,000**	<0.100 T8
	08/20/2020	**82,100 T8**	<13.0	<13.0	**26.4**	**16700**	**389**	**8,790,000**	NA	**527**	**17,000**	**1.82 T8**
	11/05/2020	<20 T8	<13.0	<13.0	**48.6**	**18,000**	**396**	**7,940,000**	NA	**501,000**	**17,200**	<0.1 T8
	03/19/2021	**82.5 T8**	<13.0	<13.0	**51.9**	**18,500**	**395**	**8,320,000**	NA	**522,000**	**17,300**	**0.969 T8**
AMW-15-D1	06/23/2016	NA	NA	NA	NA	**2,200**	**500 B**	NA	**602**	**602,000**	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/26/2016	NA	NA	NA	NA	**1,900 B**	**70 B**	NA	**130**	**130,000**	NA	NA
	10/26/2016	NA	NA	NA	NA	**95 B**	**110 B**	NA	**528**	**528,000**	NA	NA
	07/05/2017	**110**	< 150	< 140	**400**	**2,100**	**84**	**17,50,000 ^**	NA	**597,000**	**73.2**	**2.1**
	08/27/2017	**27**	**92 J**	**830**	**4,000**	**12,400**	**170 B**	**1,520,000**	NA	**4,71,000 B**	**2,480**	**12.4**
	10/11/2017	**34**	< 330	**470**	**2,400**	**6,900**	**100 B**	**17,10,000 ^**	NA	**641,000**	**2,760**	**6.9**
	10/17/2018	**40**	< 660	< 620	**5,100**	**3,900**	**320**	**989,000**	NA	**442,000**	**1,910**	**3.8**
	05/09/2019	**52**	<830	<770	**3,200**	**3,340**	**335**	**1,170,000**	NA	**422,000**	**2,500**	**3.3**
	09/13/2019	**47**	**290 J**	**150 J**	**4,000**	**3,740**	**311**	**1,160,000**	NA	**254,000**	**1,700**	**1.5**
	12/05/2019	**39**	**490**	**550**	**6,200**	**3,550**	**243**	**1,200,000**	NA	**424,000**	**2,000**	**3.2**
	02/11/2020	**20 B**	**89**	**49**	**700 B**	**4,740**	**303**	**1,050,000**	NA	**206,000**	**1,800**	**3.3**
	06/10/2020	<20.0 T8	**775**	**165**	**6,590**	**512**	**150**	**1,050,000**	NA	**393,000**	**2,010**	<0.050 T8
	08/19/2020	<20000 T8	**550**	**27.5**	**4,380**	**1,320**	**126**	**1,460,000**	NA	**442**	**1990**	**0.836 T8**
	11/04/2020	<20 T8	**722**	<13.0	**5,200**	**800**	**80.5**	**1,030,000**	NA	**425,000**	**2,250**	**0.142 T8**
	03/19/2021	**23 T8**	**1,370**	**90.7**	**9,900**	**13,700**	**113**	**1,210,000**	NA	**598,000**	**2,590**	**13.4 T8**
AMW-15-D2	06/23/2016	NA	NA	NA	NA	**110**	**5.8 B**	NA	**50 B**	**1,81,000 B**	NA	NA
	06/23/2016	NA	NA	NA	NA	**120**	**6.3 B**	NA	**185**	**185,000**	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	10/26/2016	NA	NA	NA	NA	**50 B**	**85 B**	NA	**99.9**	**99,900**	NA	NA
	10/26/2016	NA	NA	NA	NA	< 50	**98 B**	NA	**600**	**600,000**	NA	NA
	07/05/2017	**98**	< 150	< 140	**430**	**700**	**110**	**20,90,000 ^**	NA	**687,000**	**3,700**	**0.53**
	08/27/2017	**94**	< 170	**37 J**	**880**	**3,500**	**140 B**	**2,200,000**	NA	**6,73,000 B**	**3,650**	**3.5**
	10/11/2017	**68**	< 170	< 150	**280**	**4,500**	**130 B**	**21,50,000 ^**	NA	**811,000**	**3,710 F1**	**4.5**
	10/17/2018	**110**	< 330	< 310	**560**	**750**	**55**	**2,130,000**	NA	**461,000**	**3,790**	**0.75**
	05/10/2019	**130**	<170	<150	**520**	**328**	**72**	**2,030,000**	NA	**672,000**	**4,200**	**0.24**
	09/13/2019	**140**	<170	<150	**680**	**493**	**54.6**	**2,030,000**	NA	**649,000**	**3,800**	**0.35**
	12/05/2019	**120**	**1.3 J**	3 U	**800**	**739**	**62.7**	**1,870,000**	NA	**636,000**	**4,000**	**0.46**
	02/11/2020	**97 B**	**1.9 J**	< 3.0	**690 B**	**978**	**69.9**	**1,820,000**	NA	**651,000**	**4,200**	**0.79**
	06/09/2020	**39.8 T8**	<13.0	<13.0	**920**	**595**	**75.7**	**1,580,000**	NA	**610,000**	**3,750**	<0.050 T8
	08/19/2020	**46,600 T8**	<13.0	<13.0	**409**	**10,500**	**150**	**2,230,000**	NA	**413**	**2410**	**5.04 T8**
	11/04/2020	**21.5 T8**	**6.37 J**	<13.0	**809**	**963**	**76.6**	**1,940,000**	NA	**540,000**	**4,150**	**0.29 T8**
	03/19/2021	**36.2 T8**	<13.0	<13.0	**19.3**	**14,800**	**258**	**2,220,000**	NA	**590,000**	**3,500**	**5.62 T8**
AMW-15-D3	06/23/2016	NA	NA	NA	NA	**98**	**250 B**	NA	**2,980,000 ^**	**6,17,000 B**	NA	NA
	06/23/2016	NA	NA	NA	NA	**120**	**240 B**	NA	**< 5**	**12,200 B**	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/27/2017	**5.1**	< 330	< 310	**2,400**	**2,300**	**450 B**	**29,80,000 ^**	NA	**4,08,000 B**	**4,230**	**2.3**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	GC Volatiles - RSK-175				Inorganics			General Chemistry			
		Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
NYSDEC TOGS 1.1.1		NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
Units		mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
AMW-15-D3 (cont.)	10/11/2017	< 5	< 170	< 150	**610**	**450**	**99 B**	**25,00,000 ^**	NA	**508,000**	**7,530**	**0.45**
	07/13/2018	**7.6**	< 330	< 310	**1,500**	**3,100**	**1,100 B**	**3,870,000**	NA	**5,18,000 B**	**4,670**	**3.1**
	10/17/2018	**100**	< 170	< 150	**2,800**	**260**	**200**	**2,610,000**	NA	**108,000**	**7,380**	**0.26**
	05/10/2019	**140**	<330	<310	**1,600**	**301**	**222**	**2,730,000**	NA	**616,000**	**8,800**	**0.30**
	09/13/2019	**130**	< 170	< 150	**1,400**	**612**	**231**	**2,720,000**	NA	**646,000**	**4,400**	**0.40**
	12/05/2019	**100**	< 4.0	< 3.0	**1,400**	**349**	**97.4**	**1,550,000**	NA	**594,000**	**5,300**	**0.35**
	02/11/2020	**85 B**	**3.1 J**	< 3.0	**1,100 B**	**3,631**	**106**	**1,330,000**	NA	**626,000**	**2,600**	**3.10**
	06/09/2020	**29.8 T8**	<13.0	<13.0	**1,340**	**1,130**	**138**	**1,690,000**	NA	**676,000**	**4,630**	**0.605 T8**
	08/19/2020	**52,200 T8**	**19.0**	<13.0	**2,800**	**3,030**	**871**	**3,930,000**	NA	**479**	**8160**	**2.8 T8**
	11/04/2020	**23.4 T8**	<13.0	<13.0	**2,010**	**795**	**131**	**1,660,000**	NA	**649,000**	**4,790**	**0.447 T8**
	03/19/2021	<20 T8	**76.3**	**6.25 J**	**6,270**	**439**	**484**	**2,960,000**	NA	**310,000**	**3,000**	<0.100 T8
AMW-15-VD	06/23/2016	NA	NA	NA	NA	**4,200**	**200 B**	NA	**303**	**303,000**	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	08/27/2017	**31**	< 7.5	< 7.0	**24**	**11,800**	**350 B**	**8,910,000**	NA	**135,000 B**	**16,100**	**11.5**
	10/11/2017	**40**	< 7.5	< 7.0	**8**	**11,700**	**340 B**	**91,80,000 ^**	NA	**329,000**	**16,000**	**11.7**
	07/13/2018	**41**	< 7.5	< 7.0	**37**	**10,600**	**320 B**	**8,290,000**	NA	**3,57,000 B**	**19,200**	**10.6**
	10/17/2018	**37**	< 7.5	< 7.0	**27**	**10,700**	**310**	**8,770,000**	NA	**271,000**	**13,200**	**10.7**
	05/10/2019	**17**	<7.5 H	<7.0 H	**25 H**	**3,600**	**287**	**8,560,000**	NA	**432,000**	**18,000**	**3.6**
	09/13/2019	**49**	<7.5	<7.0	**22**	**7,650**	**192**	**5,240,000**	NA	**429,000**	**16,000**	**7.2**
	12/05/2019	**22**	< 4.0	< 3.0	**51**	**5,150**	**220**	**6,360,000**	NA	**478,000**	**17,000**	**5**
	02/11/2020	**11 B**	< 4.0	< 3.0	**38 B**	**2,850**	**157**	**4,770,000**	NA	**468,000**	**15,000**	**1.5**
	06/09/2020	<20.0 T8	<13.0	<13.0	**54.9**	**5,330**	**213**	**6,680,000**	NA	**517,000**	**18,000**	<0.100 T8
	08/19/2020	**29,500 T8**	<13.0	<13.0	**44.9**	**6,080**	**230**	**6,370,000**	NA	**509**	**17,000**	<0.1 T8
	11/04/2020	<20 T8	<13.0	<13.0	**63.3**	**4,530**	**280**	**8,440,000**	NA	**523,000**	**17,300**	<0.1 T8
	03/19/2021	**21.7 T8**	<13.0	<13.0	**64.5**	**10,200**	**288**	**8,660,000**	NA	**523,000**	**17,300**	**5.31 T8**
AMW-3	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**16,200**	**1,400 B**	NA	**351**	**351,000**	NA	NA
AMW-7R	01/12/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**170**	**74 B**	NA	**2,900 B**	**1,99,000 B**	NA	NA
	07/11/2018	**82**	< 330	< 310	**3,500**	**20,000**	**2,500 B**	**199,000**	NA	**8,81,000 B**	**253**	**19.7**
	10/17/2018	**94 B**	< 330	< 310	**5,800**	**12,500**	**2,900 B**	**168,000**	NA	**997,000**	**192**	**12.5**
	05/10/2019	**94**	< 330 UH	< 310 UH	**3,100 H**	**8,080**	**2,770**	**105,000**	NA	**558,000**	**120 F1**	**8.1**
	09/14/2019	**110**	<170	<150	**3,600**	**6,840**	**2,770**	**95,700**	NA	**651,000**	**62**	**6**
	12/06/2019	**47**	**1.6 J**	< 3.0	**6,200**	**4,790**	**1,420**	**93,300**	NA	**462,000**	**80**	**4.7**
	02/12/2020	**52 B**	**2.4 J**	< 3.0	**5,500 B**	**24,900**	**2,730**	**86,900**	NA	**597,000**	**85**	**23.2**
	06/09/2020	**38.1 T8**	<13.0	<13.0	**9,370**	**16,000**	**2,270**	**93,200**	NA	**516,000**	**100**	**4.63 T8**
	08/19/2020	**46300 T8**	<13.0	<13.0	**3550**	**94900**	**3080**	**113,000**	NA	**656**	**86.6**	**83.6 T8**
	11/06/2020	**44.3 T8**	**4.44 J**	<13.0	**7,880**	**33,200**	**3,500**	**111,000**	NA	**723,000**	**78.2**	**17.2 T8**
	03/19/2021	**32.1 T8**	<13.0	<13.0	**7,700**	**35,500**	**2,390**	**234,000**	NA	**615,000**	**547**	**23.4 T8**
ASB-2	06/06/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ASB-3	06/08/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ASB-4	06/07/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ASB-5	06/02/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
ASB-7	06/02/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	GC Volatiles - RSK-175				Inorganics			General Chemistry			
		Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
NYSDEC TOGS 1.1.1		NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
Units		mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
MW-18R	06/22/2016	NA	NA	NA	NA	**11,500 B**	**470 B**	NA	**20,000 B**	**5,15,000 B**	NA	NA
	07/11/2018	**2.2 J**	< 660	< 620	**3,800**	**1,400**	**17 B**	**161,000**	NA	**1,84,000 B**	**367**	**1.3**
	10/17/2018	**11 B**	< 660	< 620	**9,700**	**450**	**26 B**	**193,000**	NA	**365,000**	**259**	**0.45**
	09/14/2019	**32**	<660	<620	**13,000**	**11,700**	**110**	**310,000**	NA	**386,000**	**480**	**8.2**
	12/05/2019	**3 J**	**21**	**0.81 J**	**16,000**	**3,100**	**30.8**	**323,000**	NA	**225,000**	**400**	**2.8**
	02/12/2020	**3.9 J B**	< 4.0	< 3.0	**89**	**9,770**	**49.9**	**45,100**	NA	**24,400**	**77**	**9.6**
	06/09/2020	<20.0 T8	**8.80 J**	<13.0	**5,640**	**5,240**	**28.9**	**204,000**	NA	**101,000**	**269**	<0.100 T8
	03/19/2021	<20 T8	**19**	<13.0	**8,840**	**1,450**	**11.7**	**191,000**	NA	**131,000**	**223**	**0.907 T8**
MW-23-D1R	10/26/2016	NA	NA	NA	NA	< 50	**21 B**	NA	**555**	**555,000**	NA	NA
	10/26/2016	NA	NA	NA	NA	**240 B**	**670 B**	NA	**525**	**525,000**	NA	NA
	01/12/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/20/2016	NA	NA	NA	NA	**660**	**690 B**	NA	**485**	**485,000**	NA	NA
	07/05/2017	**82**	< 150	< 140	**150**	**17,100**	**3,100**	**11,90,000 ^**	NA	**500,000**	**1,970**	**17.1**
	08/27/2017	**75**	< 83	< 77	**1,500**	**33,900**	**2200 B**	**11,90,000 ^**	NA	**5,12,000 B**	**2,190**	**31.9**
	10/12/2017	**55**	< 170	< 150	**1,300**	**3,800**	**1000 B**	**12,30,000 ^**	NA	**562,000**	**2,270**	**3.8**
	07/12/2018	**64**	< 330	< 310	**4,800**	**4,300**	**810 B**	**1,360,000**	NA	**4,95,000 B**	**2,250**	**4**
	10/17/2018	**63**	< 660	< 620	**3,600**	**1,900**	**930**	**1,220,000**	NA	**360,000**	**2,260**	**1.9**
	09/13/2019	**68**	<83	<77	**1,400**	**1,460**	**636**	**971,000**	NA	**467,000**	**2,000**	**1.1**
	12/05/2019	**660**	**8.2**	< 3.0	**2,100**	**2,020**	**852**	**389,000**	NA	**309,000**	**1,300**	**1.8**
	02/11/2020	**10 B**	**3.3 J**	< 3.0	**770 B**	**2,650**	**191**	**474,000**	NA	**173,000**	**730**	**2.5**
	06/10/2020	**29.6 T8**	**6.78 J**	<13.0	**1,560**	**1,430**	**511**	**1,240,000**	NA	**320,000**	**1,690**	<0.050 T8
	08/19/2020	**41,200 T8**	**6.95 J**	<13.1	**1,780**	**6,320**	**1,260**	**1,300,000**	NA	**543**	**2,340**	**1.44 T8**
	11/05/2020	**23.9 T8**	**7.51 J**	<13.0	**2,040**	**3,260**	**1,050**	**1,300,000**	NA	**401,000**	**2,030**	<0.1 T8
	03/19/2021	**29.3 T8**	<13.0	<13.0	**303**	**105,000**	**4,350**	**1,310,000**	NA	**469,000**	**2,470**	**103 T8**
MW-23-D2R	01/12/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/20/2016	NA	NA	NA	NA	**40 J**	**110 B**	NA	**543**	**543,000**	NA	NA
	07/05/2017	**130**	< 38	< 35	**73**	**4,400**	**210**	**21,90,000 ^**	NA	**520,000**	**5,260**	**4.2**
	08/27/2017	**110**	< 83	< 77	**360**	**1,800**	**170 B**	**19,30,000 ^**	NA	**4,34,000 B**	**5,420**	**1.8**
	10/12/2017	**100**	< 170	< 150	**200**	**2,800**	**140 B**	**25,70,000 ^**	NA	**654,000**	**4,460**	**2.8**
	07/12/2018	**32**	< 170	< 150	**290**	**1,660**	**279**	**1,930,000**	NA	**587,000**	**3,800**	**1.4**
	05/09/2019	**32**	< 170	< 150	**290**	**1,660**	**279**	**1,930,000**	NA	**587,000**	**3,800**	**1.4**
	09/13/2019	**140**	< 170	< 150	**700**	**25,700**	**2,350**	**1,600,000**	NA	**415,000**	**2,500**	**21.6**
	12/05/2019	**69**	**2.9 J**	< 3.0	**1,500**	**26,100**	**2,120**	**1,410,000**	NA	**349,000**	**2,400**	**26.1**
	08/19/2020	**54,100 T8**	<13.0	<13.0	**1,190**	**46,200**	**290**	**2,340,000**	NA	**505**	**3,710**	**43.4 T8**
	11/05/2020	**32.6 T8**	<13.0	<13.0	**1,020**	**12,700**	**2,830**	**1,900,000**	NA	**398,000**	**3,730**	**6.28 T8**
	03/18/2021	**53.5 T8**	<13.0	<13.0	**61**	**8,940**	**139**	**2,220,000**	NA	**667,000**	**4,360**	**7.82 T8**
MW-24-D1R	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**32 J**	**60 B**	NA	**550 J**	**6,42,000 B**	NA	NA
	10/26/2016	NA	NA	NA	NA	< 50	**49 B**	NA	**526**	**526,000**	NA	NA
	10/26/2016	NA	NA	NA	NA	**58 B**	**8.9 B**	NA	**324**	**324,000**	NA	NA
	10/26/2016	NA	NA	NA	NA	**24 J B**	**59 B**	NA	**577**	**577,000**	NA	NA
	07/12/2018	**67**	**130 J**	**1,100**	**5,900**	**10,100**	**120 B**	**2,140,000**	NA	**8,75,000 B**	**4,220**	**10.1**
	10/16/2018	**59**	< 660	**550 J**	**6,000**	**2,900**	**91**	**1,070,000**	NA	**583,000**	**2,370**	**2.9**
	05/09/2019	**98**	< 330	< 310	**1,600**	**4,120**	**79.6**	**1,720,000**	NA	**572,000**	**3,900**	**3.3**
	09/13/2019	**36 [51]**	**750 [730]**	**100 J [99 J]**	**7,300 [7,700]**	**2,140 [4,060]**	**32.1 [56.5]**	**13,20,000 [15,20,000]**	NA	**4,11,000 [5,88,000]**	**1,800 [3,000]**	**1.9 [3.5]**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	GC Volatiles - RSK-175				Inorganics			General Chemistry			
		Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
	NYSDEC TOGS 1.1.1	NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
	Units	mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
MW-24-D1R (cont.)	12/05/2019	**30 [60]**	**320 [880]**	**88 [280]**	**2,400 [8,400]**	**1,540 [1,410]**	**40.6 [38.3]**	**13,40,000 [11,70,000]**	NA	**3,01,000 [5,14,000]**	**1,900 [2,000]**	**1.3 [1.3]**
	02/11/2020	**57 B [57 B]**	**520 [520]**	**110 [270]**	**4,500 B [5900]**	**196 [426]**	**13.1 J [15]**	**13,70,000 [15,40,000]**	NA	**3,78,000 [5,30,000]**	**2,300 [2,500]**	**0.2 [0.26]**
	06/09/2020	**47.8 T8 [38.3 T8]**	**419 [549]**	**230 [147]**	**5,930 [6,460]**	**1,290 [2,340]**	**22.6 [40.8]**	**15,50,000 [16,50,000]**	NA	**6,03,000 [6,05,000]**	**2,910 [3,200]**	**1.02 T8 [1.67 T8]**
	08/19/2020	**47,000 T8 [46,300 T8]**	**589 [566]**	**116 [111]**	**6,530 [6,280]**	**674 [819]**	**9.41 J [14.6]**	**14,40,000 [14,70,000]**	NA	**423 [485]**	**2,360 [2,390]**	**0.454 T8 [0.576 T8]**
	11/05/2020	**57.2 T8 [48.7 T8]**	**794 [609]**	**274 [219]**	**12,600 [9,970]**	**486 [631]**	**9.69 J [10.4]**	**1,430,000 [1,420,000]**	NA	**290,000 [287,000]**	**2,380 [2,310]**	**0.302 T8 [0.247 T8]**
	03/19/2021	**<20 T8 [38 T8]**	**647 [752]**	**209 [219]**	**10,400 [11,100]**	**415 [4,070]**	**7.67 J [42.5]**	**1,430,000 [1,330,000]**	NA	**461,000 [523,000]**	**2,640 [2,750]**	**0.159 T8 [3.73 T8]**
MW-24-D2	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**40 J**	**55 B**	NA	**298,000 B**	**7,41,000 B**	NA	NA
	10/25/2016	NA	NA	NA	NA	**49 J**	**62**	NA	**512**	**512,000**	NA	NA
	10/25/2016	NA	NA	NA	NA	< 50	**56**	NA	**759**	**759,000**	NA	NA
	07/05/2017	**130**	< 150	< 140	**130**	**1,800**	**88**	**25,20,000 ^**	NA	**667,000**	**4,060**	**1.8**
	08/27/2017	**110**	< 170	< 150	**980**	**6,600**	**160 B**	**2,260,000**	NA	**7,74,000 B**	**4,100**	**6.6**
	10/11/2017	**54**	< 170	< 150	**410**	**5,500**	**140 B**	**23,80,000 ^**	NA	**804,000**	**3,720**	**5.5**
	07/12/2018	**15**	< 7.5	< 7.0	**44**	**1,100**	**33 B**	**94,900**	NA	**1,14,000 B**	**182**	**1.1**
	10/17/2018	**5.7**	< 170	< 150	**370**	**610**	**32**	**1,08,000 ^**	NA	**102,000**	**201**	**0.61**
	05/09/2019	**5.0**	< 7.5	< 7.0	< 4.0	**391**	**7.7 J**	**100,000**	NA	**112,000**	**89**	**0.39**
	09/13/2019	**15.0**	< 7.5	< 7.0	< 4.0	**2,160**	**35.6**	**81,400**	NA	**108,000**	**49**	**2**
	12/05/2019	**26**	**1.5 J**	**0.57 J**	**270**	**2,090**	**58.7**	**366,000**	NA	**190,000**	**550**	**1.9**
	02/11/2020	**8 B**	**2.7 J**	< 3.0	**210 B**	**1,450**	**22.2**	**349,000**	NA	**482,000**	**340**	**1.2**
	06/09/2020	<20.0 T8	**25.3**	<13.0	**2,180**	**380**	**24.8**	**471,000**	NA	**267,000**	**805**	<0.050 T8
	08/18/2020	<20,000 T8	**13.7**	<13.0	**1,200**	**436**	**32.8**	**518,000**	NA	**235**	**728**	<0.05 T8
	11/05/2020	<20 J T8	**57.4**	<13.0	**5,720**	**491**	**36.4**	**819,000**	NA	**241,000**	**724**	<0.05 T8
	03/19/2021	**24.7 T8**	**44.7**	<13.0	**4,500**	**1,960**	**51.9**	**1,210,000**	NA	**607,000**	**2,240**	**1.14 T8**
MW-24-VDR	07/12/2018	**89**	**2.1 J**	**2.3 J**	**160**	**37900**	**910 B**	**8,960,000**	NA	**4,54,000 B**	**16,000**	**37.8**
	10/17/2018	**79**	< 7.5	< 7.0	**120**	**26,100**	**740**	**8,730,000**	NA	**416,000**	**13,100**	**26.1**
	05/09/2019	**92**	< 83	< 77	**13 J**	**25,200**	**597**	**6,100,000**	NA	**461,000**	**16,000**	**25.2**
	09/13/2019	**92**	<7.5	<7.0	**26**	**8,910**	**235**	**2,520,000**	NA	**295,000**	**7,300**	**8.2**
	12/05/2019	**3.8 J**	< 4.0	**1.7 J**	**28**	**36,500**	**694**	**9,030,000**	NA	**446,000**	**17,000**	**36.5**
	02/11/2020	**85 B**	< 4.0	<3.0	**40 B**	**31,500**	**523**	**7,000,000**	NA	**474,000**	**15,000**	**29.5**
	06/09/2020	**57.7 T8**	<13.0	<13.0	**77.0**	**37,100**	**454**	**7,320,000**	NA	**337,000**	**13,700**	<0.100 T8
	08/18/2020	**75,500 T8**	<13.0	<13.0	**55.8**	**44,900**	**578**	**8,910,000**	NA	**332**	**12,800**	**12.8 T8**
	11/05/2020	**28.5 T8**	<13.0	<13.0	**68.1**	**45,100**	**588**	**8,850,000**	NA	**388,000**	**15,800**	**2.71 T8**
	03/19/2021	**81.7 T8**	<13.0	<13.0	**87.1**	**63,900**	**687**	**8,250,000**	NA	**459,000**	**17,300**	**31.6 T8**
MW-26-D1	01/12/2016	NA	NA	NA	NA	**NA**	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	**< 50**	**35 B**	NA	**569,000 B**	**5,69,000 B**	NA	NA
	10/25/2016	NA	NA	NA	NA	**< 50**	**25**	NA	**479**	**479,000**	NA	NA
	10/25/2016	NA	NA	NA	NA	**< 50**	**37**	NA	**591**	**591,000**	NA	NA
	07/05/2017	**120**	< 150	< 140	**250**	**230**	**41**	**15,70,000 ^**	NA	**542,000**	**2,520**	**0.23**
	08/27/2017	**95**	< 170	< 150	**1,200**	**640**	**48 B**	**1,500,000**	NA	**5,32,000 B**	**2,530**	**0.64**
	10/11/2017	**10**	< 7.5	< 7.0	**10**	**190**	**75 B**	**304,000**	NA	**177,000**	**483**	**0.19**
	07/13/2018	**110**	< 330	< 310	**2,900**	**320**	**35 B**	**1,640,000**	NA	**558,000**	**2,810**	**0.32**
	10/17/2018	**65 B**	< 170	< 150	**1,800**	**280**	**24 B**	**1,510,000**	NA	**416,000**	**2,540**	**0.28**
	09/13/2019	**79**	< 170	< 150	**4,100**	**93.9 J**	**19.2**	**1,400,000**	NA	**542,000**	**3,000**	<0.10
	12/06/2019	**64**	5.3	21	**2,400**	**364**	**18**	**1,260,000**	NA	**405,000**	**2,000**	**0.25**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

		GC Volatiles - RSK-175				Inorganics			General Chemistry			
Location ID	Date Sampled	Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
NYSDEC TOGS 1.1.1		NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
Units		mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
MW-26-D1 (cont.)	02/11/2020	45 H B	4.9	21	1,900 B	1,080	25.6	1,440,000	NA	405,000	2,100	0.51
	06/10/2020	72.0 T8	15.0	65.8	3,260	553	21.4	1,300,000	NA	438,000	2,400	<0.050 T8
	08/19/2020	34,800 T8	7.93 J	23.2	2,030	1,340	31.4	1,370,000	NA	500	2,360	1.01 T8
	11/06/2020	58.2 T8	12.7 J	39.2	2,820	554	21.4	1,360,000	NA	387,000	2,340	0.326 T8
MW-26-D2	01/12/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	490 B	700 B	NA	344	344,000	NA	NA
	10/25/2016	NA	NA	NA	NA	55	63	NA	NA	NA	NA	NA
	10/25/2016	NA	NA	NA	NA	< 50	140	NA	653	653,000	NA	NA
	07/05/2017	130	< 7.5	< 7.0	76	970	420	39,30,000 ^	NA	348,000	9,010	0.97
	08/27/2017	110	< 83	< 77	92	970	310 B	3,370,000	NA	379,000	7,980	0.97
	10/11/2017	55	< 170	< 150	670	1,100	160 B	2,770,000	NA	435,000	8,600	1.1
	10/17/2018	110 B	< 170	< 150	1,100	150	52 B	2,190,000	NA	509,000	3,820	0.15
	05/09/2019	130	< 660	< 620	750	466	75.2	2,420,000	NA	684,000	5,000	0.47
	09/13/2019	150	<83	<77	1,000	207	65.6	2,270,000	NA	702,000	4,000	0.21
	12/06/2019	140	1.1 J	< 3.0	1,300	54.4 J	59.8	2,340,000	NA	628,000	4,000	< 0.1
	02/11/2020	83 B	0.8 J	< 3.0	710 B	348	88.8	2,500,000	NA	588,000	3,900	0.35
	06/10/2020	57.8 T8	<13.0	<13.0	1,340	84.3 J	68.3	2,190,000	NA	671,000	4,390	<0.050 T8
	08/19/2020	47,900 T8	<13.0	<13.0	360	402	99.5	2,280,000	NA	638	4,160	0.242 T8
MW-26-VD	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	74,000 B	2,600 B	NA	61 B	1,76,000 B	NA	NA
MW-27-D1R	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	430	200 B	NA	51,600	7,95,000 B	NA	NA
	07/05/2017	26	< 380	< 350	550	2,800	56	11,30,000 ^	NA	3,94,000 B	2,860	2.8
	08/27/2017	100	< 170	< 150	1,100	1,300	330 B	960,000	NA	884,000	5,640	1.3
	07/13/2018	140	< 660	< 620	3,700	8,200	170 B	1,690,000	NA	5,26,000 B	2,770	8
	10/18/2018	150 B	< 170	< 150	3,900	2,100	61 B	1,770,000	NA	725,000	3,890	2
	05/10/2019	97	< 83	< 77	1,600	51,600	456	1,900,000	NA	579,000	3,500	50.7
	09/14/2019	170	<330	<310	1,600	12,800	161	2,090,000	NA	724,000	3,400	12.4
	12/05/2019	170	5.5	40	2,600	1,310	51.9	1,920,000	NA	762,000	3,800	1.3
	08/19/2020	55,300 T8	<13.0	19.9	1,530	10,600	156	2,710,000	NA	945	5,060	0.178 T8
	11/06/2020	83.4 T8	<13.0	27.8	2,010	10,900	176	2,140,000	NA	652,000	3,870	10.4 T8
	03/20/2021	56.6 T8	9.14 J	39.4	3,920	8,780	150	2,160,000	NA	788,000	4,300	8.07 T8
MW-27-D2	01/13/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	1,300	38 B	NA	940 B	2,79,000 B	NA	NA
	07/05/2017	130	< 75	< 70	53	12,400	550	26,90,000 ^	NA	4,08,000 B	6,330	12.4
	08/27/2017	100	< 83	< 77	180	11,600	1,200 B	31,40,000 ^	NA	303,000	9,140	11.6
	10/12/2017	81	< 170	< 150	350	9,500	1,700 B	44,60,000 ^	NA	374,000	8,290	9.1
	07/13/2018	140	< 330	< 310	1,500	4,600	340 B	2,530,000	NA	3,63,000 B	7,510	4.6
	10/18/2018	130 B	< 170	< 150	1,200	2,800	940 B	3,580,000	NA	195,000	8,300	2.8
	05/10/2019	66	< 170	< 150	310	902	197	505,000	NA	599,000	4,100	0.14
	09/14/2019	150	< 170	< 150	1,200	4,080	272	1,120,000	NA	638,000	3,500	3.5
	12/05/2019	150	< 4.0	< 3.0	1,600	1,190	174	1,620,000	NA	526,000	3,600	1.1
	02/12/2020	110 B	< 4.0	< 3.0	910 B	1,920	230	1,940,000	NA	511,000	3,800	1.4

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	GC Volatiles - RSK-175				Inorganics			General Chemistry			
		Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
NYSDEC TOGS 1.1.1		NE	NE	NE	NE	300	300	20,000	NE	NE	250	NE
Units		mg/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	mg/L	ug/L	mg/L	mg/L
MW-27-D2 (cont.)	06/10/2020	**98.7 T8**	<13.0	<13.0	**1,100**	**887**	**97.6**	**1,880,000**	NA	**496,000**	**4,660**	<0.100 T8
	08/19/2020	**75,400 T8**	<13.0	<13.0	**876**	**747**	**199**	**2,470,000**	NA	**397**	**3,690**	<0.05 T8
	11/06/2020	**60.9 T8**	<13.0	<13.0	**408**	**1,360**	**996**	**3,260,000**	NA	**323,000**	**7,520**	<0.1 T8
	03/20/2021	**93.9 T8**	<13.0	<13.0	**907**	**10,600**	**1,610**	**4,090,000**	NA	**291,000**	**8,920**	**6.06 T8**
MW-28-D1	06/24/2016	NA	NA	NA	NA	**79**	**68 B**	NA	**667,000**	**7,45,000 B**	NA	NA
	07/28/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/05/2017	**51**	< 150	< 140	**290**	**3,600**	**67**	**418,000 ^**	NA	**457,000**	**3,120**	**3.6**
	08/27/2017	**15**	< 170	< 150	**1,000**	**740**	**19 B**	**10,40,000 ^**	NA	**393,000**	**3,310**	**0.74**
	10/11/2017	**3.8 J**	< 170	< 150	**520**	**950**	**27 B**	**998,000**	NA	**196,000**	**1,530**	**0.95**
	10/17/2018	**8.9 B**	< 330	< 310	**1,500**	**980**	**22 B**	**386,000**	NA	**102,000**	**945**	**0.98**
	05/09/2019	**120**	< 660	< 620	**1,300**	**2,480**	**89**	**1,940,000**	NA	**667,000**	**3,300**	**1.9**
	09/13/2019	**160**	<170	<150	**1,600**	**511**	**63.1**	**1,970,000**	NA	**735,000**	**2,900**	<0.10
	12/05/2019	**75**	**33**	**15**	**2,500**	**169**	**10.4 J**	**874,000**	NA	**337,000**	**1,800**	<0.10
	02/11/2020	**73 B**	**25**	**11**	**1,800 B**	**253**	**49.4**	**1,160,000**	NA	**495,000**	**1,900**	<0.10
	06/09/2020	**26.5 T8**	**12.2 J**	<13.0	**1,140**	**226**	**47.8**	**1,360,000**	NA	**472,000**	**2,570**	<0.050 T8
	08/19/2020	**23,000 T8**	<13.0	<13.0	**361**	**167**	**57.7**	**1,410,000**	NA	**496**	**2,490**	**0.0216 JT8**
	11/06/2020	**73.8 T8**	**46.5**	<13.0	**4,740**	**54.8 J**	**51.3**	**1,540,000**	NA	**548,000**	**3,110**	<0.05 T8
MW-28-D2R	06/24/2016	NA	NA	NA	NA	**52,800**	**1,100 B**	NA	**182**	**182,000**	NA	NA
	07/28/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	07/05/2017	**120**	< 7.5	< 7.0	**67**	**6,800**	**340**	**38,10,000 ^**	NA	**334,000**	**9,090**	**6.7**
	08/27/2017	**120**	< 83	< 77	**62**	**6,000**	**500 B**	**5,340,000**	NA	**3,37,000 B**	**11,300 B**	**5.6**
	10/11/2017	**91**	< 170	< 150	**370**	**9,300**	**470 F1 B**	**4,750,000**	NA	**412,000**	**6,670**	**9.1**
	07/13/2018	**91**	< 330	< 310	**880**	**5,200**	**190 B**	**3,000,000**	NA	**4,68,000 B**	**4,010**	**5.2**
	10/17/2018	**140 B**	< 170	< 150	**240**	**2,200**	**710 B**	**4,670,000**	NA	**333,000**	**9,820**	**2.2**
	05/09/2019	**42**	< 330	< 310	**730**	**569**	**224**	**2,850,000**	NA	**385,000**	**7,600**	**0.37**
	09/13/2019	**160**	<7.5	<7.0	**620**	**450**	**241**	**2,700,000**	NA	**428,000**	**4,600**	**0.25**
	12/06/2019	**160**	< 4.0	<3.0	**310**	**463**	**989**	**4,430,000**	NA	**349,000**	**7,400**	**0.3**
	02/11/2020	**100 B**	< 4.0	< 3.0	**1,000 B**	**252**	**184**	**1,620,000**	NA	**276,000**	**3,600**	**0.25**
	06/09/2020	**90.0 T8**	<13.0	<13.0	**239**	**5,050**	**1,730**	**4,130,000**	NA	**339,000**	**18,800**	<0.100 T8
	08/19/2020	**90,300 T8**	<13.0	<13.0	**212**	**48,300**	**855**	**5,750,000**	NA	**343**	**9,550**	**43.8 T8**
	11/06/2020	**85.8 T8**	<13.0	<13.0	**618**	**5,890**	**370**	**2,760,000**	NA	**395,000**	**6,460**	<0.1 T8
	03/20/2021	**68 T8**	<13.0	<13.0	**416**	**4,220**	**1,190**	**5,210,000**	NA	**347,000**	**10,800**	**3.66 T8**
MW-29-D1	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**520**	**270 B**	NA	**4.3 J**	**5,67,000 B**	NA	NA
	10/26/2016	NA	NA	NA	NA	**220 B**	**250 B**	NA	**540**	**540,000**	NA	NA
	10/26/2016	NA	NA	NA	NA	< 50	**5.2 B**	NA	**547**	**547,000**	NA	NA
	07/05/2017	**180**	< 300	< 280	**680**	**460**	**350**	**9,51,000 ^**	NA	**556,000**	**1,610**	**0**
	08/27/2017	**150**	< 660	< 620	**11,000**	**2,400**	**150 B**	**24,70,000 ^**	NA	**5,60,000 B**	**1,580**	**2.4**
	10/12/2017	**140**	< 170	< 150	**5,200**	**3,400**	**300 B**	**8,93,000 ^**	NA	**619,000**	**1,530**	**3.4**
	07/13/2018	**180**	< 660	< 620	**15,000**	**1,300**	**340 B**	**988,000**	NA	**5,63,000 B**	**1,680**	**1.3**
	10/18/2018	**210 B**	< 1700	< 1500	**19,000**	**1,500**	**270 B**	**960,000**	NA	**535,000**	**1,550**	**1.5**
	05/10/2019	**190**	< 83	< 77	**9,300 E**	**1,450**	**470**	**839,000**	NA	**469,000**	**1,700**	**1.4**
	09/14/2019	**40**	<170	<150	**3,200**	**4,370**	**58.4**	**23,500**	NA	**40,100**	**58**	**4.3**
	12/06/2019	**28**	**1 J**	< 3.0	**1,100**	**673**	**32.1**	**75,900**	NA	**63,500**	**130**	**0.67**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	GC Volatiles - RSK-175				Inorganics			General Chemistry			
		Carbon Dioxide	Ethane	Ethene	Methane	Iron	Manganese	Sodium	Alkalinity, Bicarbonate as CaCO3	Alkalinity, Total as CaCO3	Chloride	Ferric Iron
NYSDEC TOGS 1.1.1		**NE**	**NE**	**NE**	**NE**	**300**	**300**	**20,000**	**NE**	**NE**	**250**	**NE**
Units		**mg/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**	**mg/L**	**ug/L**	**mg/L**	**mg/L**
MW-29-D1 (cont.)	02/12/2020	**15 B**	< 4.0	< 3.0	**340 B**	**2,040**	**131**	**105,000**	NA	**62,700**	**160**	**1.8**
	06/10/2020	**53.4 T8**	**5.33 J**	<13.0	**10,700**	**741**	**161**	**643,000**	NA	**273,000**	**1,050**	**0.379 T8**
	08/19/2020	**39,600 T8**	<13.0	<13.0	**6,710**	**1,360**	**172**	**574,000**	NA	**256**	**950**	**1.13 T8**
	11/06/2020	**31.7 T8**	**10.6 J**	<13.0	**10,700**	**199**	**146**	**460,000**	NA	**208,000**	**795**	<0.05 T8
	03/20/2021	**30.9 T8**	**9.15 J**	<13.0	**6,640**	**8,750**	**205**	**524,000**	NA	**285,000**	**975**	**4.55 T8**
MW-29-D2	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**64**	**150 B**	NA	**430 B**	**4,53,000 B**	NA	NA
MW-29-VD	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**390**	**62 B**	NA	**229 B**	**2,29,000 B**	NA	NA
MW-30-D1	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	**360 B**	**93 B**	NA	**841 B**	**8,41,000 B**	NA	NA
MW-30-D2	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	< 50	**110 B**	NA	**755 B**	**7,55,000 B**	NA	NA
MW-30-VD	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	**4,900 B**	**260 B**	NA	**713 B**	**7,13,000 B**	NA	NA
MW-31-D1R	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	**230 B**	**25 B**	NA	**221 B**	**2,21,000 B**	NA	NA
MW-31-D2R	01/14/2016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	**2,200 B**	**430 B**	NA	**508 B**	**5,08,000 B**	NA	NA

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	**Nitrogen, Nitrate as N**	**Nitrogen, Nitrite**	**Nitrate-Nitrite**	**Sulfate (SO4)**	**Sulfide**	**Total Organic Carbon (TOC)**
	NYSDEC TOGS 1.1.1	**NE**	**10,000**	**1**	**10,000**	**NE**	**NE**	**NE**
	Units	**ug/L**	**ug/L**	**mg/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
AMW-12	01/14/2016	NA	NA	NA	NA	NA	NA	NA
AMW-13-D1	06/24/2016	NA	NA	NA	NA	**170,000**	**11,900**	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA
AMW-13-D2	06/23/2016	NA	NA	NA	NA	**250,000**	**2,600**	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA
AMW-13-VD	06/23/2016	NA	NA	NA	NA	**1,860,000**	< 100	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA
AMW-14-D1	06/24/2016	NA	NA	NA	NA	**103,000**	**48,000**	NA
	07/26/2016	NA	NA	NA	NA	NA	NA	NA
	07/05/2017	**170 HF**	< 50	< 0.050	NA	**140,000**	**38,000**	**13,100 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**251,000**	**56,400**	**10,600 B**
	10/11/2017	< 100	< 50	< 0.050	NA	**1,24,000 B**	**50,400**	**23,600 B**
	07/12/2018	**120 HF**	< 50	< 0.050	NA	**172,000**	**50,800**	NA
	10/17/2018	**260 HF**	< 50	< 0.050	NA	**1,98,000 B**	**48,400**	NA
	05/10/2019	< 100 HF	**80 J**	<0.10	NA	**98,000**	**52,700**	**45,400 B**
	09/13/2019	**570 HF**	**14 J B**	<0.10	NA	**240,000**	**64,600**	**22,100**
	12/05/2019	< 100 HF	<100	<0.10	NA	**130,000**	**62,600**	**21,100**
	02/12/2020	**150 HF**	**17 J H**	< 0.1	NA	**280,000**	**64,700**	**18,400**
	06/10/2020	**1,470 T8**	**--**	**--**	<1,000	**219,000**	<50.0	**19,200**
	08/19/2020	**1,500 T8**	NA	NA	<2,000	**131,000**	**4.16**	**26,900**
	11/04/2020	**418 T8**	NA	NA	<100	**127,000**	**458**	**39,000**
	03/19/2021	**2,440 T8**	NA	NA	<2,000	**112,000**	**182**	**20,000 B**
AMW-14-D2	06/23/2016	NA	NA	NA	NA	**263,000**	**22,500**	NA
	07/26/2016	NA	NA	NA	NA	**NA**	NA	NA
	07/27/2016	NA	NA	NA	NA	**NA**	NA	NA
	08/27/2017	< 100	< 50	< 0.050	NA	**507,000**	**4,200**	**7,800 B**
	10/11/2017	< 100	< 50	< 0.050	NA	**2,10,000 B**	**27,200**	**11,600 B**
	07/12/2018	< 100	< 50	< 0.050	NA	**315,000**	**56,000**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**3,27,000 B**	**58,800**	NA
	05/10/2019	**1,100 HF**	**49 J**	<0.10	NA	**84,000**	**71,600**	**18,500 B**
	09/13/2019	**550 HF**	<100	**0.0092 J B**	NA	**120,000**	**60,800**	**19,200**
	12/05/2019	**290 HF**	<100	<0.10	NA	**260,000**	**51,200**	**18,300**
	02/12/2020	**850 HF**	< 100	<0.1	NA	**310,000**	**59,700**	**16,700**
	06/10/2020	**2,360 T8**	NA	NA	<1,000	**270,000**	<50.0	**14,500**
	08/19/2020	**847 T8**	NA	NA	<2,000	**182,000**	**1.01**	**16,200**
	11/05/2020	**322 T8**	NA	NA	<100	**176,000**	**8,060**	**16,800**
	03/19/2021	**904 T8**	--	--	<2,000	**321,000**	**79**	**15,300**
AMW-14-VD	06/23/2016	NA	NA	NA	NA	**1,780,000**	< 100	NA
	07/27/2016	NA	NA	NA	NA	**NA**	NA	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**1,830,000**	**800 J**	**3,400 B**
	08/27/2017	**4,700 HF**	< 50	< 0.050	NA	**2,000,000**	< 1,000	**4,000 B**
	10/11/2017	**1,600 HF**	< 50	< 0.050	NA	**1,890,000**	**800 J**	**4,500 B**
	07/12/2018	< 100	< 50	< 0.050	NA	**1,870,000**	**5,200 F1**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**19,20,000 B**	< 1,000	NA

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
	NYSDEC TOGS 1.1.1	NE	10,000	1	10,000	NE	NE	NE
	Units	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L
AMW-14-VD (cont.)	05/10/2019	**300 HF**	**94 J**	**0.076 J**	NA	**2,000,000**	<1,000	**18,300 B**
	09/13/2019	**1,400 HF**	**35 J B**	**0.027 J B**	NA	**1,700,000**	**830 J**	**8,500**
	12/05/2019	**130 HF**	< 100	**0.020 J B**	NA	**2,800,000**	**1,200**	**9,300**
	02/12/2020	**680 HF**	**21 J B**	**0.019 J B**	NA	**2,000,000**	< 1.0	**7,900**
	06/10/2020	**17,800 T8**	NA	NA	<100	**1,920,000**	<50.0	**7,270**
	08/20/2020	**14,900 T8**	NA	NA	<100	**1,850,000**	<0.05	**8,160**
	11/05/2020	**18,000 T8**	NA	NA	<100	**2,250,000**	**117**	**7,270**
	03/19/2021	**17,600 T8**	NA	NA	**82.0 J**	**1,960,000**	<50	**8,300**
AMW-15-D1	06/23/2016	NA	NA	NA	NA	**166,000**	**20,500**	NA
	07/27/2016	NA	NA	NA	NA	**NA**	NA	NA
	10/26/2016	NA	NA	NA	NA	**63,100**	**8,000**	NA
	10/26/2016	NA	NA	NA	NA	**164,000**	**36,000**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**1,640,000**	**42,000**	**9,400 B**
	08/27/2017	< 500	< 50	< 0.050	NA	**156,000**	**53,200**	**53,400 B**
	10/11/2017	< 200	< 50	< 0.050	NA	**1,89,000 B**	**41,600**	**36,200 B**
	10/17/2018	**120 HF**	**79**	< 0.050	NA	**188,000**	**56,000**	NA
	05/09/2019	<100 HF	**430 J**	**0.38 J**	NA	**200,000**	**41,400**	**36,800 B**
	09/13/2019	**2,200 HF**	< 100	**0.029 J**	NA	**380,000**	**31,100**	**38,500**
	12/05/2019	**340 HF**	< 100	<0.10	NA	**180,000**	**30,700**	**40,800**
	02/11/2020	**1,400 HF**	**17 J H**	**0.017 J H**	NA	**380,000**	**11,500**	**26,300**
	06/10/2020	**662 T8**	NA	NA	<1,000	**331,000**	**51.0**	**31,800**
	08/19/2020	**481 T8**	NA	NA	<10000	**202,000**	**25.6**	**40,600**
	11/04/2020	**658 T8**	NA	NA	<100	**138,000**	**514**	**32,100**
	03/19/2021	**324 T8**	NA	NA	<2,000	**115,000**	**1,630**	**27,400**
AMW-15-D2	06/23/2016	NA	NA	NA	NA	**166,000**	**1,800**	NA
	06/23/2016	NA	NA	NA	NA	**165,000**	**1,900 F1**	NA
	07/27/2016	NA	NA	NA	NA	**NA**	NA	NA
	10/26/2016	NA	NA	NA	NA	**243,000**	**12,800**	NA
	10/26/2016	NA	NA	NA	NA	**216,000**	**36,000**	NA
	07/05/2017	**170 HF**	< 50	< 0.050	NA	**269,000**	**34,000**	**10,300 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**237,000**	**58,000**	**10,900 B**
	10/11/2017	< 100	< 50	< 0.050	NA	**2,54,000 B**	**45,200**	**9,800 B**
	10/17/2018	< 100	< 50	< 0.050	NA	**2,62,000 B**	**48,000**	NA
	05/10/2019	**85 J HF**	**47 J**	**0.0070 J**	NA	**220,000**	**50,800**	**14,200 B**
	09/13/2019	**140 HF**	< 100	<0.10	NA	**330,000**	**55,100**	**14,800**
	12/05/2019	**280 HF**	< 100	<0.10	NA	**280,000**	**58,800**	**15,800**
	02/11/2020	**190 HF**	< 100	<0.10	NA	**380,000**	**54,600**	**13,700**
	06/09/2020	**1,460 T8**	NA	NA	<1,000	**301,000**	**186**	**12,000**
	08/19/2020	**5,440 T8**	NA	NA	<2000	**166,000**	**0.214**	**12,300**
	11/04/2020	**673 T8**	NA	NA	<100	**263,000**	**58**	**13,300**
	03/19/2021	**9,200 T8**	NA	NA	<2,000	**256,000**	**98**	**12,700**
AMW-15-D3	06/23/2016	NA	NA	NA	NA	**1,790,000**	NA	NA
	06/23/2016	NA	NA	NA	NA	**784,000**	NA	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA
	08/27/2017	< 500	< 50	< 0.050	NA	**495,000**	**16,400**	**34,300 B**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
NYSDEC TOGS 1.1.1		**NE**	**10,000**	**1**	**10,000**	**NE**	**NE**	**NE**
Units		**ug/L**	**ug/L**	**mg/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
AMW-15-D3 (cont.)	10/11/2017	< 100	< 50	< 0.050	NA	**897,000 B**	**39,200**	**7,200 B**
	07/13/2018	< 100	< 50	< 0.050	NA	**482,000**	**22,800**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**916,000**	**35,600**	NA
	05/10/2019	< 100	**42 J**	**0.056 J**	NA	**980,000**	**41,400**	**14,400 B**
	09/13/2019	**210 HF**	< 100	<0.10	NA	**300,000**	**55,100**	**11,000**
	12/05/2019	< 100	< 100	<0.10	NA	**470,000**	**58,800**	**12,300**
	02/11/2020	**470 HF**	< 500 H	< 0.5 H	NA	**290,000**	**23,200**	**13,700**
	06/09/2020	**526 T8**	NA	NA	<1,000	**534,000**	<50.0	**13,700**
	08/19/2020	**229 T8**	NA	NA	<500	**919,000**	**6.8**	**20,100**
	11/04/2020	**348 T8**	NA	NA	<100	**337,000**	**1,050**	**13,500**
	03/19/2021	**5,440 T8**	NA	NA	<500	**275,000**	**27.0 J**	**8,250**
AMW-15-VD	06/23/2016	NA	NA	NA	NA	**1,810,000**	< 100	NA
	07/27/2016	NA	NA	NA	NA	NA	NA	NA
	08/27/2017	**280 HF**	< 50	< 0.050	NA	**2,140,000**	< 1,000	**3,500 B**
	10/11/2017	< 100	< 50	< 0.050	NA	**20,70,000 B**	< 1,000	**3,400 B**
	07/13/2018	< 100	< 50	< 0.050	NA	**1,890,000**	**800 J**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**15,30,000 B**	< 1,000	NA
	05/10/2019	< 100*	< 100	**0.035 J**	NA	**2,000,000**	<1000	**6,800 B**
	09/13/2019	**500 HF**	< 100	**0.011 J**	NA	**1,800,000**	<1,000	**6,900**
	12/05/2019	**130 HF**	< 100 U F1	**0.019 JB**	NA	**2,800,000**	<1,000	**7,700**
	02/11/2020	**370 HF**	< 500 H	< 0.5 H	NA	**2,000,000**	< 1.0	**6,500**
	06/09/2020	**6,390 T8**	NA	NA	<100	**1,990,000**	<50.0	**6,450 B**
	08/19/2020	**52,800 T8**	NA	NA	<500	**1,970,000**	<0.05	**7,560**
	11/04/2020	**4,880 T8**	NA	NA	<100	**2,270,000**	**144**	**8,040 B**
	03/19/2021	**4,850 T8**	NA	NA	<2,000	**1,990,000**	**<50**	**8,970**
AMW-3	01/13/2016	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**970,000**	**5,300**	NA
AMW-7R	01/12/2016	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**82,300**	**5,200**	NA
	07/11/2018	**320 HF**	< 50	< 0.050	NA	**41,900**	**3,800**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**22,600 B**	**1,600**	NA
	05/10/2019	< 100 HF	< 100	**0.023 J**	NA	**82,000 F1**	<1000	**19,800**
	09/14/2019	**840 HF**	<100	**0.015 J B**	NA	**49,000**	**1,200**	**20,800**
	12/06/2019	**100 HF**	**25 J B**	**0.017 J**	NA	**84,000**	**1,900**	**88,400**
	02/12/2020	**1700 HF**	**23 J B**	**0.02 J B**	NA	**75,000**	**10,400**	**19,800**
	06/09/2020	**11,300 T8**	NA	NA	<100	**68,600**	<50.0	**20,500**
	08/19/2020	**11200 T8**	NA	NA	<500	**96,200**	**0.062**	**28,900**
	11/06/2020	**16,000 T8**	NA	NA	<100	**37,600**	<50	**23,500**
	03/19/2021	**12,100 T8**	NA	NA	<100	**115,000**	<50	**24,300**
ASB-2	06/06/2016	NA	NA	NA	NA	NA	NA	NA
ASB-3	06/08/2016	NA	NA	NA	NA	NA	NA	NA
ASB-4	06/07/2016	NA	NA	NA	NA	NA	NA	NA
ASB-5	06/02/2016	NA	NA	NA	NA	NA	NA	NA
ASB-7	06/02/2016	NA	NA	NA	NA	NA	NA	NA

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Table 3
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Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
	NYSDEC TOGS 1.1.1	NE	10,000	1	10,000	NE	NE	NE
	Units	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L
MW-18R	06/22/2016	NA	NA	NA	NA	**27,800**	< 100	NA
	07/11/2018	**110 HF**	< 50	< 0.050	NA	**120,000**	**12,200**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**20,000 B**	**11,600**	NA
	09/14/2019	**3,500 HF**	<100	**0.024 J B**	NA	**86,000**	**14,800**	95,400
	12/05/2019	**0.28 HF**	**30 JB**	**0.029 J**	NA	**74,000**	**15,900**	**123,000**
	02/12/2020	**150 H F**	**160 B**	**0.053 J B**	NA	**14,000**	**910 J**	**55,000**
	06/09/2020	**5,360 T8**	NA	NA	<1,000	**87,100**	**70.0**	**57,700**
	03/19/2021	**547 T8**	NA	NA	<2,000	**48,700**	**55.0**	**61,100**
MW-23-D1R	10/26/2016	NA	NA	NA	NA	**148,000**	**6,400**	NA
	10/26/2016	NA	NA	NA	NA	**156,000**	**13,600**	NA
	01/12/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/20/2016	NA	NA	NA	NA	**180,000**	**16,900 F1**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**259,000**	**8,400**	**16,100 B**
	08/27/2017	**2,000 HF**	**23 J H**	< 0.050	NA	**173,000**	**15,400**	**17,300 B**
	10/12/2017	< 100	< 50	< 0.050	NA	**1,78,000 B**	**26,800**	**15,400 B**
	07/12/2018	**260 HF**	< 50	< 0.050	NA	**149,000**	**28,800**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**177,000**	**25,200**	NA
	09/13/2019	**330 HF**	**26 J B**	**0.017 J B**	NA	**190,000**	**10,300**	20,800
	12/05/2019	**260 HF**	**37 JB**	**0.018 J**	NA	**130,000**	**3,500**	**22,300**
	02/11/2020	**120 HF**	**99 J H**	**0.018 J H**	NA	**130,000**	**8,800**	**7,500**
	06/10/2020	**1,460 T8**	NA	NA	<1,000	**213,000**	**39.0 J**	**18,200**
	08/19/2020	**4,880 T8**	NA	NA	<2,000	**111,000**	<0.05	**21,600**
	11/05/2020	**3,600 T8**	NA	NA	405	**121,000**	<50	**20,200**
	03/19/2021	**2,600 T8**	NA	NA	**275**	**234,000**	**414 J6**	**15,200**
MW-23-D2R	01/12/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/20/2016	NA	NA	NA	NA	**317,000**	**700**	NA
	07/05/2017	**170 HF**	< 50	< 0.050	NA	**861,000**	**29,600**	**5,200 B**
	08/27/2017	< 100	**37 J H**	< 0.050	NA	**665,000**	**36,200**	**6,100 B**
	10/12/2017	< 100	< 50	< 0.050	NA	**4,78,000 B**	**20,000**	**9,700 B**
	07/12/2018	**240 HF**	**38 J**	**0.0045 J**	NA	**290,000**	**10,900**	**20,700 B**
	05/09/2019	**240 HF**	**38 J**	**0.0045 J**	NA	**290,000**	**10,900**	**20,700 B**
	09/13/2019	**4,100 HF**	**17 J B**	**0.025 J B**	NA	**160,000**	**34,100**	**17,100**
	12/05/2019	< 100	**69 JB**	**0.051 J**	NA	**160,000**	**3,800**	**18,900**
	08/19/2020	**2,780 T8**	NA	NA	<500	**229,000**	**0.092**	**12,700**
	11/05/2020	**6,430 T8**	NA	NA	<100	**202,000**	<50	**11,700**
	03/18/2021	**1,120 T8**	NA	NA	<2,000	**336,000**	**86**	**11,600**
MW-24-D1R	01/13/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/21/2016	NA	NA	NA	NA	**189,000**	**79,300**	NA
	10/26/2016	NA	NA	NA	NA	**217,000**	**64,000 F1**	NA
	10/26/2016	NA	NA	NA	NA	**248,000**	**60,000**	NA
	10/26/2016	NA	NA	NA	NA	**219,000**	**56,000**	NA
	07/12/2018	< 100	< 50	< 0.050	NA	**200,000**	**66,400**	NA
	10/16/2018	< 100	< 50	< 0.050	NA	**75,300**	**56,400**	NA
	05/09/2019	**860 HF**	**63 J**	**0.014 J**	NA	**250,000**	**41,400**	**15,400 B**
	09/13/2019	**230 HF**	<100 [<100]	**0.015 J [<0.10]**	NA	**3,20,000 [2,00,000]**	**29,200 [75,900]**	**36,100 [34,900]**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
	NYSDEC TOGS 1.1.1	NE	10,000	1	10,000	NE	NE	NE
	Units	ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L
MW-24-D1R (cont.)	12/05/2019	**290 HF**	**150 B** [< 100]	**0.17 B**	NA	**3,50,000 [1,30,000]**	**22,400 [92,800]**	**50,900 [25,900]**
	02/11/2020	< 100 **[170 H F]**	**16 J H [< 50]**	< 0.1 [< 0.5]	NA	**3,80,000 [3,40,000]**	**43,300 [66,900]**	**35,500 [29,600]**
	06/09/2020	**270 T8 [669 T8]**	NA	NA	<1,000 [<1,000]	**2,16,000 [2,73,000]**	**129** [<50.0]	**31,100 [21,600]**
	08/19/2020	**220 T8 [243 T8]**	NA	NA	<10,000 [<2,000]	**2,04,000 [1,61,000]**	**0.58 [1.53]**	**36,000 [29,600]**
	11/05/2020	**184 T8 [384 T8]**	NA	NA	<100 [<100]	**189,000 [248,000]**	**160 [<50]**	**36,700 [35,000]**
	03/19/2021	**256 T8 [345 T8]**	NA	NA	<2,000 [<2,000]	**191,000 [165,000]**	**77.0 [193]**	**36,300 [37,800]**
MW-24-D2	01/13/2016	NA	NA	NA	NA	**NA**	NA	NA
	01/13/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/21/2016	NA	NA	NA	NA	**270,000**	**92,200**	NA
	10/25/2016	NA	NA	NA	NA	**374,000**	**48,000**	NA
	10/25/2016	NA	NA	NA	NA	**270,000**	**64,000**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**541,000**	**84,000**	**12,500 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**346,000**	**61,800**	**11,600 B**
	10/11/2017	< 100	< 50	< 0.050	NA	**2,98,000 B**	**56,400**	**10,800 B**
	07/12/2018	< 100	**51 H**	**0.020 J H**	NA	**28,000**	**800 J**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**29,900**	**800 J**	NA
	05/09/2019	< 100 HF	**18 J**	**0.038 J**	NA	**9,100**	< 1,000	**6,300 B**
	09/13/2019	**160 HF**	**1,200**	**0.013 J**	NA	**9,900**	< 1,000	**6,000**
	12/05/2019	**180 HF**	< 100	< 0.1	NA	**55,000**	**12,100**	**59,700**
	02/11/2020	**220 HF**	**30 J H**	**0.016 J**	NA	**48,000**	< 1.0	**23,200**
	06/09/2020	**492 T8**	NA	NA	**63.3 J**	**89,200**	<50.0	**13,700**
	08/18/2020	**1,160 T8**	NA	NA	<500	**98,300**	<0.05	**15,800**
	11/05/2020	**1,050 T8**	NA	NA	<100	**85,500**	<50	**19,200**
	03/19/2021	**815 T8**	NA	NA	<2,000	**174,000**	**27 J**	**36,600**
MW-24-VDR	07/12/2018	**100 HF**	< 50	< 0.050	NA	**1,640,000**	< 1,000	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**1,300,000**	< 1,000	NA
	05/09/2019	< 100 HF	**10 J**	**0.063 J**	NA	**1,700,000**	<1,000	**7,700 B**
	09/13/2019	**700 HF**	<100	**0.010 J**	NA	**720,000**	**1,200**	**7,700**
	12/05/2019	< 100 HF	< 100	< 0.10	NA	**3,100,000**	< 1,000	**4,800**
	02/11/2020	**2000 HF**	36 J H	**0.013 J**	NA	**2,000,000**	< 1,000	**8,200**
	06/09/2020	**43,100 T8**	NA	NA	<100	**1,580,000**	<50.0	**7,030**
	08/18/2020	**32,100 T8**	NA	NA	<100	**1,510,000**	<0.05	**8,400**
	11/05/2020	**42,400 T8**	NA	NA	<100	**1,770,000**	<50	**6,760 B**
	03/19/2021	**32,400 T8**	NA	NA	<100	**2,020,000**	<50	**11,300**
MW-26-D1	01/12/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/22/2016	NA	NA	NA	NA	**139,000**	**70,600 F1**	NA
	10/25/2016	NA	NA	NA	NA	**252,000**	**48,000**	NA
	10/25/2016	NA	NA	NA	NA	**131,000**	**56,000**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**313,000**	**44,000**	**9,100 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**203,000**	**43,200**	**10,800 B**
	10/11/2017	< 100	**600**	**5.1**	NA	**69,200**	< 1,000	**22,900 B**
	07/13/2018	< 100	< 50	< 0.050	NA	**237,000**	**44,800**	NA
	10/17/2018	< 100	< 50	< 0.050	NA	**2,64,000 B**	**28,400**	NA
	09/13/2019	**170 HF**	**12 J B**	**0.012 J B**	NA	**98,000**	**23,600**	**33,000**
	12/06/2019	**110 HF**	**30 JB**	**0.010 J**	NA	**230,000**	**21,000**	**31,600**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
NYSDEC TOGS 1.1.1		NE	10,000	1	10,000	NE	NE	NE
Units		ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L
MW-26-D1 (cont.)	02/11/2020	**570 HF**	NA	NA	NA	**290,000**	NA	**32,800**
	06/10/2020	**557 T8**	NA	NA	<1,000	**343,000**	**123**	**28,100**
	08/19/2020	**336 T8**	NA	NA	<500	**185,000**	**125**	**31,500**
	11/06/2020	**228 T8**	NA	NA	<100	**203,000**	<50	**31,100**
MW-26-D2	01/12/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/22/2016	NA	NA	NA	NA	**1,200,000**	**1,700**	NA
	10/25/2016	NA	NA	NA	NA	**NA**	**40,000**	NA
	10/25/2016	NA	NA	NA	NA	**382,000**	**36,000**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**1,580,000**	**24,400**	**4,300 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**1,100,000**	**16,000**	**4,800 B**
	10/11/2017	< 100	**28 J**	< 0.050	NA	**1,100,000**	**26,800**	**8,800 B**
	10/17/2018	< 100	< 50	< 0.050	NA	**3,61,000 B**	**25,600**	NA
	05/09/2019	< 100 HF	**21 J**	< 0.10	NA	**350,000**	**54,600**	**14,600 B**
	09/13/2019	<100 HF	<100	**0.0071 J B**	NA	**280,000**	**57,000**	**14,900**
	12/06/2019	**270 HF**	<100	< 0.10	NA	**280,000**	**45,600**	**13,700**
	02/11/2020	< 100 HF	**18 J H**	< 0.1	NA	**420,000**	**28,200**	**15,400**
	06/10/2020	**279 T8**	NA	NA	<1,000	**368,000**	**282**	**13,200 B**
	08/19/2020	**160 T8**	NA	NA	<500	**288,000**	**6.6**	**17,800**
MW-26-VD	01/13/2016	NA	NA	NA	NA	**NA**	**NA**	NA
	06/22/2016	NA	NA	NA	NA	**497,000**	**6,000**	NA
MW-27-D1R	01/13/2016	NA	NA	NA	NA	**NA**	**NA**	NA
	06/21/2016	NA	NA	NA	NA	**290,000**	**97,300**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**308,000**	**14,400**	**13,700 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**699,000**	**1,400**	**14,400 B**
	07/13/2018	**170 HF**	< 50	< 0.050	NA	**157,000**	**63,200**	NA
	10/18/2018	**91 J HF**	< 50	< 0.050	NA	**183,000**	**63,200**	NA
	05/10/2019	**910 HF**	**19 J**	**0.010 J**	NA	**260,000**	**37,600**	**17,600**
	09/14/2019	**420 HF**	<100	**0.0084 J B**	NA	**160,000**	**53,200**	**17,600**
	12/05/2019	< 100	**45 JB**	< 0.10	NA	**200,000**	**45,600**	**16,600**
	08/19/2020	**10,400 T8**	NA	NA	<2,000	**310,000**	**93.7**	**18,700**
	11/06/2020	**552 T8**	NA	NA	<100	**170,000**	<50	**14,400 B**
	03/20/2021	**703 T8**	NA	NA	<2,000	**171,000**	**79.0**	**18,800 B**
MW-27-D2	01/13/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/21/2016	NA	NA	NA	NA	**49,200**	**160**	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**808,000**	**12,800**	**6,300 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**1,300,000**	**16,600**	**4,800 B**
	10/12/2017	**450 HF**	**40 J**	< 0.050	NA	**11,20,000 B**	**8,800**	**4,700 B**
	07/13/2018	< 100	< 50	< 0.050	NA	**844,000**	**10,800**	NA
	10/18/2018	< 100	< 50	< 0.050	NA	**1,250,000**	**7,200**	NA
	05/10/2019	**760 HF**	**29 J**	< 0.10	NA	**250,000**	**24,400**	**15,200**
	09/14/2019	**630 HF**	**26 J B**	**0.013 J B**	NA	**250,000**	**32,200**	**12,700**
	12/05/2019	**120 HF**	< 100	**0.011 J**	NA	**280,000**	**22,000**	**12,000**
	02/12/2020	**480 HF F1**	**31 J B**	**0.02 J B**	NA	**400,000**	**14,100**	**10,100**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
NYSDEC TOGS 1.1.1		**NE**	**10,000**	**1**	**10,000**	**NE**	**NE**	**NE**
Units		**ug/L**	**ug/L**	**mg/L**	**ug/L**	**ug/L**	**ug/L**	**ug/L**
MW-27-D2 (cont.)	06/10/2020	**4,450 T8**	NA	NA	<1,000	**485,000**	<50.0	**9,620**
	08/19/2020	**1,470 T8**	NA	NA	<100 J6	**367,000**	**0.047 J**	**8,900**
	11/06/2020	**12,600 T8**	NA	NA	461	**1,100,000**	<50	**6,090**
	03/20/2021	**4,550 T8**	NA	NA	**53.7 J J6**	**1,120,000**	<50	**6,900**
MW-28-D1	06/24/2016	NA	NA	NA	NA	**155,000**	**54,400**	NA
	07/28/2016	NA	NA	NA	NA	NA	NA	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**340,000**	**4,000**	**13,000 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**349,000**	**18,200**	**14,400 B**
	10/11/2017	< 100	< 50	< 0.050	NA	**196,000**	**32,800**	**23,900 B**
	10/17/2018	< 100	**76**	**0.044 J**	NA	**231,000**	**7,200**	NA
	05/09/2019	**600 HF**	< 100	**0.016 J**	NA	**170,000**	**45,200**	**12,900 B**
	09/13/2019	**560 HF**	<100	**0.014 J B**	NA	**81,000**	**51,400**	**14,800**
	12/05/2019	**100 HF**	**21 JB**	**0.017 J**	NA	**280,000**	**1,600**	**17,300**
	02/11/2020	**280 HF**	**22 J H**	**0.018 J**	NA	**290,000**	**50,900**	**17,700**
	06/09/2020	**522 T8**	NA	NA	<100	**343,000**	<50.0	**15,300 B**
	08/19/2020	**145 T8**	NA	NA	<100	**304,000**	<0.05	**31,300**
	11/06/2020	**160 T8**	NA	NA	<100	**178,000**	190	**16,500**
MW-28-D2R	06/24/2016	NA	NA	NA	NA	**1,080,000**	< 100	NA
	07/28/2016	NA	NA	NA	NA	**NA**	NA	NA
	07/05/2017	**92 J HF**	< 50	< 0.050	NA	**1,620,000**	**2,400**	**4,000 B**
	08/27/2017	**420 HF**	< 50	< 0.050	NA	**1,370,000**	**4,000**	**4,800 B**
	10/11/2017	**160 HF**	< 50	< 0.050	NA	**938,000**	**3,600**	**4,500 B**
	07/13/2018	< 100	< 50	< 0.050	NA	**432,000**	**11,200**	NA
	10/17/2018	< 100	**260**	< 0.050	NA	**1,330,000**	**3,200**	NA
	05/09/2019	**200 HF**	< 100	**0.036 J**	NA	**870,000**	**10,900**	**9,400 B**
	09/13/2019	**200 HF**	**23 J B**	**0.020 J B**	NA	**530,000**	**6,100**	**8,800**
	12/06/2019	**160 HF**	**25 JB**	**0.015 J**	NA	**850,000**	**5,000**	**6,600**
	02/11/2020	**100 U HF**	**140 H**	**0.014 J**	NA	**440,000**	**11,500**	**8,300**
	06/09/2020	**6,540 T8**	NA	NA	**55.8 J**	**2,220,000**	<50.0	**5,920**
	08/19/2020	**4,540 T8**	NA	NA	<100	**1,140,000**	<0.05	**6,560**
	11/06/2020	**8,800 T8**	NA	NA	138	**618,000**	<50	**6,560**
	03/20/2021	**566 T8**	NA	NA	**217**	**1,270,000**	<50	**6,950**
MW-29-D1	01/14/2016	NA	NA	NA	NA	**NA**	NA	NA
	06/21/2016	NA	NA	NA	NA	**< 5000**	**230**	NA
	10/26/2016	NA	NA	NA	NA	**< 5000**	**1,200**	NA
	10/26/2016	NA	NA	NA	NA	**1,800 J**	< 2,000	NA
	07/05/2017	< 100	< 50	< 0.050	NA	**< 1,00,000**	**800 J**	**13,500 B**
	08/27/2017	< 100	< 50	< 0.050	NA	**< 1,00,000**	**101,000**	**12,900 B**
	10/12/2017	< 100	< 50	< 0.050	NA	**< 40,000**	**1,200**	**11,300 B**
	07/13/2018	< 100	< 50	< 0.050	NA	**< 40,000**	**1,200**	NA
	10/18/2018	< 100	< 50	< 0.050	NA	**13,600 J**	**800 J**	NA
	05/10/2019	**63 J HF**	< 100	**0.026 J**	NA	**13,000**	**1,100**	**14,200**
	09/14/2019	**110 HF**	<100	**0.016 J B**	NA	**6,900**	**830 J**	**10,000**
	12/06/2019	< 100	**53 J B**	**0.036 J**	NA	**16,000**	< 1,000	**29,500**

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Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Location ID	Date Sampled	General Chemistry						
		Ferrous Iron	Nitrogen, Nitrate as N	Nitrogen, Nitrite	Nitrate-Nitrite	Sulfate (SO4)	Sulfide	Total Organic Carbon (TOC)
NYSDEC TOGS 1.1.1		NE	10,000	1	10,000	NE	NE	NE
Units		ug/L	ug/L	mg/L	ug/L	ug/L	ug/L	ug/L
MW-29-D1 (cont.)	02/12/2020	**230 HF**	`	**0.018 J B**	NA	**17,000**	**910 J**	**3,400**
	06/10/2020	**362 T8**	NA	NA	<100	**72,600**	<50.0	**16,400**
	08/19/2020	**232 T8**	NA	NA	**107**	**60,500**	**0.031 J**	**18,700**
	11/06/2020	**204 T8**	NA	NA	**<100**	**43,800**	<50	**17,200**
	03/20/2021	**4,200 T8**	NA	NA	<2,000	**44,500**	<50	**17,700 B**
MW-29-D2	01/14/2016	NA	NA	NA	NA	NA	**NA**	NA
	06/21/2016	NA	NA	NA	NA	**939,000**	**17,000**	NA
MW-29-VD	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	06/21/2016	NA	NA	NA	NA	**1,890,000**	< 100	NA
MW-30-D1	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	NA	**92,700**	NA
MW-30-D2	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	NA	**64,100 F1**	NA
MW-30-VD	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	NA	< 100	NA
MW-31-D1R	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	NA	**600**	NA
MW-31-D2R	01/14/2016	NA	NA	NA	NA	NA	NA	NA
	06/22/2016	NA	NA	NA	NA	NA	**2,800**	NA

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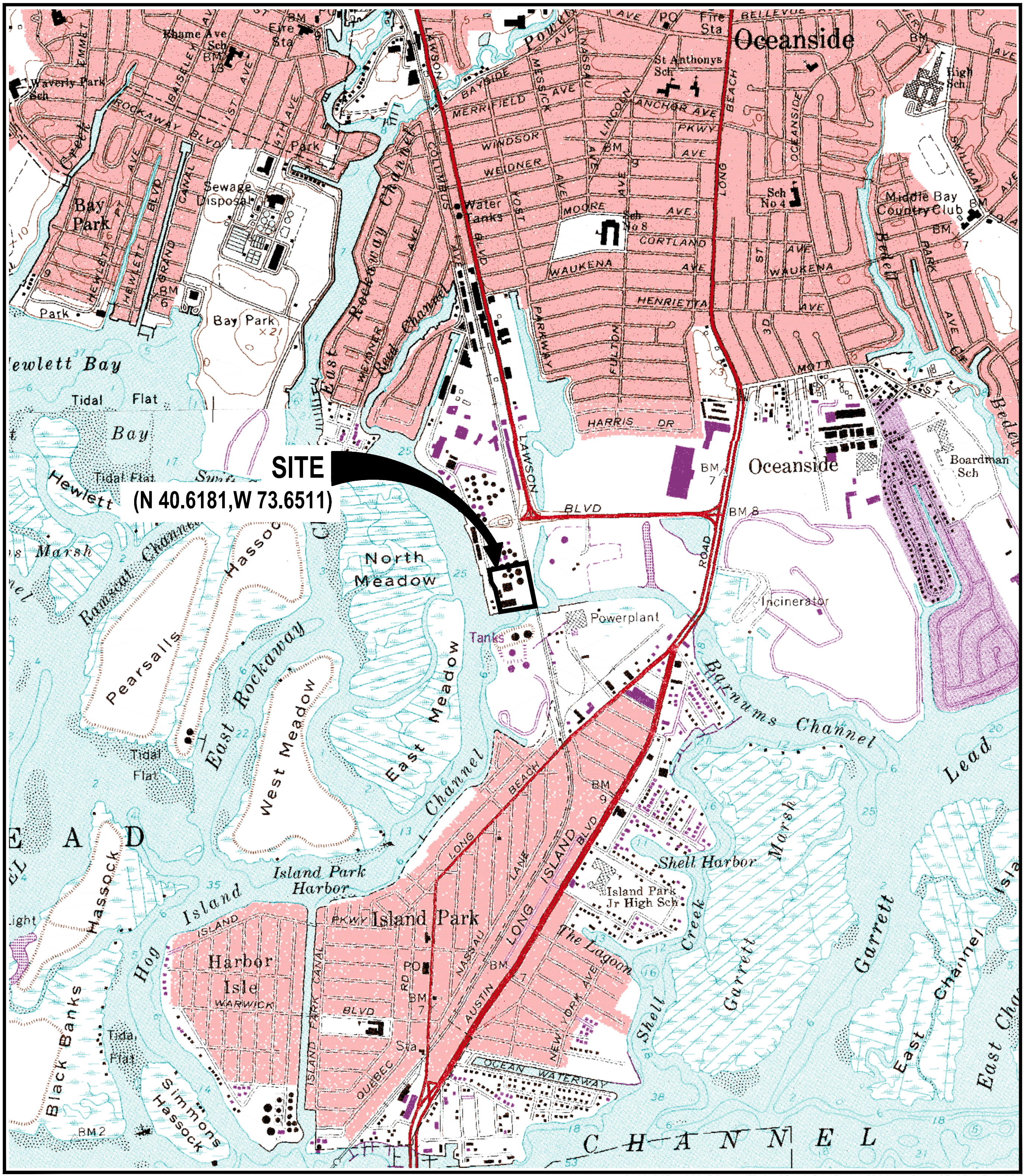
Table 3
Historical Groundwater Analytical Results
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

Notes:
ID = Identification
NYSDEC = New York State Department of Environmental Conservation
TOGS = NYSDEC Technical and Operational Guidance Series ambient water quality standards and guidance values of June 1998
ug/L = micrograms per liter
Bolded values = compound was detected
Shaded cells = concentration was above the TOGS
< = Less than indicated reporting limit
NE = Not established
CaCO3 '= calcium carbonate
J = Analyte detected at a level less than the Reporting Limit and greater than or equal to the Method Detection Limit. Concentrations within this range are estimated.
J0 = The identification of the analyte is acceptable, but the reported concentration is an estimate. The calibration metmethod criteria.
J4 = The associated batch QC was outside the established quality control range for accuracy.
J6 = The sample matrix interfered with the ability to make any accurate determination; spike value is low
T8 = Sample(s) received past/too close to holding time expiration.
HF = Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
H = Sample was prepped or analyzed beyond the specified holding time.
B = Compound was found in the blank and sample.
F1 = Matrix spike and/or matrix spike duplicate recovery was outside acceptance limits.
E = Result exceeded calibration range
C3 = The reported concentration is an estimate. The continuing calibration standard associated with this data responded low. Method sensitivity check is acceptable.
C5 = The reported concentration is an estimate. The continuing calibration standard associated with this data responded high. Data is likely to show a high bias concerning the result.
[ ] = Duplicate analysis results
D = Sample was diluted due to high concentration of target analytes.
* = LCS or LCSD was above the control limits.
^ = Instrument related QC was outside acceptance limits.
-- = Not available

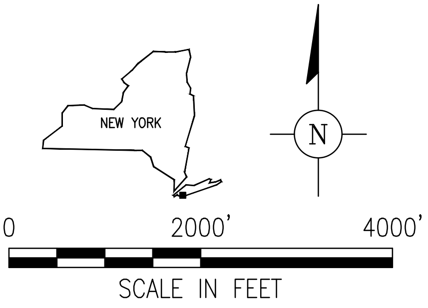
Table 4
Groundwater Monitoring Schedule
Chevron Facility #6518040
Former Gulf Oil Terminal
Oceanside, Township of Hempstead, New York

				Sample and analyze for:									
MW ID	Diameter (inches)	Screen Length (feet)	Installed Total Depth (feet BTIC)	VOCs USEPA Method 8260C	Total Iron, Sodium & Manganese USEP Method 6010C	Nitrite and Nitrate USEPA Method 353.2	Alkalinity	Sulfate & Chloride	Sulfide	Total Organic Carbon	Ferric and ferrous iron	Carbon dioxide	Ethane, Ethene and Methane
AMW-7R	2	4.2-14.22	14.42	X	X	X	X	X	X	X	X	X	X
AMW-14-D1	2	22-32	32.00	X	X	X	X	X	X	X	X	X	X
AMW-14-D2	2	32-42	42.00	X	X	X	X	X	X	X	X	X	X
AMW-14-VD	2	64-74	75.00	X	X	X	X	X	X	X	X	X	X
AMW-15-D1	2	23.5-33.5	36.19	X	X	X	X	X	X	X	X	X	X
AMW-15-D2	2	40-50	52.00	X	X	X	X	X	X	X	X	X	X
AMW-15-VD	2	60-70	72.00	X	X	X	X	X	X	X	X	X	X
AMW-15-D3	2	30-40	42.00	X	X	X	X	X	X	X	X	X	X
MW-18R	2	2-7	7.00	X	X	X	X	X	X	X	X	X	X
MW-23-D1R	2	21-31	25.81	X	X	X	X	X	X	X	X	X	X
MW-23-D2R	2	35-45	17	X	X	X	X	X	X	X	X	X	X
MW-24-D1R	2	22.76-32.79	31.48	X	X	X	X	X	X	X	X	X	X
MW-24-D2	2	36-46	42	X	X	X	X	X	X	X	X	X	X
MW-24-VDR	2	63.76-73.78	73.98	X	X	X	X	X	X	X	X	X	X
MW-27-D1R	2	22.76-32.79	32.99	X	X	X	X	X	X	X	X	X	X
MW-27-D2	2	37-47	46.87	X	X	X	X	X	X	X	X	X	X
MW-29-D1	2	21-31	23.21	X	X	X	X	X	X	X	X	X	X
MW-26-D2	2	34-44	42.10	X	X	X	X	X	X	X	X	X	X
MW-28-D1	2	22-32	30.25	X	X	X	X	X	X	X	X	X	X
Total depth of wells being sampled:			738										
Blind Dup	Collect blind duplicate below at MW-24-D1R			X	X	X	X	X	X	X	X	X	X
Field Blank				X	X	X	X	X	X	X	X	X	X
Trip Blank				X									

FIGURES



MAP SOURCE: USGS 7.5 MINUTE QUADRANGLE 1979 LYNBROOK AND LAWRENCE, NEW YORK



FORMER GULF OIL TERMINAL
(CHEVRON FACILITY #6518040)
OCEANSIDE, NEW YORK
SITE MANAGEMENT PLAN

SITE LOCATION MAP

ARCADIS

FIGURE
1

CITY:SYRACUSE-NY DIV/GROUP:ENVCAD DB:G.STEINBERGER LD: PIC:A. HEBERT PM:B. MCCUNE TM:J.ROBERTSON LYR:ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0047517\0023\00001\DWG\47517N01.dwg LAYOUT: 1 SAVED: 9/26/2014 2:28 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: PDF-AP PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/16/2016 12:46 PM BY: HOWES, DAVID
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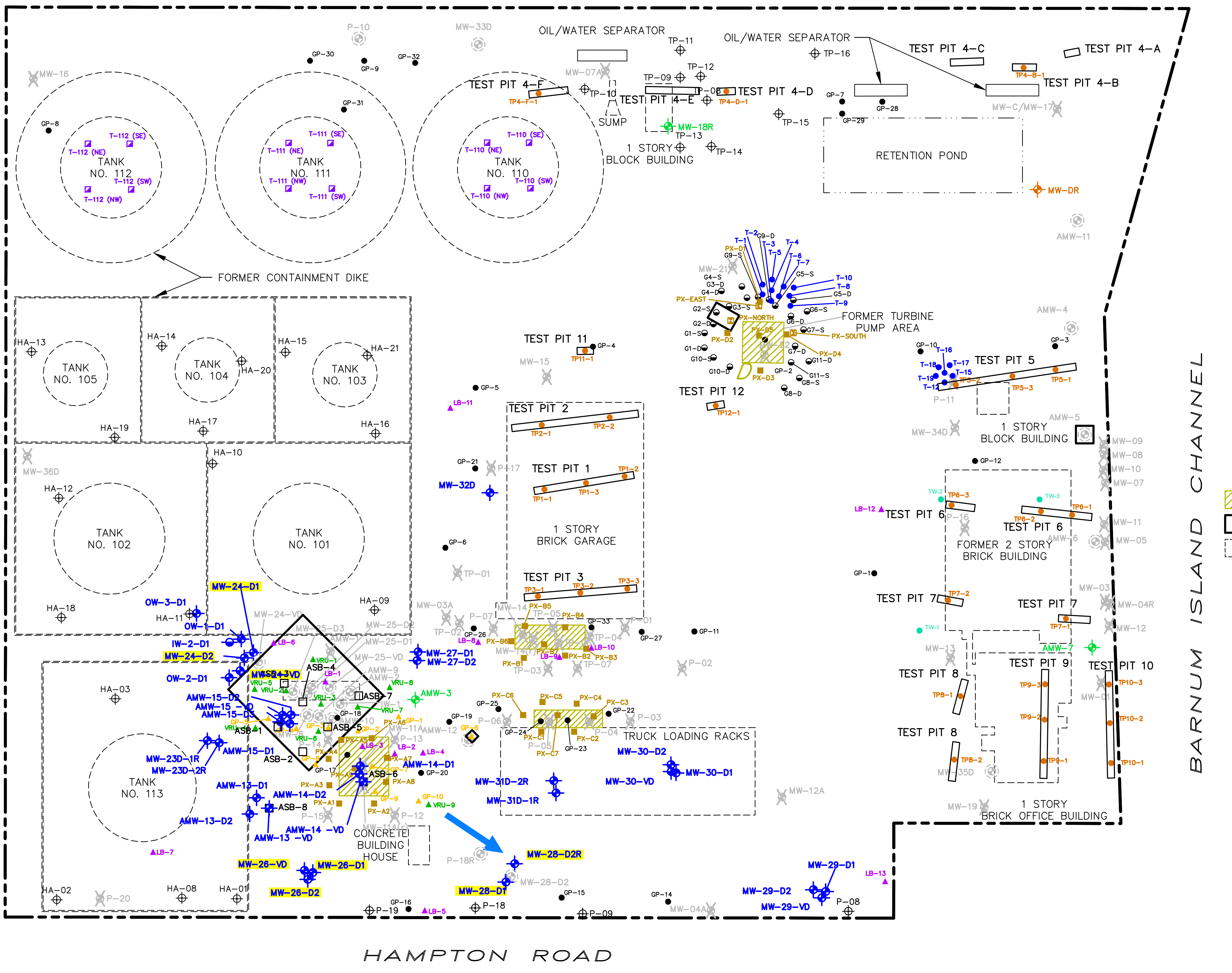
47517X02.TIF



LEGEND:

- ⊕ WATER TABLE MONITORING WELL
- ⊕ MEADOW MAT MONITORING WELL
- ⊕ LOWER SAND UNIT MONITORING WELL
- ⊖ LOWER SAND UNIT INJECTION WELL
- ◎ DECOMMISSIONED/DESTROYED MONITORING WELL
- ⊕ HISTORIC TEMPORARY PIEZOMETER
- ⊕ HISTORIC EXISTING MONITORING WELL
- ✕ HISTORIC ABANDONED/DESTROYED MONITORING POINT
- ● 2000 LBG GEOPROBE SOIL BORING LOCATION
- ▲ 2000 BBL SOIL BORING LOCATION
- ▲ 2002 BBL SOIL BORING LOCATION
- ■ 2002 BBL POST EXCAVATION BORING LOCATION
- ◪ 2003 LBG SOIL SAMPLING TANK LOCATION
- ▲ 2004 LANGAN SOIL BORING LOCATION
- ● 2004 CEDAR CREEK TEMPORARY WELL
- ◒ 2005 BBL BORING LOCATION
- ▣ 2005 BBL POST EXCAVATION BORING LOCATION
- ⊘ 2005 BBL PAIRED WELL LOCATION
- ● 2010 TEST PIT SOIL SAMPLE LOCATION
- ☐ 2016 SOIL BORING
- ▨ LIMITS OF 2003/2004 IRM EXCAVATIONS
- ▭ LIMITS OF 2013/2014 IRM EXCAVATIONS
- ⬚ HISTORICAL SITE FEATURE

NOTES:

1. SITE PLAN DERIVED FROM STORB, INC. DRAWING ENTITLED "PAVING PLAN–GULF OIL COMPANY–U.S., OCEANSIDE TERMINAL" AUGUST 7, 1976 AND LANGAN DRAWING ENTITLED "HISTORICAL SOIL AND GROUNDWATER SAMPLING PLAN MAY 11, 2007.
2. HISTORICAL SITE LAYOUT AND SAMPLE LOCATIONS ARE APPROXIMATE.
3. MONITORING WELL LOCATIONS SURVEYED BY AMERICAN ENGINEERING AND SURVEY.
4. REFER TO FIGURE 9 FOR STORM DRAINS, CATCH BASINS, AND ASSOCIATED PIPING DETAILS.

0 60' 120'
GRAPHIC SCALE

GULF OIL TERMINAL
(CHEVRON FACILITY #6518040)
OCEANSIDE, NEW YORK

SITE LAYOUT MAP

ARCADIS

FIGURE
2

C:\Users\JDLoving\ARCADIS\Environmental CAD Team - BIM360 - OneDrive Sync Location\AUS-CHEVRON-GULF OIL 6518040-OCEANSIDE New York\2022\01-In Progress\01-DWG\6518040_SITE PLAN_FIG 2.DWG LAYOUT: 2 SAVED: 9/20/2022 8:59 AM ACADVER: 23.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 9/20/2022 9:00 AM BY: LOVING, JEFF
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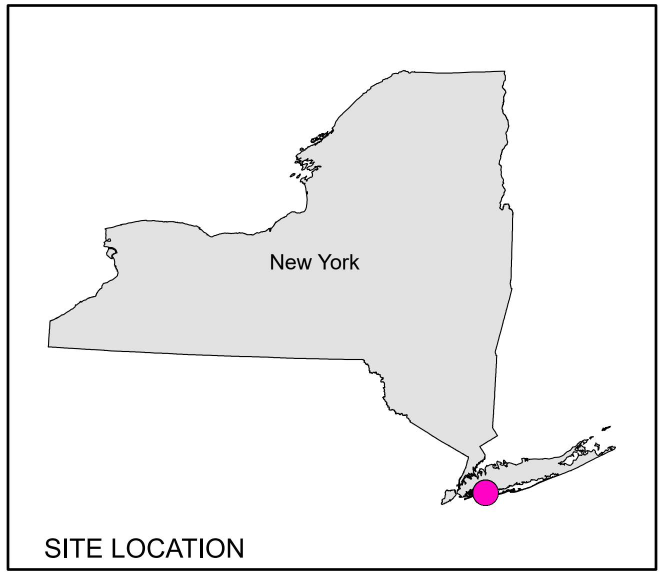

SITE LOCATION

LEGEND:

▭ PARCEL BOUNDARY

▭ SITE BOUNDARY

0 150 300 Feet

GRAPHIC SCALE

NOTES:

1. 2023 IMAGERY OBTAINED FROM GOOGLE EARTH PRO.
2. TAX PARCEL DATA DIGITIZED APPROXIMATELY FROM NASSAU COUNTY NEW YORK GIS PARCEL VIEWER AT : https://lrv.nassaucountyny.gov/

CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY

TAX PARCEL MAP

ARCADIS

FIGURE
3

T:_ENV\Chevron_Oceanside_NY\2025\SiteManagementPlan_Pro\Chevron_Oceanside_SiteManagementPlan.aprx 1/29/2025 3:05 PMLast Saved By: jrapp

CITY: SYRACUSE, NY DIV/GROUP: ENV/IM-DV DB: L FORAKER, R. ALLEN LD: PIC: J. VOGELEY PM: W. McCUNE TM: W. McCUNE LYR: ON=*;OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0047517\0023\00002\DWG\47517V04.DWG LAYOUT: 4 SAVED: 11/29/2016 2:56 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: C-LB-PDF-GMS PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/29/2016 3:00 PM BY: ALLEN, ROYCE
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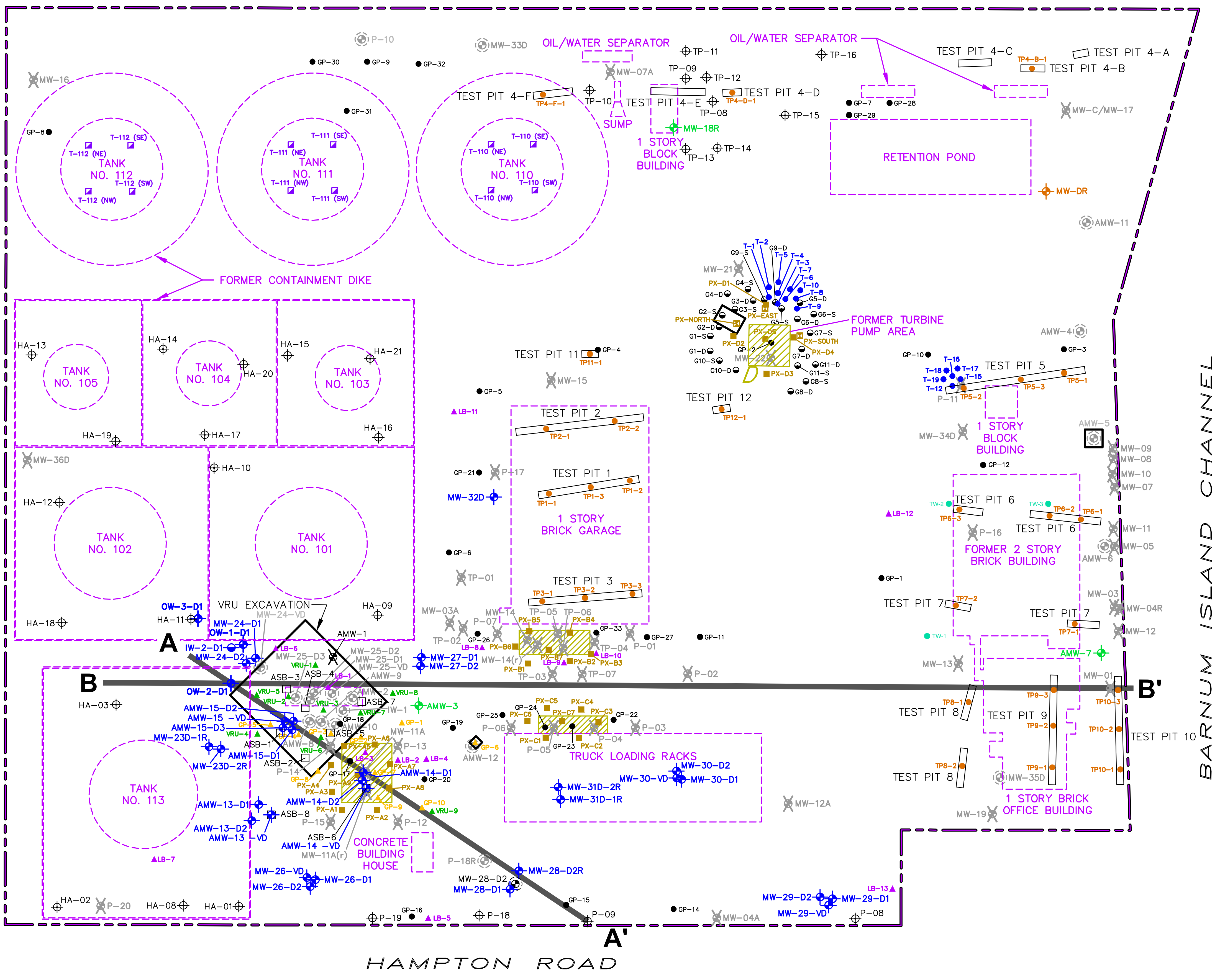


LEGEND:

⊕	WATER TABLE MONITORING WELL
⊕	MEADOW MAT MONITORING WELL
⊕	LOWER SAND UNIT MONITORING WELL
⊖	LOWER SAND UNIT INJECTION WELL
◎	DECOMMISSIONED/DESTROYED MONITORING WELL
⊕	HISTORIC TEMPORARY PIEZOMETER
⊕	HISTORIC EXISTING MONITORING WELL
✕	HISTORIC ABANDONED/DESTROYED MONITORING POINT
●	2000 LBG GEOPROBE SOIL BORING LOCATION
▲	2000 BBL SOIL BORING LOCATION
▲	2002 BBL SOIL BORING LOCATION
■	2002 BBL POST EXCAVATION BORING LOCATION
■	2003 LBG SOIL SAMPLING TANK LOCATION
▲	2004 LANGAN SOIL BORING LOCATION
●	2004 CEDAR CREEK TEMPORARY WELL
◐	2005 BBL BORING LOCATION
⊠	2005 BBL POST EXCAVATION BORING LOCATION
●	2005 BBL PAIRED WELL LOCATION
●	2010 TEST PIT SOIL SAMPLE LOCATION
☐	2016 SOIL BORING
▭	LIMITS OF 2003/2004 IRM EXCAVATIONS
▨	LIMITS OF 2013/2014 IRM EXCAVATIONS
A—A'	LINE OF CROSS SECTION

NOTES:

1. SITE PLAN DERIVED FROM STORB, INC. DRAWING ENTITLED "PAVING PLAN–GULF OIL COMPANY–U.S., OCEANSIDE TERMINAL" AUGUST 7, 1976 AND LANGAN DRAWING ENTITLED "HISTORICAL SOIL AND GROUNDWATER SAMPLING PLAN MAY 11, 2007.
2. HISTORICAL SITE LAYOUT AND SAMPLE LOCATIONS ARE APPROXIMATE.
3. MONITORING WELL LOCATIONS SURVEYED BY AMERICAN ENGINEERING AND SURVEY.

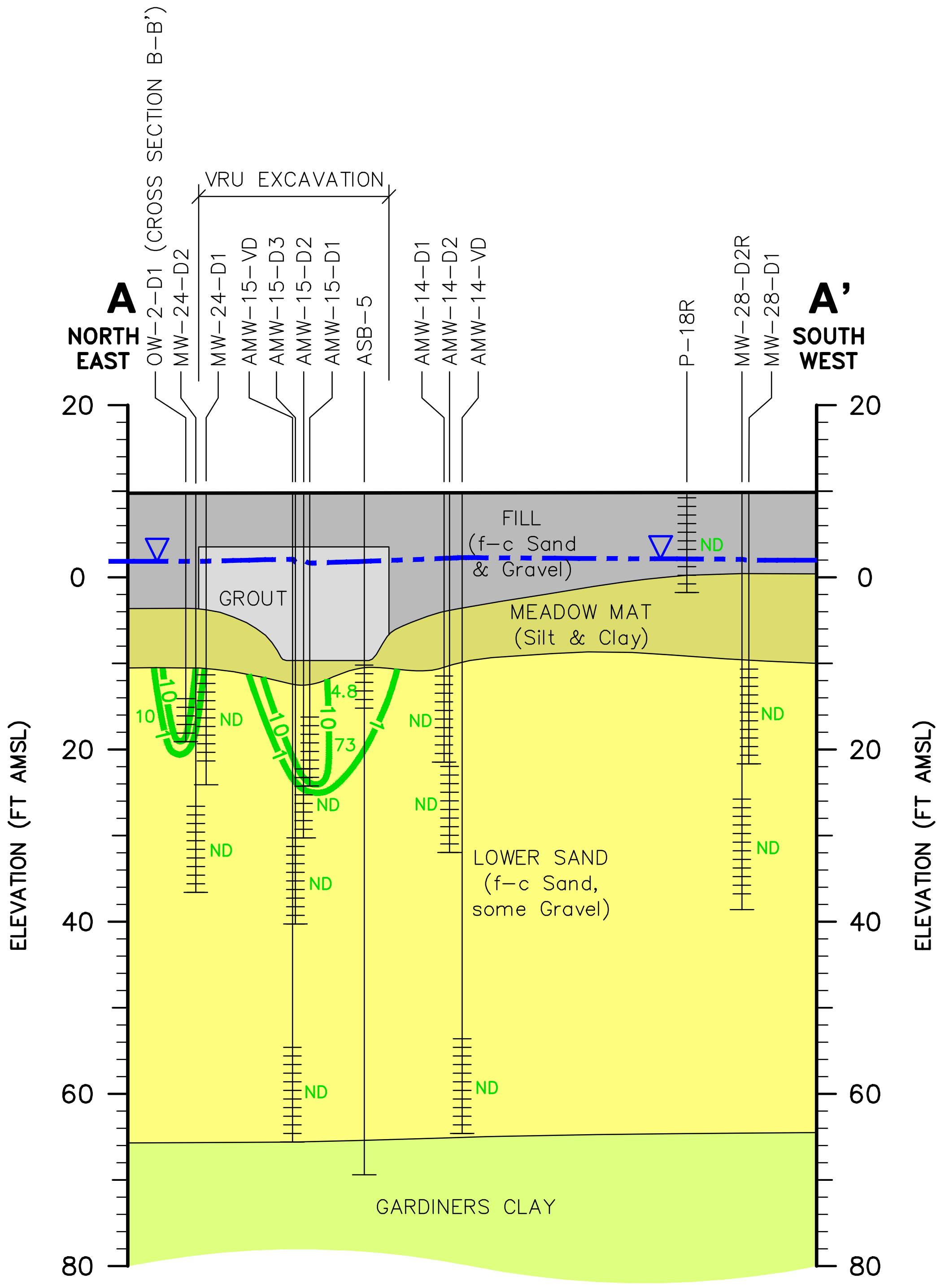
0 60' 120'
GRAPHIC SCALE

GULF OIL TERMINAL
(CHEVRON FACILITY #6518040)
OCEANSIDE, NEW YORK
SITE MANAGEMENT PLAN

GEOLOGIC CROSS SECTION

ARCADIS

FIGURE
4A



LEGEND:

OW-2-D1 WELL OR BORING ID

GROUND SURFACE

LITHOLOGIC CONTACT (DASHED WHERE INFERRED)

▽ GROUNDWATER ELEVATION AT HIGH TIDE JULY 2016

SCREEN

4.8 TRICHLOROETHENE CONCENTRATION (μg/L)

10 TRICHLOROETHENE CONCENTRATION CONTOUR

BOTTOM OF BORING

▨ FILL

▨ GROUT

▨ MEADOW MAT

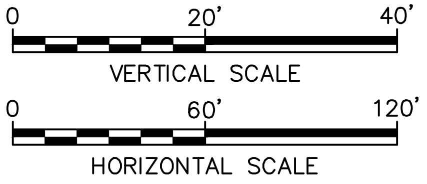
▨ LOWER SAND

▨ GARDINERS CLAY

NOTES:

1. CONCENTRATIONS SHOWN ARE FROM THE MOST RECENT GROUNDWATER SAMPLES COLLECTED IN 2016.
2. ND – NOT DETECTED.

VERTICAL EXAGGERATION = 3X



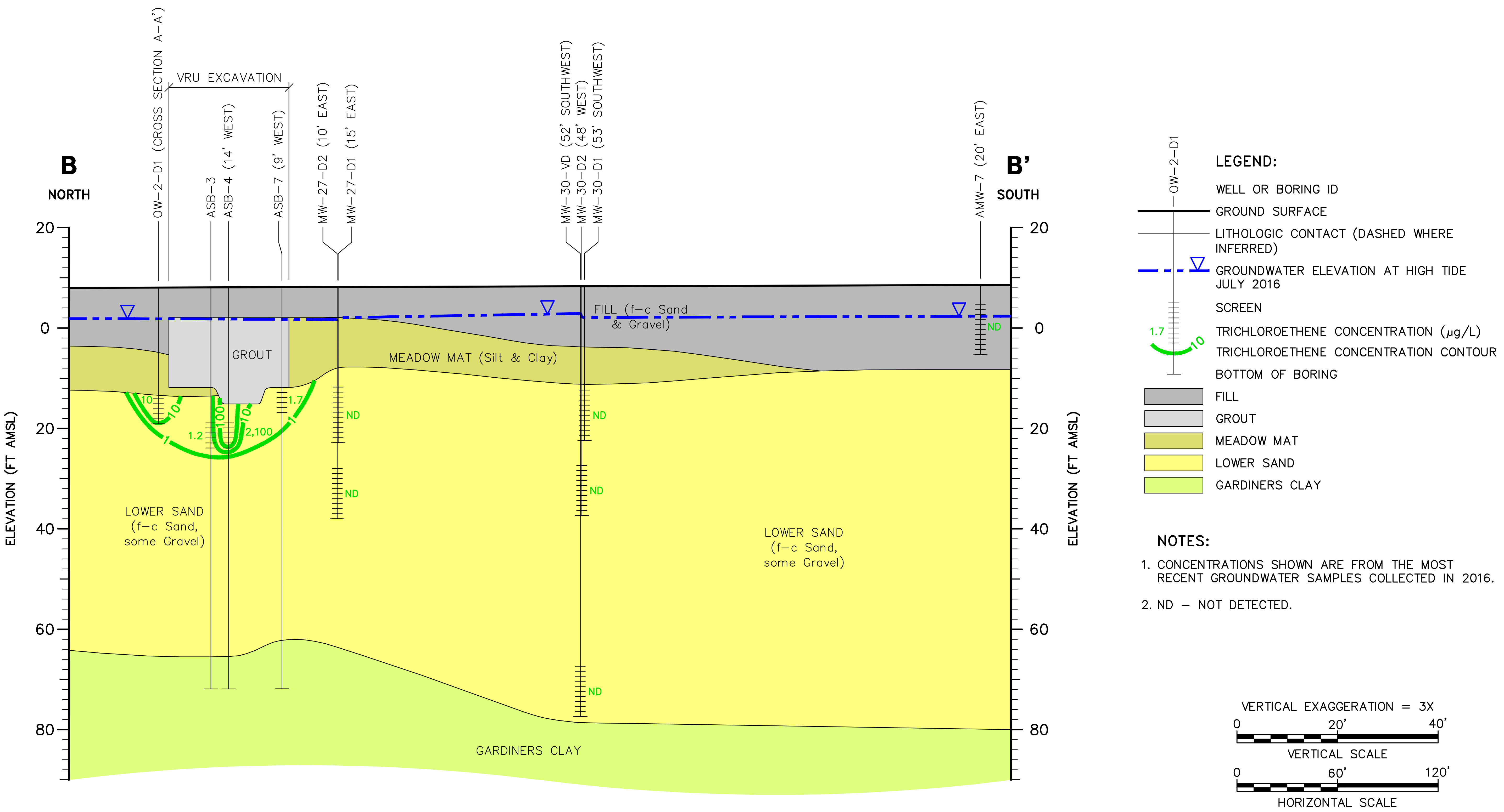
GULF OIL TERMINAL
(CHEVRON FACILITY #6518040)
OCEANSIDE, NEW YORK
SITE MANAGEMENT PLAN

GEOLOGIC CROSS SECTION

ARCADIS

FIGURE
4B

CITY: SYRACUSE, N.Y. DIV/GROUP: ENVCAD-141 DB: L. FORAKER, R.ALLEN LD: PIC: J. VOGELEY PM: W. McCUNE TM: W. McCUNE LYR: ON=*; OFF=*REF*
G:\ENVCAD\SYRACUSE\ACT\B0047517\0023\00002\DWG\47517V02.DWG LAYOUT: 5 SAVED: 11/22/2016 11:00 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/22/2016 11:02 AM BY: ALLEN, ROYCE
XREFS: IMAGES:
47517X01
47517XBL



NOTES:

1. CONCENTRATIONS SHOWN ARE FROM THE MOST RECENT GROUNDWATER SAMPLES COLLECTED IN 2016.
2. ND – NOT DETECTED.

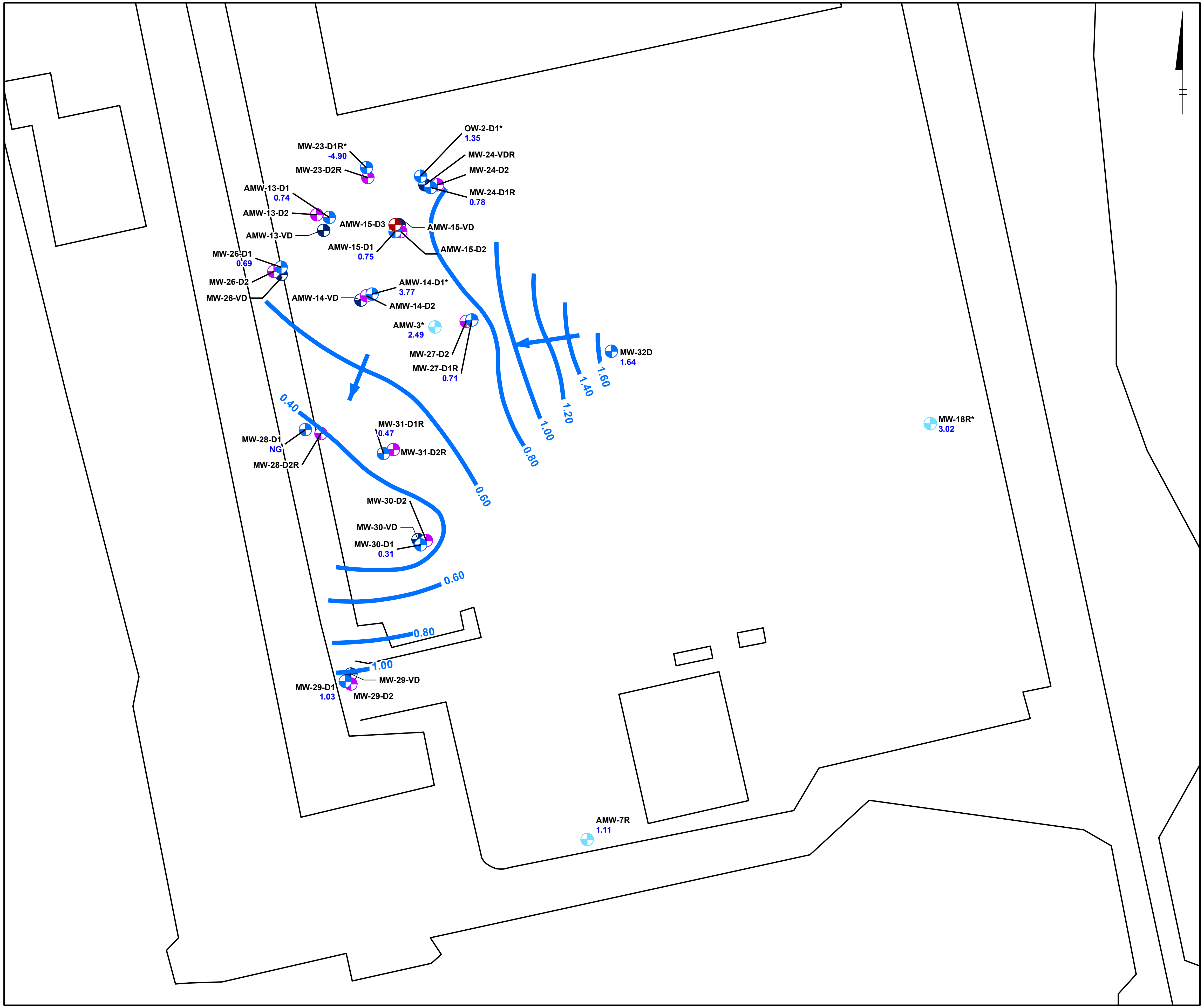
GULF OIL TERMINAL
(CHEVRON FACILITY #6518040)
OCEANSIDE, NEW YORK
SITE MANAGEMENT PLAN

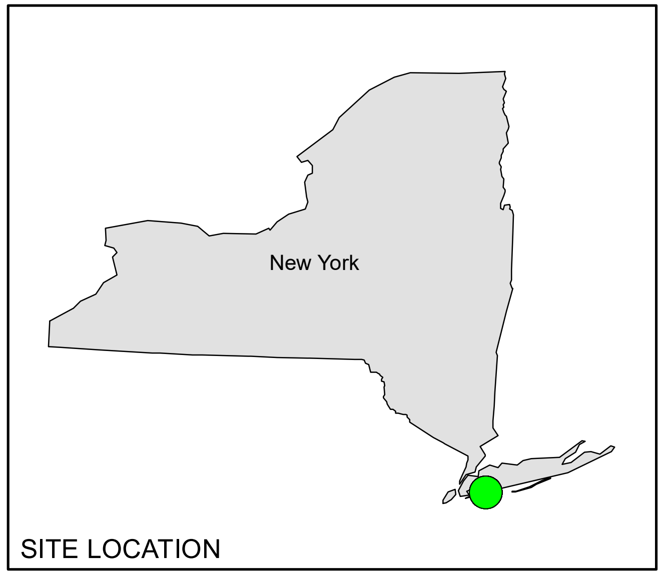
GEOLOGIC CROSS SECTION

ARCADIS

FIGURE
4C

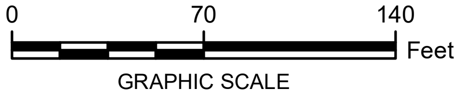
CITY: SYRACUSE, N.Y. DIV/GROUP: ENVCAD-141 DB: R.ALLEN LD: PIC: J. VOGELEY PM: W. McCUNE TM: W. McCUNE LYR: ON=*; OFF=*REF* G:\ENVCAD\SYRACUSE\ACT\B0047517\0023\00002\DWG\47517V03.DWG LAYOUT: 6 SAVED: 11/22/2016 10:55 AM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 11/22/2016 10:57 AM BY: ALLEN, ROYCE
XREFS: IMAGES:
47517X01
47517XBL





LEGEND:

- ◐ SHALLOW FILL UNIT MONITORING WELLS
- ◐ D1 HORIZON MONITORING WELLS
- ◐ D2 HORIZON MONITORING WELLS
- ◐ D3 HORIZON MONITORING WELLS
- ◐ VD HORIZON MONITORING WELLS
- ━ GROUNDWATER ELEVATION CONTOUR (NAVD 88)
- ◀━ APPROXIMATE FLOW DIRECTION
- 0.71 GROUNDWATER ELEVATION IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
- 3.02* NOT USED TO GENERATE CONTOURS
- NG NOT GAUGED



NOTE:

1. 2017 IMAGERY OBTAINED FROM GOOGLE EARTH.
2. THE WELLS WERE GAUGED DURING LOW TIDE.

CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY
SITE MANAGEMENT PLAN

GROUNDWATER CONTOUR MAP
2019

ARCADIS

FIGURE
5A

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: avi00976
T:_ENV\Chevron_Oceanside_NY\1Q2021Report\GW_d1Horizon_ContourMapMar2021.mxd 4/28/2021 9:26:10 AM

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: avi00976
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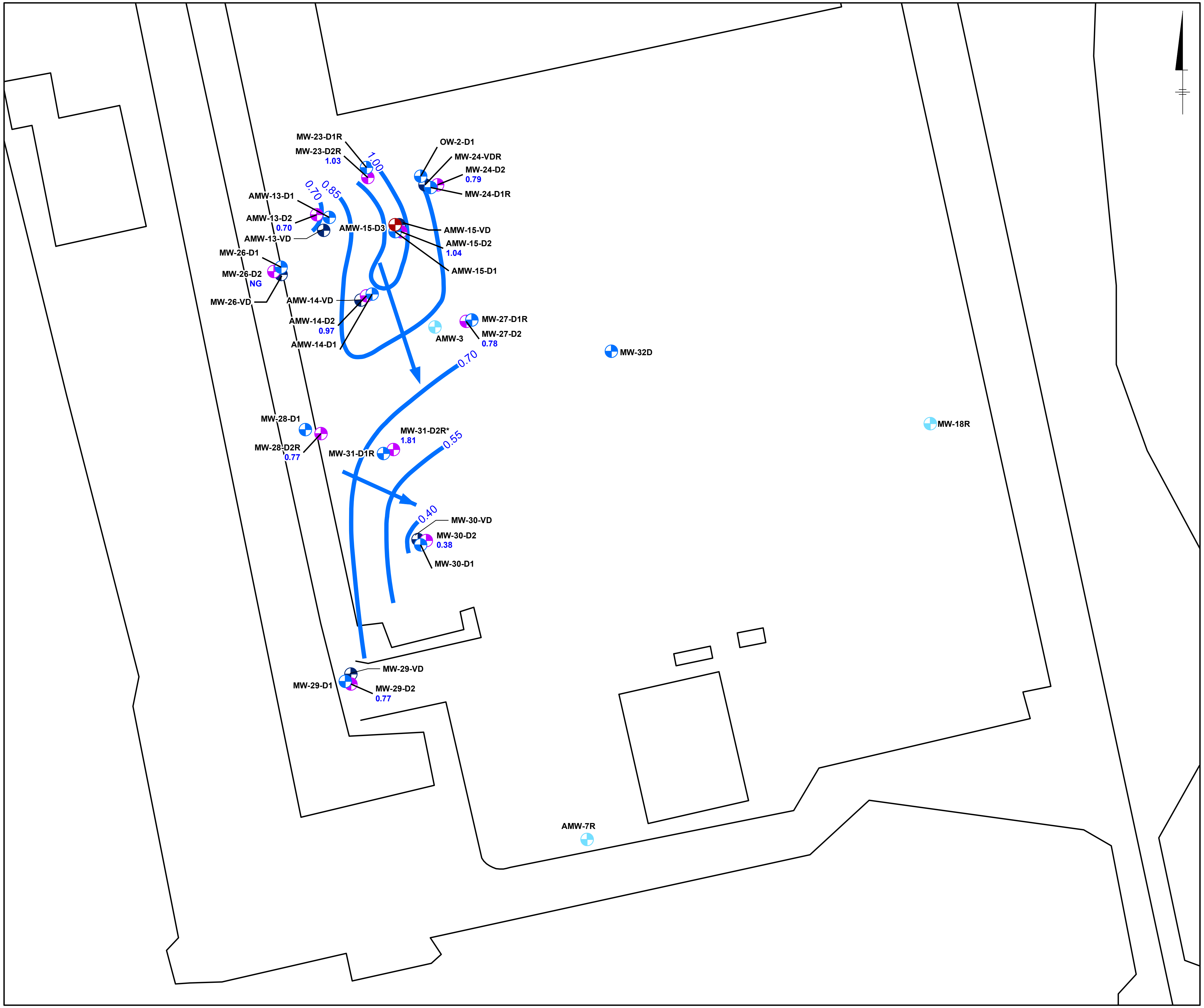
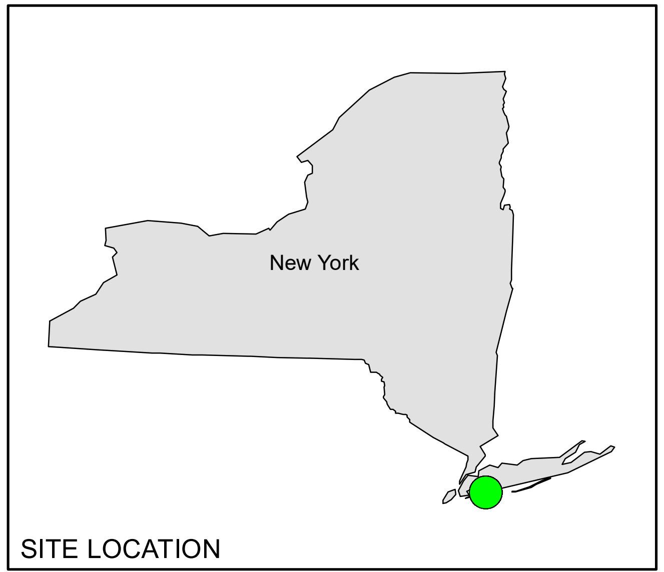




SITE LOCATION

LEGEND:

- ● SHALLOW FILL UNIT MONITORING WELLS
- ● D1 HORIZON MONITORING WELLS
- ● D2 HORIZON MONITORING WELLS
- ● D3 HORIZON MONITORING WELLS
- ● VD HORIZON MONITORING WELLS
- ━ GROUNDWATER ELEVATION CONTOUR (NAVD 88)
- ← APPROXIMATE FLOW DIRECTION
- 0.70 GROUNDWATER ELEVATION IN NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD 88)
- 1.81* NOT USED TO GENERATE CONTOURS
- NG NOT GAUGED

0 70 140
Feet
GRAPHIC SCALE

NOTE:

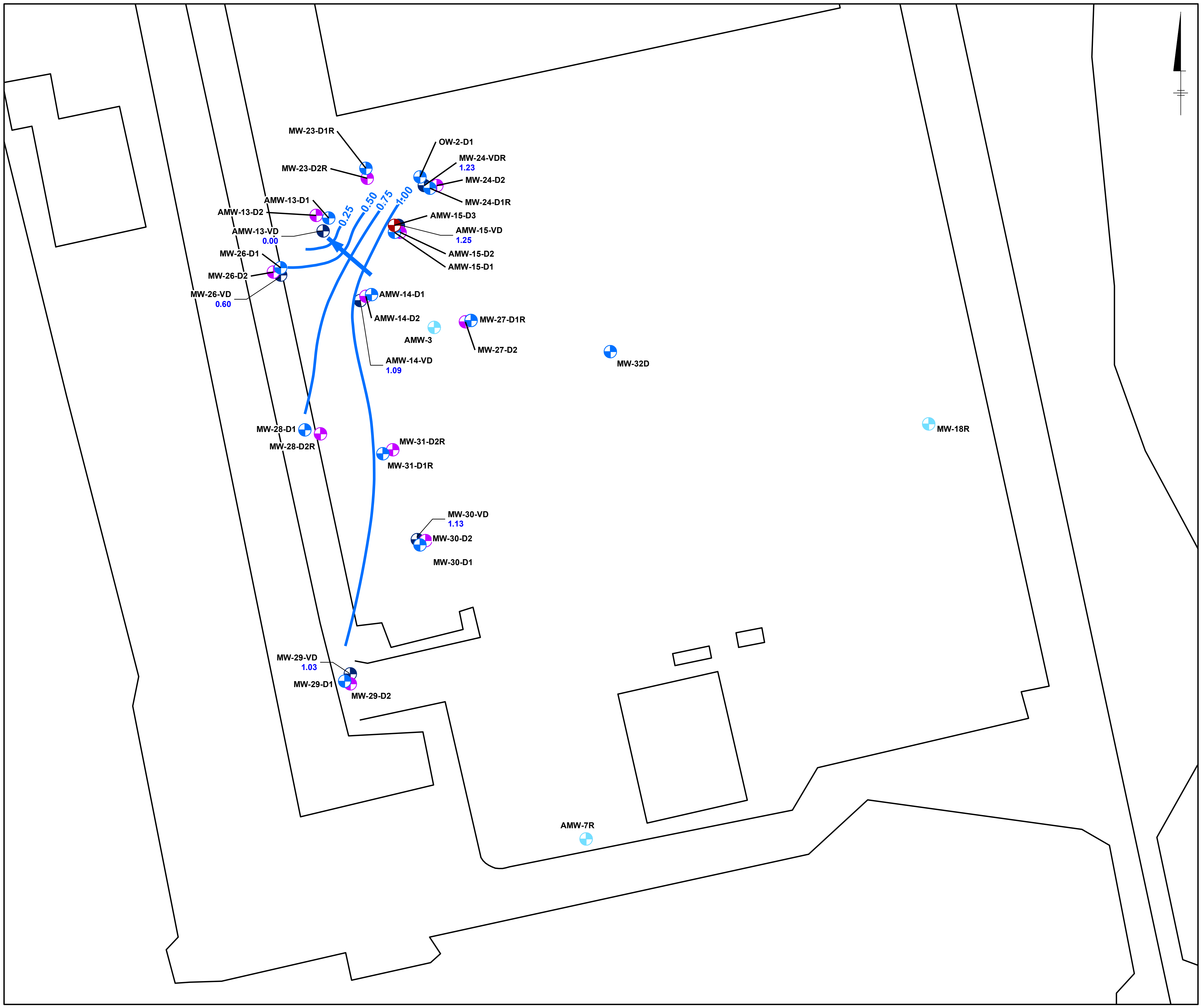
1. 2017 IMAGERY OBTAINED FROM GOOGLE EARTH.
2. THE WELLS WERE GAUGED DURING LOW TIDE.

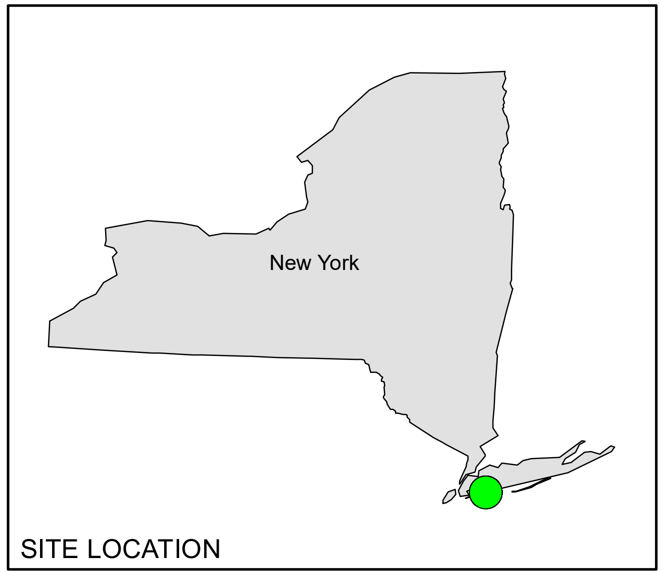
CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY
SITE MANAGEMENT PLAN

GROUNDWATER CONTOUR MAP
2020

ARCADIS

FIGURE
5B





SITE LOCATION

LEGEND:

- ● SHALLOW FILL UNIT MONITORING WELLS
- ● D1 HORIZON MONITORING WELLS
- ● D2 HORIZON MONITORING WELLS
- ● D3 HORIZON MONITORING WELLS
- ● VD HORIZON MONITORING WELLS
- 1.09 GROUNDWATER ELEVATION CONTOUR (NAVD 88)
- ━ GROUNDWATER ELEVATION CONTOUR (NAVD 88)
- ⬅ APPROXIMATE FLOW DIRECTION

0 70 140 Feet

GRAPHIC SCALE

NOTE:

1. 2017 IMAGERY OBTAINED FROM GOOGLE EARTH.
2. THE WELLS WERE GAUGED DURING LOW TIDE.

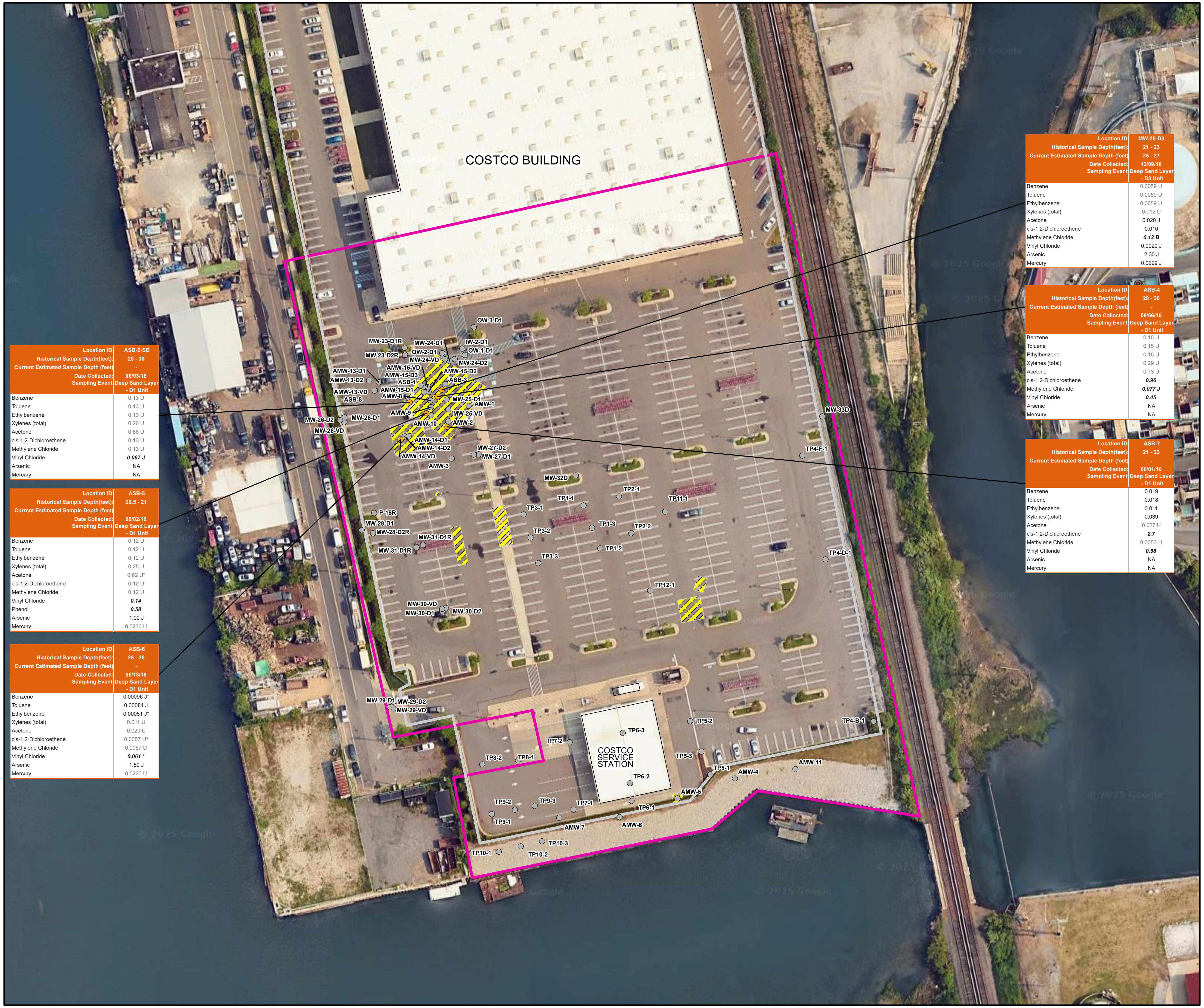
CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY

GROUNDWATER CONTOUR MAP
2021

ARCADIS

FIGURE
5C

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: avi00976
T:_ENV\Chevron_Oceanside_NY\1Q2021\Report\GW_VDHorizon_ContourMapMar2021.mxd 4/28/2021 9:37:03 AM



Location ID:	ASB-2-SD
Historical Sample Depth(feet):	28 - 30
Current Estimated Sample Depth (feet)	-
Date Collected:	06/03/16
Sampling Event:	Deep Sand Layer - D1 Unit
Benzene	0.13 U
Toluene	0.13 U
Ethylbenzene	0.13 U
Xylenes (total)	0.26 U
Acetone	0.66 U
cis-1,2-Dichloroethene	0.13 U
Methylene Chloride	0.13 U
Vinyl Chloride	***0.067 J***
Arsenic	NA
Mercury	NA

Location ID:	ASB-5
Historical Sample Depth(feet):	20.5 - 21
Current Estimated Sample Depth (feet)	-
Date Collected:	06/02/16
Sampling Event:	Deep Sand Layer - D1 Unit
Benzene	0.12 U
Toluene	0.12 U
Ethylbenzene	0.12 U
Xylenes (total)	0.25 U
Acetone	0.62 U*
cis-1,2-Dichloroethene	0.12 U
Methylene Chloride	0.12 U
Vinyl Chloride	***0.14***
Phenol	***0.58***
Arsenic	1.00 J
Mercury	0.0230 U

Location ID:	ASB-6
Historical Sample Depth(feet):	26 - 28
Current Estimated Sample Depth (feet)	-
Date Collected:	06/13/16
Sampling Event:	Deep Sand Layer - D1 Unit
Benzene	0.00096 J*
Toluene	0.00084 J
Ethylbenzene	0.00051 J*
Xylenes (total)	0.011 U
Acetone	0.029 U
cis-1,2-Dichloroethene	0.0057 U*
Methylene Chloride	0.0057 U
Vinyl Chloride	***0.061 ****
Arsenic	1.50 J
Mercury	0.0220 U

Location ID:	MW-25-D3
Historical Sample Depth(feet):	21 - 23
Current Estimated Sample Depth (feet)	25 - 27
Date Collected:	12/09/10
Sampling Event:	Deep Sand Layer - D3 Unit
Benzene	0.0059 U
Toluene	0.0059 U
Ethylbenzene	0.0059 U
Xylenes (total)	0.012 U
Acetone	0.020 J
cis-1,2-Dichloroethene	0.010
Methylene Chloride	***0.12 B***
Vinyl Chloride	0.0020 J
Arsenic	2.30 J
Mercury	0.0229 J

Location ID:	ASB-4
Historical Sample Depth(feet):	28 - 30
Current Estimated Sample Depth (feet)	-
Date Collected:	06/06/16
Sampling Event:	Deep Sand Layer - D1 Unit
Benzene	0.15 U
Toluene	0.15 U
Ethylbenzene	0.15 U
Xylenes (total)	0.29 U
Acetone	0.73 U
cis-1,2-Dichloroethene	***0.96***
Methylene Chloride	***0.077 J***
Vinyl Chloride	***0.45***
Arsenic	NA
Mercury	NA

Location ID:	ASB-7
Historical Sample Depth(feet):	21 - 23
Current Estimated Sample Depth (feet)	-
Date Collected:	06/01/16
Sampling Event:	Deep Sand Layer - D1 Unit
Benzene	0.019
Toluene	0.018
Ethylbenzene	0.011
Xylenes (total)	0.039
Acetone	0.027 U
cis-1,2-Dichloroethene	***2.7***
Methylene Chloride	0.0053 U
Vinyl Chloride	***0.58***
Arsenic	NA
Mercury	NA

LEGEND:

● SAMPLE LOCATION WITH EXCEEDANCE

● SAMPLE LOCATION

☐ ASPHALT AREA

☐ SITE FEATURE

▨ FORMER EXCAVATION AREA

☐ SITE BOUNDARY

0 100 200 Feet

GRAPHIC SCALE

NOTE:

1. 2023 IMAGERY OBTAINED FROM GOOGLE EARTH PRO.

CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY

SOIL ANALYTICAL MAP - DEEP SAND FILL

ARCADIS

FIGURE
6A

T:_ENV\Chevron_Oceanside_NY\2025\SiteManagementPlan_Pro\Chevron_Oceanside_SiteManagementPlan.aprx 1/29/2025 3:05 PMLast Saved By: jrapp

Location ID:	P-18R
Historical Sample Depth(feet):	0 - 2
Current Estimated Sample Depth (feet)	4 - 6
Date Collected:	12/02/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0056 U
Toluene	0.0056 U
Ethylbenzene	0.0056 U
Xylenes (total)	0.011 U
Acetone	0.028 U
cis-1,2-Dichloroethene	0.0056 U
Methylene Chloride	0.0077 UB
Vinyl Chloride	0.0056 U
Benzo(a)anthracene	***2.0***
Benzo(a)pyrene	0.58 J
Benzo(b)fluoranthene	0.90 J
Benzo(g,h,i)perylene	0.17 J
Benzo(k)fluoranthene	0.34 J
bis(2-Chloroethoxy)methane	0.96 U
Chrysene	***1.8***
Dibenzo(a,h)anthracene	0.96 U
Phenol	0.96 U
Arsenic	3.80 J
Mercury	0.0269

Location ID:	AMW-3	AMW-3	AMW-3
Historical Sample Depth(feet):	0 - 2	2 - 4	4 - 6
Current Estimated Sample Depth (feet)	4 - 6	6 - 8	8 - 10
Date Collected:	11/30/10	11/30/10	11/30/10
Sampling Event:	Shallow Sand Fill - Shallow Unit	Shallow Sand Fill - Shallow Unit	Shallow Sand Fill - Shallow Unit
Benzene	0.13 U	0.12 U	***0.11 J***
Toluene	0.11 J	0.20	0.12 U
Ethylbenzene	***2.4***	***6.7***	***2.0***
Xylenes (total)	***5.2***	***6.1***	*0.26*
Acetone	0.64 U	0.59 U	0.62 U
cis-1,2-Dichloroethene	0.13 U	0.12 U	0.12 U
Methylene Chloride	0.13 UJ	0.12 UJ	***0.062 J***
Vinyl Chloride	0.13 U	0.12 U	0.12 U
Arsenic	2.00 J	2.20 J	2.30 J
Mercury	0.0329	0.0525	0.0184 J

Location ID:	TP-1-1
Historical Sample Depth(feet):	4
Current Estimated Sample Depth (feet)	8
Date Collected:	11/29/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0059 U
Toluene	0.0014 J
Ethylbenzene	0.0059 U
Xylenes (total)	0.011 J
Acetone	0.018 J
cis-1,2-Dichloroethene	0.0059 U
Methylene Chloride	0.0085
Vinyl Chloride	0.0059 U
Benzo(a)anthracene	0.20
Benzo(a)pyrene	0.19 J
Benzo(b)fluoranthene	0.22
Benzo(g,h,i)perylene	0.15 J
Benzo(k)fluoranthene	0.085 J
bis(2-Chloroethoxy)methane	0.20 U
Chrysene	0.19 J
Dibenzo(a,h)anthracene	0.029 J
Phenol	0.20 U
Arsenic	1.40 J
Mercury	0.0234 U

Location ID:	TP-1-3
Historical Sample Depth(feet):	3.5
Current Estimated Sample Depth (feet)	7.5
Date Collected:	11/30/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0057 U
Toluene	0.0057 U
Ethylbenzene	0.0057 U
Xylenes (total)	0.011 U
Acetone	0.015 J
cis-1,2-Dichloroethene	0.0057 U
Methylene Chloride	0.011
Vinyl Chloride	0.0057 U
Arsenic	2.30 UJ
Mercury	0.0227 U

Location ID:	TP-1-2
Historical Sample Depth(feet):	3
Current Estimated Sample Depth (feet)	7
Date Collected:	11/30/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0054 U
Toluene	0.0054 U
Ethylbenzene	0.0054 U
Xylenes (total)	0.011 U
Acetone	0.020 J
cis-1,2-Dichloroethene	0.0054 U
Methylene Chloride	0.0097
Vinyl Chloride	0.0054 U
Arsenic	1.50 J
Mercury	0.0218 U

Location ID:	TP-11-1
Historical Sample Depth(feet):	5
Current Estimated Sample Depth (feet)	9
Date Collected:	12/07/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.040 U
Toluene	0.040 U
Ethylbenzene	0.040 U
Xylenes (total)	0.020 J
Acetone	***0.058 J***
cis-1,2-Dichloroethene	0.040 U
Methylene Chloride	***0.086***
Vinyl Chloride	0.040 U
Benzo(a)anthracene	0.039 J
Benzo(a)pyrene	0.024 J
Benzo(b)fluoranthene	0.029 J
Benzo(g,h,i)perylene	0.23 U
Benzo(k)fluoranthene	0.23 U
bis(2-Chloroethoxy)methane	0.23 U
Chrysene	0.030 J
Dibenzo(a,h)anthracene	0.23 U
Phenol	0.23 U
Arsenic	3.00
Mercury	0.0279 U

Location ID:	MW-31-D2R
Historical Sample Depth(feet):	2 - 4
Current Estimated Sample Depth (feet)	6 - 8
Date Collected:	11/17/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0054 U
Toluene	0.0054 U
Ethylbenzene	0.0054 U
Xylenes (total)	0.011 U
Acetone	0.027 U
cis-1,2-Dichloroethene	0.0054 U
Methylene Chloride	0.025 UBJ
Vinyl Chloride	0.0054 U
Benzo(a)anthracene	***3.3***
Benzo(a)pyrene	*3.0*
Benzo(b)fluoranthene	***3.9***
Benzo(g,h,i)perylene	1.2
Benzo(k)fluoranthene	*1.2*
bis(2-Chloroethoxy)methane	0.37 U
Chrysene	***2.5***
Dibenzo(a,h)anthracene	0.27 J
Phenol	0.37 U
Arsenic	2.20
Mercury	0.0377

Location ID:	TP-12-1
Historical Sample Depth(feet):	4.7
Current Estimated Sample Depth (feet)	8.7
Date Collected:	12/07/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.12 U
Toluene	0.12 U
Ethylbenzene	0.12 U
Xylenes (total)	0.23 U
Acetone	0.58 U
cis-1,2-Dichloroethene	0.12 U
Methylene Chloride	0.12 U
Vinyl Chloride	0.12 U
Benzo(a)anthracene	0.26 J
Benzo(a)pyrene	0.23 J
Benzo(b)fluoranthene	0.39 JY
Benzo(g,h,i)perylene	0.19 J
Benzo(k)fluoranthene	0.48 JY
bis(2-Chloroethoxy)methane	0.78 U
Chrysene	0.22 J
Dibenzo(a,h)anthracene	0.78 U
Phenol	0.78 U
Arsenic	1.70 J
Mercury	***1.35***

Location ID:	TP-7-2
Historical Sample Depth(feet):	5
Current Estimated Sample Depth (feet)	9
Date Collected:	12/06/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.54 U
Toluene	0.54 U
Ethylbenzene	0.54 U
Xylenes (total)	1.1 U
Acetone	2.7 U
cis-1,2-Dichloroethene	0.54 U
Methylene Chloride	0.54 U
Vinyl Chloride	0.54 U
Benzo(a)anthracene	***3.7 J***
Benzo(a)pyrene	*3.7 J*
Benzo(b)fluoranthene	***4.1 J***
Benzo(g,h,i)perylene	2.1 J
Benzo(k)fluoranthene	*1.1 J*
bis(2-Chloroethoxy)methane	4.7 U
Chrysene	***3.5 J***
Dibenzo(a,h)anthracene	4.7 U
Phenol	4.7 U
Arsenic	3.60
Mercury	0.104

Location ID:	TP-6-3
Historical Sample Depth(feet):	5.5
Current Estimated Sample Depth (feet)	9.5
Date Collected:	12/03/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.57 U
Toluene	0.57 U
Ethylbenzene	0.57 U
Xylenes (total)	1.1 U
Acetone	2.9 U
cis-1,2-Dichloroethene	0.57 U
Methylene Chloride	0.57 U
Vinyl Chloride	0.57 U
Benzo(a)anthracene	***2.7 J***
Benzo(a)pyrene	*2.7 J*
Benzo(b)fluoranthene	***2.8 J***
Benzo(g,h,i)perylene	1.5 J
Benzo(k)fluoranthene	*1.2 J*
bis(2-Chloroethoxy)methane	4.8 U
Chrysene	***2.3 J***
Dibenzo(a,h)anthracene	4.8 U
Phenol	4.8 U
Arsenic	1.90 J
Mercury	0.0224 U

Location ID:	TP-5-2
Historical Sample Depth(feet):	5.5
Current Estimated Sample Depth (feet)	9.5
Date Collected:	12/02/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.032 U
Toluene	0.032 U
Ethylbenzene	0.032 U
Xylenes (total)	0.064 U
Acetone	0.16 U
cis-1,2-Dichloroethene	0.032 U
Methylene Chloride	***0.11***
Vinyl Chloride	0.032 U
Arsenic	2.70 J
Mercury	0.0155 J

Location ID:	TP-8-1
Historical Sample Depth(feet):	4.5
Current Estimated Sample Depth (feet)	8.5
Date Collected:	12/06/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.10 U
Toluene	0.10 U
Ethylbenzene	0.10 U
Xylenes (total)	0.21 U
Acetone	0.51 U
cis-1,2-Dichloroethene	0.10 U
Methylene Chloride	***0.082 J***
Vinyl Chloride	0.10 U
Arsenic	2.40 U
Mercury	0.0220 U

Location ID:	TP-6-1
Historical Sample Depth(feet):	5
Current Estimated Sample Depth (feet)	9
Date Collected:	12/03/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0053 U
Toluene	0.0053 U
Ethylbenzene	0.0053 U
Xylenes (total)	0.011 U
Acetone	***0.080***
cis-1,2-Dichloroethene	0.0053 U
Methylene Chloride	0.038 J
Vinyl Chloride	0.0053 U
Arsenic	***28.1***
Mercury	0.0732

Location ID:	TP-10-2
Historical Sample Depth(feet):	6
Current Estimated Sample Depth (feet)	10
Date Collected:	12/07/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0056 U
Toluene	0.0056 U
Ethylbenzene	0.0056 U
Xylenes (total)	0.011 U
Acetone	0.028 U
cis-1,2-Dichloroethene	0.0056 U
Methylene Chloride	0.018
Vinyl Chloride	0.0056 U
Benzo(a)anthracene	0.24 J
Benzo(a)pyrene	0.26 J
Benzo(b)fluoranthene	0.25 J
Benzo(g,h,i)perylene	0.14 J
Benzo(k)fluoranthene	0.94 U
bis(2-Chloroethoxy)methane	0.94 U
Chrysene	0.23 J
Dibenzo(a,h)anthracene	0.94 U
Phenol	0.94 U
Arsenic	***20.7***
Mercury	0.0675

Location ID:	TP-9-3
Historical Sample Depth(feet):	6.5
Current Estimated Sample Depth (feet)	10.5
Date Collected:	12/07/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0079 U
Toluene	0.0079 U
Ethylbenzene	0.0079 U
Xylenes (total)	0.016 U
Acetone	***0.055***
cis-1,2-Dichloroethene	0.0079 U
Methylene Chloride	0.020
Vinyl Chloride	0.0079 U
Arsenic	10.3
Mercury	0.0313 U

Location ID:	AMW-7
Historical Sample Depth(feet):	10 - 12
Current Estimated Sample Depth (feet)	
Date Collected:	11/29/10
Sampling Event:	Shallow Sand Fill - Shallow Unit
Benzene	0.0065 U
Toluene	0.0065 U
Ethylbenzene	0.0065 U
Xylenes (total)	0.013 U
Acetone	***0.050***
cis-1,2-Dichloroethene	0.0015 J
Methylene Chloride	0.023
Vinyl Chloride	0.0032 J
Arsenic	4.10 J
Mercury	0.0219 J

Location ID:	AMW-6	AMW-6	AMW-6
Historical Sample Depth(feet):	2 - 4	4 - 6	6 - 8
Current Estimated Sample Depth (feet)	6 - 8	8 - 10	10 - 12
Date Collected:	11/18/10	11/18/10	11/18/10
Sampling Event:	Shallow Sand Fill - Shallow Unit	Shallow Sand Fill - Shallow Unit	Shallow Sand Fill - Shallow Unit
Benzene	0.0055 U	0.0057 U	0.036 U
Toluene	0.0055 U	0.0057 U	0.036 U
Ethylbenzene	0.0055 U	0.0057 U	0.036 U
Xylenes (total)	0.011 U	0.011 U	0.071 U
Acetone	0.027 U	***0.059***	***0.18***
cis-1,2-Dichloroethene	0.0055 U	0.0057 U	0.036 U
Methylene Chloride	0.0062	0.0090	0.049
Vinyl Chloride	0.0055 U	0.0057 U	0.036 U
Arsenic	***16.2***	***20.1***	10.6
Mercury	0.0785	*0.199*	0.122

LEGEND:

●	SAMPLE LOCATION WITH EXCEEDANCE
●	SAMPLE LOCATION
☐	ASPHALT AREA
☐	SITE FEATURE
▨	FORMER EXCAVATION AREA
☐	SITE BOUNDARY

0 100 200 Feet

GRAPHIC SCALE

NOTE:

1. 2023 IMAGERY OBTAINED FROM GOOGLE EARTH PRO.

CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY

SOIL ANALYTICAL MAP - SHALLOW SAND FILL

ARCADIS

FIGURE
6B

T:_ENV\Chevron_Oceanside_NY\2025\SiteManagementPlan_Pro\Chevron_Oceanside_SiteManagementPlan.aprx 1/29/2025 3:05 PMLast Saved By: jrapp

LEGEND:

▭ ASPHALT AREA

▭ SITE FEATURE

▭ SITE BOUNDARY

🟨 DEEP SOIL IMPACTS RANGING FROM 24 FEET TO 34 FEET BGS

🟧 SHALLOW SOIL IMPACTS RANGING FROM 8 FEET TO 16 FEET BGS

0 100 200 Feet

GRAPHIC SCALE

NOTES:

1. 2023 IMAGERY OBTAINED FROM GOOGLE EARTH PRO.
2. AREAS OF REMAINING SOIL IMPACTS ARE BASED ON SOIL SAMPLES THAT EXCEED PROTECTION OF GROUNDWATER AND/OR COMMERCIAL CLEANUP OBJECTIVES.
3. AREAS OF REMAINING SOIL IMPACTS HAVE BEEN IDENTIFIED IN LOCATIONS THAT HAVE NOT BEEN EXCAVATED OR REMEDIATED.
4. DEPTHS OF SHALLOW AND DEEP SOIL IMPACTS ARE BASED ON EXISTING FINAL DESIGN GRADE. DEPTHS OF IMPACTS ARE CONSIDERED APPROXIMATE.
5. BGS = BELOW GROUND SURFACE

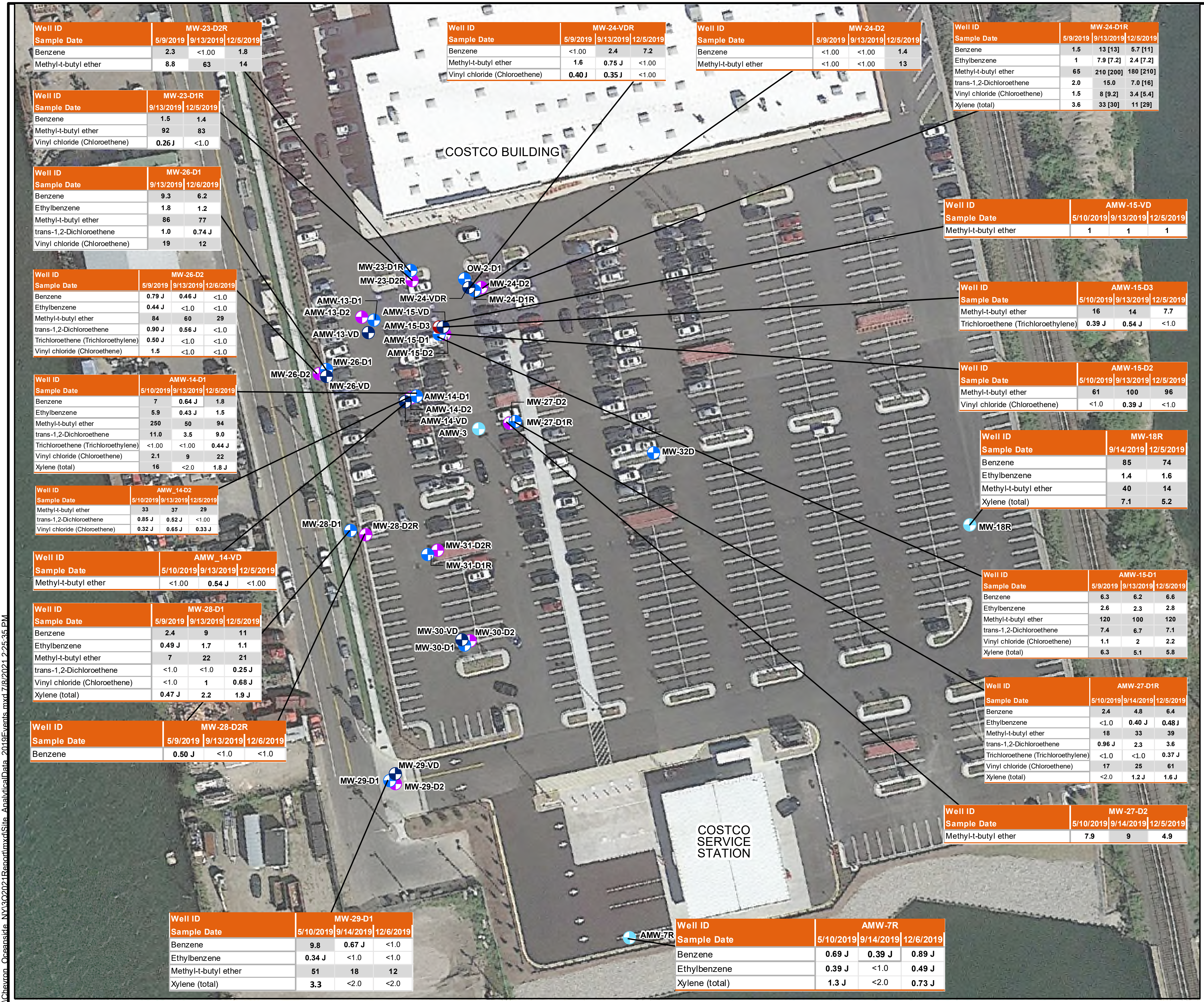
CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY

AREAS OF CONCERN

ARCADIS

FIGURE
6C

T:_ENV\Chevron_Oceanside_NY\2025\SiteManagementPlan_Pro\Chevron_Oceanside_SiteManagementPlan.aprx 1/29/2025 3:05 PMLast Saved By: jrapp



Well ID	MW-23-D2R		
Sample Date	5/9/2019	9/13/2019	12/5/2019
Benzene	**2.3**	<1.00	**1.8**
Methyl-t-butyl ether	**8.8**	**63**	**14**

Well ID	MW-23-D1R	
Sample Date	9/13/2019	12/5/2019
Benzene	**1.5**	**1.4**
Methyl-t-butyl ether	**92**	**83**
Vinyl chloride (Chloroethene)	**0.26 J**	<1.0

Well ID	MW-26-D1	
Sample Date	9/13/2019	12/6/2019
Benzene	**9.3**	**6.2**
Ethylbenzene	**1.8**	**1.2**
Methyl-t-butyl ether	**86**	**77**
trans-1,2-Dichloroethene	**1.0**	**0.74 J**
Vinyl chloride (Chloroethene)	**19**	**12**

Well ID	MW-26-D2		
Sample Date	5/9/2019	9/13/2019	12/6/2019
Benzene	**0.79 J**	**0.46 J**	<1.0
Ethylbenzene	**0.44 J**	<1.0	<1.0
Methyl-t-butyl ether	**84**	**60**	**29**
trans-1,2-Dichloroethene	**0.90 J**	**0.56 J**	<1.0
Trichloroethene (Trichloroethylene)	**0.50 J**	<1.0	<1.0
Vinyl chloride (Chloroethene)	**1.5**	<1.0	<1.0

Well ID	AMW-14-D1		
Sample Date	5/10/2019	9/13/2019	12/5/2019
Benzene	**7**	**0.64 J**	**1.8**
Ethylbenzene	**5.9**	**0.43 J**	**1.5**
Methyl-t-butyl ether	**250**	**50**	**94**
trans-1,2-Dichloroethene	**11.0**	**3.5**	**9.0**
Trichloroethene (Trichloroethylene)	<1.00	<1.00	**0.44 J**
Vinyl chloride (Chloroethene)	**2.1**	**9**	**22**
Xylene (total)	**16**	<2.0	**1.8 J**

Well ID	AMW_14-D2		
Sample Date	5/10/2019	9/13/2019	12/5/2019
Methyl-t-butyl ether	**33**	**37**	**29**
trans-1,2-Dichloroethene	**0.85 J**	**0.52 J**	<1.00
Vinyl chloride (Chloroethene)	**0.32 J**	**0.65 J**	**0.33 J**

Well ID	AMW_14-VD		
Sample Date	5/10/2019	9/13/2019	12/5/2019
Methyl-t-butyl ether	<1.00	**0.54 J**	<1.00

Well ID	MW-28-D1		
Sample Date	5/9/2019	9/13/2019	12/5/2019
Benzene	**2.4**	**9**	**11**
Ethylbenzene	**0.49 J**	**1.7**	**1.1**
Methyl-t-butyl ether	**7**	**22**	**21**
trans-1,2-Dichloroethene	<1.0	<1.0	**0.25 J**
Vinyl chloride (Chloroethene)	<1.0	**1**	**0.68 J**
Xylene (total)	**0.47 J**	**2.2**	**1.9 J**

Well ID	MW-28-D2R		
Sample Date	5/9/2019	9/13/2019	12/6/2019
Benzene	**0.50 J**	<1.0	<1.0

Well ID	MW-29-D1		
Sample Date	5/10/2019	9/14/2019	12/6/2019
Benzene	**9.8**	**0.67 J**	<1.0
Ethylbenzene	**0.34 J**	<1.0	<1.0
Methyl-t-butyl ether	**51**	**18**	**12**
Xylene (total)	**3.3**	<2.0	<2.0

Well ID	MW-24-VDR		
Sample Date	5/9/2019	9/13/2019	12/5/2019
Benzene	<1.00	**2.4**	**7.2**
Methyl-t-butyl ether	**1.6**	**0.75 J**	<1.00
Vinyl chloride (Chloroethene)	**0.40 J**	**0.35 J**	<1.00

Well ID	MW-24-D2		
Sample Date	5/9/2019	9/13/2019	12/5/2019
Benzene	<1.00	<1.00	**1.4**
Methyl-t-butyl ether	<1.00	<1.00	**13**

Well ID	MW-24-D1R		
Sample Date	5/9/2019	9/13/2019	12/5/2019
Benzene	**1.5**	**13 [13]**	**5.7 [11]**
Ethylbenzene	**1**	**7.9 [7.2]**	**2.4 [7.2]**
Methyl-t-butyl ether	**65**	**210 [200]**	**180 [210]**
trans-1,2-Dichloroethene	**2.0**	**15.0**	**7.0 [16]**
Vinyl chloride (Chloroethene)	**1.5**	**8 [9.2]**	**3.4 [5.4]**
Xylene (total)	**3.6**	**33 [30]**	**11 [29]**

Well ID	AMW-15-VD		
Sample Date	5/10/2019	9/13/2019	12/5/2019
Methyl-t-butyl ether	**1**	**1**	**1**

Well ID	AMW-15-D3		
Sample Date	5/10/2019	9/13/2019	12/5/2019
Methyl-t-butyl ether	**16**	**14**	**7.7**
Trichloroethene (Trichloroethylene)	**0.39 J**	**0.54 J**	<1.0

Well ID	AMW-15-D2		
Sample Date	5/10/2019	9/13/2019	12/5/2019
Methyl-t-butyl ether	**61**	**100**	**96**
Vinyl chloride (Chloroethene)	<1.0	**0.39 J**	<1.0

Well ID	MW-18R	
Sample Date	9/14/2019	12/5/2019
Benzene	**85**	**74**
Ethylbenzene	**1.4**	**1.6**
Methyl-t-butyl ether	**40**	**14**
Xylene (total)	**7.1**	**5.2**

Well ID	AMW-15-D1		
Sample Date	5/9/2019	9/13/2019	12/5/2019
Benzene	**6.3**	**6.2**	**6.6**
Ethylbenzene	**2.6**	**2.3**	**2.8**
Methyl-t-butyl ether	**120**	**100**	**120**
trans-1,2-Dichloroethene	**7.4**	**6.7**	**7.1**
Vinyl chloride (Chloroethene)	**1.1**	**2**	**2.2**
Xylene (total)	**6.3**	**5.1**	**5.8**

Well ID	AMW-27-D1R		
Sample Date	5/10/2019	9/14/2019	12/5/2019
Benzene	**2.4**	**4.8**	**6.4**
Ethylbenzene	<1.0	**0.40 J**	**0.48 J**
Methyl-t-butyl ether	**18**	**33**	**39**
trans-1,2-Dichloroethene	**0.96 J**	**2.3**	**3.6**
Trichloroethene (Trichloroethylene)	<1.0	<1.0	**0.37 J**
Vinyl chloride (Chloroethene)	**17**	**25**	**61**
Xylene (total)	<2.0	**1.2 J**	**1.6 J**

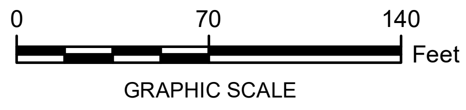
Well ID	MW-27-D2		
Sample Date	5/10/2019	9/14/2019	12/5/2019
Methyl-t-butyl ether	**7.9**	**9**	**4.9**

Well ID	AMW-7R		
Sample Date	5/10/2019	9/14/2019	12/6/2019
Benzene	**0.69 J**	**0.39 J**	**0.89 J**
Ethylbenzene	**0.39 J**	<1.0	**0.49 J**
Xylene (total)	**1.3 J**	<2.0	**0.73 J**

LEGEND:

- ● SHALLOW FILL UNIT MONITORING WELLS
- ● D1 HORIZON MONITORING WELLS
- ● D2 HORIZON MONITORING WELLS
- ● D3 HORIZON MONITORING WELLS
- ● VD HORIZON MONITORING WELLS

Parameter Name	NYDEC TOGS 1.1.1
Benzene	1 ug/L
Ethylbenzene	5 ug/L
Methyl-t-butyl ether	10 ug/L
trans-1,2-Dichloroethene	5 ug/L
Vinyl chloride (Chloroethene)	2 ug/L
Xylene (total)	5 ug/L



GRAPHIC SCALE

NOTES:
2017 IMAGERY OBTAINED FROM GOOGLE EARTH.
CONCENTRATIONS ARE IN MICROGRAMS PER LITER (UG/L)
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NYSDEC = NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
TOGS = NYSDEC TECHNICAL AND OPERATIONAL GUIDANCE SERIES AMBIENT WATER QUALITY STANDARDS AND GUIDANCE VALUES OF JUNE 1998
BOLDED VALUES = COMPOUND DETECTED
GREY SHADED CELLS = CONCENTRATION ABOVE THE TOGS
J = ANALYTE DETECTED AT A LEVEL LESS THAN THE REPORTING LIMIT (RL) AND GREATER THAN OR EQUAL TO THE METHOD DETECTION LIMIT (MDL). CONCENTRATIONS WITHIN THIS RANGE ARE ESTIMATED.
[ ] = DUPLICATE ANALYSIS RESULTS
< = LESS THAN INDICATED REPORTING LIMIT
B = THE SAME ANALYTE IS FOUND IN THE ASSOCIATED BLANK
C3 = THE REPORTED CONCENTRATION IS AN ESTIMATE. THE CONTINUING CALLIBRATION STANDARD ASSOCIATED WITH THIS DATA RESPONDED LOW. METHOD SENSTIVITY CHECK IS ACCEPTABLE

CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY
SITE MANAGEMENT PLAN

GROUNDWATER ANALYTICAL MAP 2019

ARCADIS

FIGURE
7A

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: jrapp
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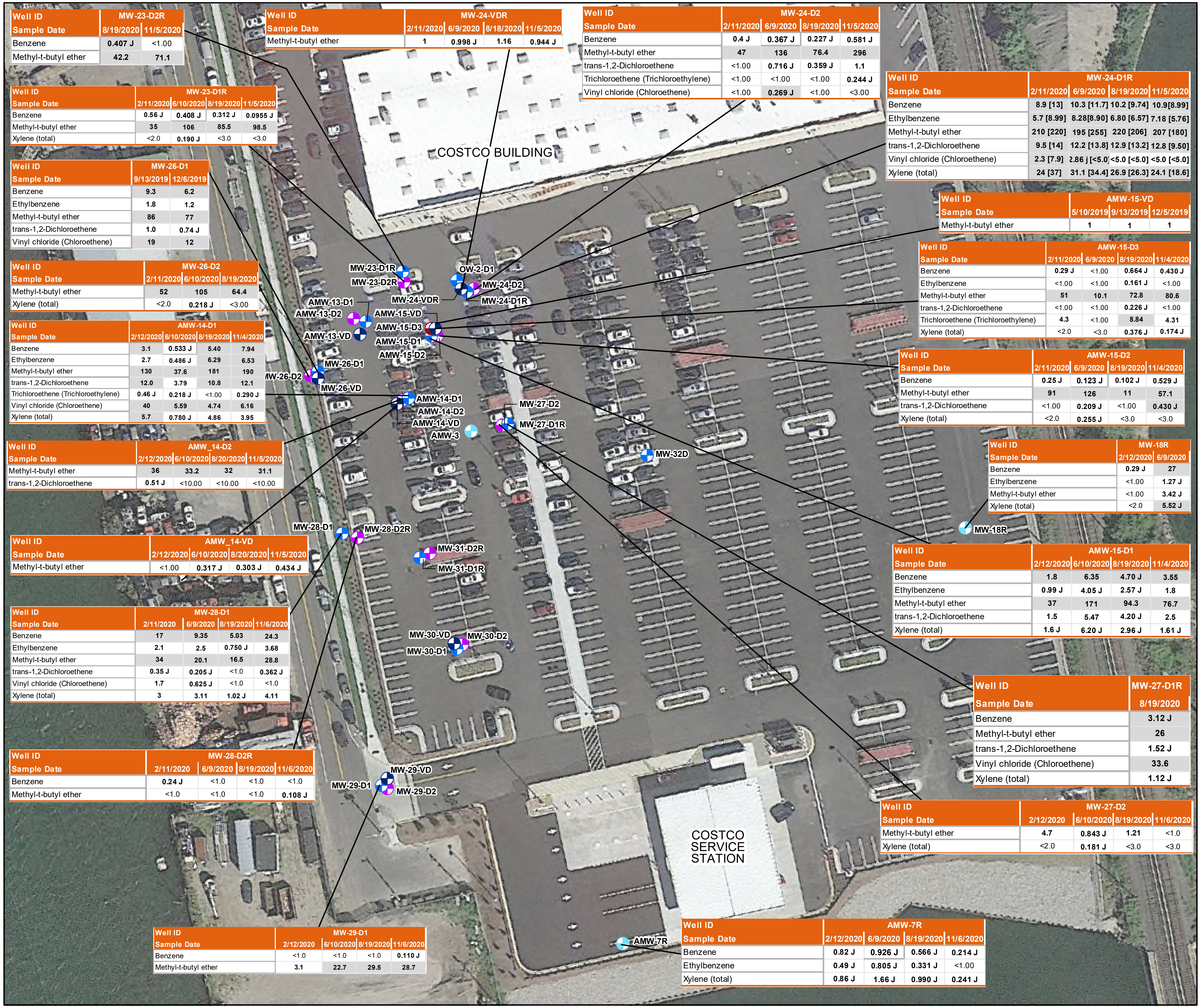

Well ID	**MW-23-D2R**	
Sample Date	**8/19/2020**	**11/5/2020**
Benzene	**0.407 J**	<1.00
Methyl-t-butyl ether	**42.2**	**71.1**

Well ID	**MW-23-D1R**			
Sample Date	**2/11/2020**	**6/10/2020**	**8/19/2020**	**11/5/2020**
Benzene	**0.56 J**	**0.408 J**	**0.312 J**	**0.0955 J**
Methyl-t-butyl ether	**35**	**106**	**85.5**	**98.5**
Xylene (total)	<2.0	**0.190 J**	<3.0	<3.0

Well ID	**MW-26-D1**	
Sample Date	**9/13/2019**	**12/6/2019**
Benzene	**9.3**	**6.2**
Ethylbenzene	**1.8**	**1.2**
Methyl-t-butyl ether	**86**	**77**
trans-1,2-Dichloroethene	**1.0**	**0.74 J**
Vinyl chloride (Chloroethene)	**19**	**12**

Well ID	**MW-26-D2**		
Sample Date	**2/11/2020**	**6/10/2020**	**8/19/2020**
Methyl-t-butyl ether	**52**	**105**	**64.4**
Xylene (total)	<2.0	**0.218 J**	<3.00

Well ID	**AMW-14-D1**			
Sample Date	**2/12/2020**	**6/10/2020**	**8/19/2020**	**11/4/2020**
Benzene	**3.1**	**0.533 J**	**5.40**	**7.94**
Ethylbenzene	**2.7**	**0.486 J**	**6.29**	**6.53**
Methyl-t-butyl ether	**130**	**37.6**	**181**	**190**
trans-1,2-Dichloroethene	**12.0**	**3.79**	**10.8**	**12.1**
Trichloroethene (Trichloroethylene)	**0.46 J**	**0.218 J**	<1.00	**0.290 J**
Vinyl chloride (Chloroethene)	**40**	**5.59**	**4.74**	**6.16**
Xylene (total)	**5.7**	**0.780 J**	**4.86**	**3.95**

Well ID	**AMW_14-D2**			
Sample Date	**2/12/2020**	**6/10/2020**	**8/20/2020**	**11/5/2020**
Methyl-t-butyl ether	**36**	**33.2**	**32**	**31.1**
trans-1,2-Dichloroethene	**0.51 J**	<10.00	<10.00	<10.00

Well ID	**AMW_14-VD**			
Sample Date	**2/12/2020**	**6/10/2020**	**8/20/2020**	**11/5/2020**
Methyl-t-butyl ether	<1.00	**0.317 J**	**0.303 J**	**0.434 J**

Well ID	**MW-28-D1**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/19/2020**	**11/6/2020**
Benzene	**17**	**9.35**	**5.03**	**24.3**
Ethylbenzene	**2.1**	**2.5**	**0.750 J**	**3.68**
Methyl-t-butyl ether	**34**	**20.1**	**16.5**	**28.8**
trans-1,2-Dichloroethene	**0.35 J**	**0.205 J**	<1.0	**0.362 J**
Vinyl chloride (Chloroethene)	**1.7**	**0.625 J**	<1.0	<1.0
Xylene (total)	**3**	**3.11**	**1.02 J**	**4.11**

Well ID	**MW-28-D2R**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/19/2020**	**11/6/2020**
Benzene	**0.24 J**	<1.0	<1.0	<1.0
Methyl-t-butyl ether	<1.0	<1.0	<1.0	**0.108 J**

Well ID	**MW-29-D1**			
Sample Date	**2/12/2020**	**6/10/2020**	**8/19/2020**	**11/6/2020**
Benzene	<1.0	<1.0	<1.0	**0.110 J**
Methyl-t-butyl ether	**3.1**	**22.7**	**29.5**	**28.7**

Well ID	**MW-24-VDR**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/18/2020**	**11/5/2020**
Methyl-t-butyl ether	**1**	**0.998 J**	**1.16**	**0.944 J**

Well ID	**MW-24-D2**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/19/2020**	**11/5/2020**
Benzene	**0.4 J**	**0.367 J**	**0.227 J**	**0.581 J**
Methyl-t-butyl ether	**47**	**136**	**76.4**	**296**
trans-1,2-Dichloroethene	<1.00	**0.716 J**	**0.359 J**	**1.1**
Trichloroethene (Trichloroethylene)	<1.00	<1.00	<1.00	**0.244 J**
Vinyl chloride (Chloroethene)	<1.00	**0.269 J**	<1.00	<3.00

Well ID	**MW-24-D1R**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/19/2020**	**11/5/2020**
Benzene	**8.9 [13]**	**10.3 [11.7]**	**10.2 [9.74]**	**10.9[8.99]**
Ethylbenzene	**5.7 [8.99]**	**8.28[8.90]**	**6.80 [6.57]**	**7.18 [5.76]**
Methyl-t-butyl ether	**210 [220]**	**195 [255]**	**220 [206]**	**207 [180]**
trans-1,2-Dichloroethene	**9.5 [14]**	**12.2 [13.8]**	**12.9 [13.2]**	**12.8 [9.50]**
Vinyl chloride (Chloroethene)	**2.3 [7.9]**	**2.86 j [<5.0]**	**<5.0 [<5.0]**	**<5.0 [<5.0]**
Xylene (total)	**24 [37]**	**31.1 [34.4]**	**26.9 [26.3]**	**24.1 [18.6]**

Well ID	**AMW-15-VD**		
Sample Date	**5/10/2019**	**9/13/2019**	**12/5/2019**
Methyl-t-butyl ether	**1**	**1**	**1**

Well ID	**AMW-15-D3**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/19/2020**	**11/4/2020**
Benzene	**0.29 J**	<1.00	**0.664 J**	**0.430 J**
Ethylbenzene	<1.00	<1.00	**0.161 J**	<1.00
Methyl-t-butyl ether	**51**	**10.1**	**72.8**	**80.6**
trans-1,2-Dichloroethene	<1.00	<1.00	**0.226 J**	<1.00
Trichloroethene (Trichloroethylene)	**4.3**	<1.00	**8.84**	**4.31**
Xylene (total)	<2.0	<3.0	**0.376 J**	**0.174 J**

Well ID	**AMW-15-D2**			
Sample Date	**2/11/2020**	**6/9/2020**	**8/19/2020**	**11/4/2020**
Benzene	**0.25 J**	**0.123 J**	**0.102 J**	**0.529 J**
Methyl-t-butyl ether	**91**	**126**	**11**	**57.1**
trans-1,2-Dichloroethene	<1.00	**0.209 J**	<1.00	**0.430 J**
Xylene (total)	<2.0	**0.255 J**	<3.0	<3.0

Well ID	**MW-18R**	
Sample Date	**2/12/2020**	**6/9/2020**
Benzene	**0.29 J**	**27**
Ethylbenzene	<1.00	**1.27 J**
Methyl-t-butyl ether	<1.00	**3.42 J**
Xylene (total)	<2.0	**5.52 J**

Well ID	**AMW-15-D1**			
Sample Date	**2/12/2020**	**6/10/2020**	**8/19/2020**	**11/4/2020**
Benzene	**1.8**	**6.35**	**4.70 J**	**3.55**
Ethylbenzene	**0.99 J**	**4.05 J**	**2.57 J**	**1.8**
Methyl-t-butyl ether	**37**	**171**	**94.3**	**76.7**
trans-1,2-Dichloroethene	**1.5**	**5.47**	**4.20 J**	**2.5**
Xylene (total)	**1.6 J**	**6.20 J**	**2.96 J**	**1.61 J**

Well ID	**MW-27-D1R**
Sample Date	**8/19/2020**
Benzene	**3.12 J**
Methyl-t-butyl ether	**26**
trans-1,2-Dichloroethene	**1.52 J**
Vinyl chloride (Chloroethene)	**33.6**
Xylene (total)	**1.12 J**

Well ID	**MW-27-D2**			
Sample Date	**2/12/2020**	**6/10/2020**	**8/19/2020**	**11/6/2020**
Methyl-t-butyl ether	**4.7**	**0.843 J**	**1.21**	<1.0
Xylene (total)	<2.0	**0.181 J**	<3.0	<3.0

Well ID	**AMW-7R**			
Sample Date	**2/12/2020**	**6/9/2020**	**8/19/2020**	**11/6/2020**
Benzene	**0.82 J**	**0.926 J**	**0.566 J**	**0.214 J**
Ethylbenzene	**0.49 J**	**0.805 J**	**0.331 J**	<1.00
Xylene (total)	**0.86 J**	**1.66 J**	**0.990 J**	**0.241 J**

LEGEND:

●	SHALLOW FILL UNIT MONITORING WELLS
●	D1 HORIZON MONITORING WELLS
●	D2 HORIZON MONITORING WELLS
●	D3 HORIZON MONITORING WELLS
●	VD HORIZON MONITORING WELLS

Parameter Name	NYDEC TOGS 1.1.1
Benzene	1 ug/L
Ethylbenzene	5 ug/L
Methyl-t-butyl ether	10 ug/L
trans-1,2-Dichloroethene	5 ug/L
Vinyl chloride (Chloroethene)	2 ug/L
Xylene (total)	5 ug/L

0 70 140 Feet

GRAPHIC SCALE

NOTES:
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CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY
SITE MANAGEMENT PLAN

GROUNDWATER ANALYTICAL MAP
2020

ARCADIS

FIGURE
7B

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: jrapp
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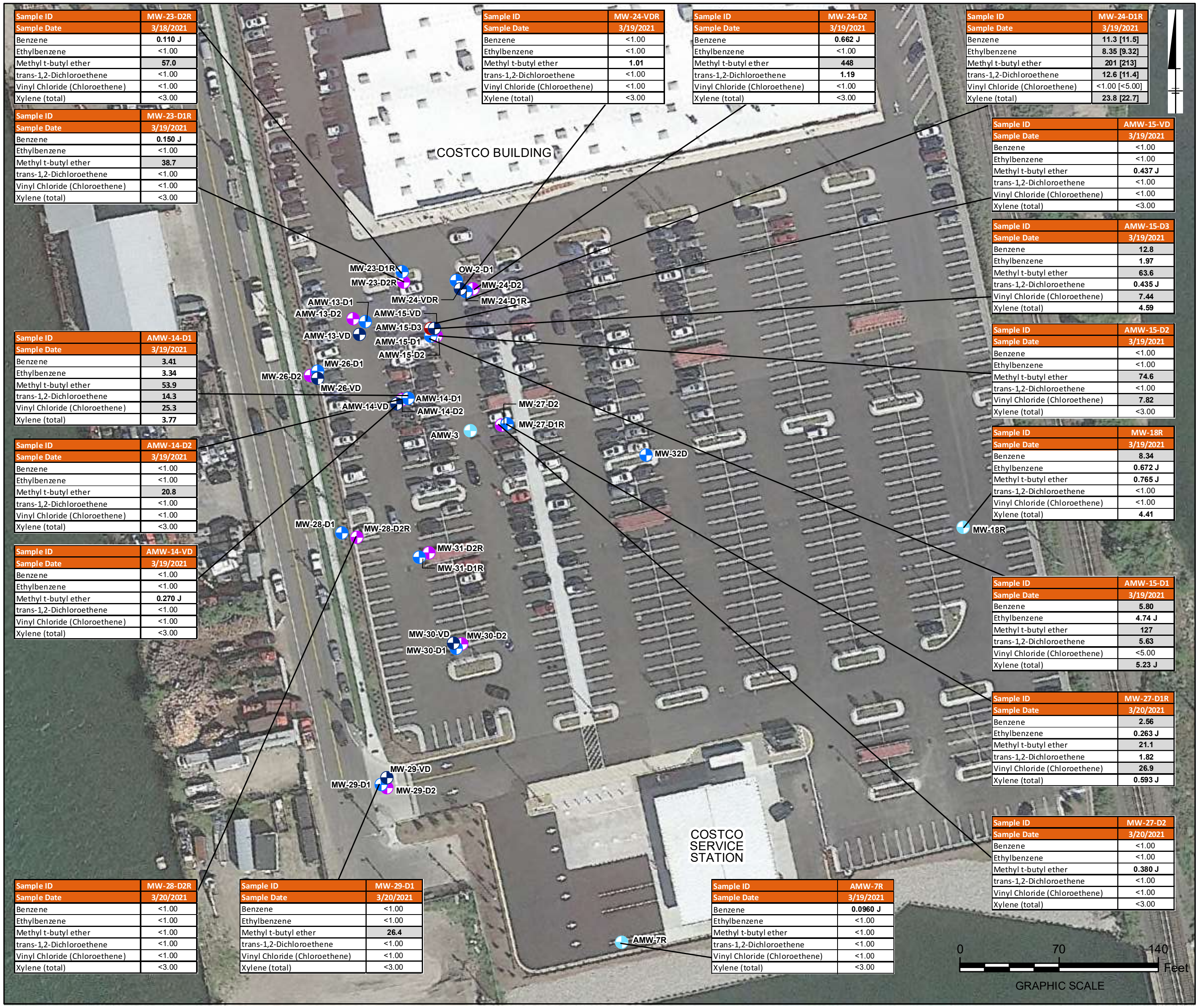


Sample ID	MW-23-D2R
Sample Date	3/18/2021
Benzene	**0.110 J**
Ethylbenzene	<1.00
Methyl t-butyl ether	**57.0**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	MW-23-D1R
Sample Date	3/19/2021
Benzene	**0.150 J**
Ethylbenzene	<1.00
Methyl t-butyl ether	**38.7**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	MW-24-VDR
Sample Date	3/19/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**1.01**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	MW-24-D2
Sample Date	3/19/2021
Benzene	**0.662 J**
Ethylbenzene	<1.00
Methyl t-butyl ether	**448**
trans-1,2-Dichloroethene	**1.19**
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	MW-24-D1R
Sample Date	3/19/2021
Benzene	**11.3 [11.5]**
Ethylbenzene	**8.35 [9.32]**
Methyl t-butyl ether	**201 [213]**
trans-1,2-Dichloroethene	**12.6 [11.4]**
Vinyl Chloride (Chloroethene)	<1.00 [<5.00]
Xylene (total)	**23.8 [22.7]**

Sample ID	AMW-15-VD
Sample Date	3/19/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**0.437 J**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	AMW-15-D3
Sample Date	3/19/2021
Benzene	**12.8**
Ethylbenzene	**1.97**
Methyl t-butyl ether	**63.6**
trans-1,2-Dichloroethene	**0.435 J**
Vinyl Chloride (Chloroethene)	**7.44**
Xylene (total)	**4.59**

Sample ID	AMW-15-D2
Sample Date	3/19/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**74.6**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	**7.82**
Xylene (total)	<3.00

Sample ID	MW-18R
Sample Date	3/19/2021
Benzene	**8.34**
Ethylbenzene	**0.672 J**
Methyl t-butyl ether	**0.765 J**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	**4.41**

Sample ID	AMW-15-D1
Sample Date	3/19/2021
Benzene	**5.80**
Ethylbenzene	**4.74 J**
Methyl t-butyl ether	**127**
trans-1,2-Dichloroethene	**5.63**
Vinyl Chloride (Chloroethene)	<5.00
Xylene (total)	**5.23 J**

Sample ID	MW-27-D1R
Sample Date	3/20/2021
Benzene	**2.56**
Ethylbenzene	**0.263 J**
Methyl t-butyl ether	**21.1**
trans-1,2-Dichloroethene	**1.82**
Vinyl Chloride (Chloroethene)	**26.9**
Xylene (total)	**0.593 J**

Sample ID	MW-27-D2
Sample Date	3/20/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**0.380 J**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	AMW-14-D1
Sample Date	3/19/2021
Benzene	**3.41**
Ethylbenzene	**3.34**
Methyl t-butyl ether	**53.9**
trans-1,2-Dichloroethene	**14.3**
Vinyl Chloride (Chloroethene)	**25.3**
Xylene (total)	**3.77**

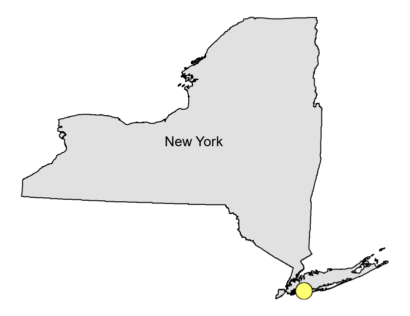
Sample ID	AMW-14-D2
Sample Date	3/19/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**20.8**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	AMW-14-VD
Sample Date	3/19/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**0.270 J**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	MW-28-D2R
Sample Date	3/20/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	<1.00
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	MW-29-D1
Sample Date	3/20/2021
Benzene	<1.00
Ethylbenzene	<1.00
Methyl t-butyl ether	**26.4**
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00

Sample ID	AMW-7R
Sample Date	3/19/2021
Benzene	**0.0960 J**
Ethylbenzene	<1.00
Methyl t-butyl ether	<1.00
trans-1,2-Dichloroethene	<1.00
Vinyl Chloride (Chloroethene)	<1.00
Xylene (total)	<3.00



SITE LOCATION

LEGEND:

- ● SHALLOW FILL UNIT MONITORING WELLS
- ● D1 HORIZON MONITORING WELLS
- ● D2 HORIZON MONITORING WELLS
- ● D3 HORIZON MONITORING WELLS
- ● VD HORIZON MONITORING WELLS

Parameter Name	NYDEC TOGS 1.1.1
Benzene	1 ug/L
Ethylbenzene	5 ug/L
Methyl-t-butyl ether	10 ug/L
trans-1,2-Dichloroethene	5 ug/L
Vinyl chloride (Chloroethene)	2 ug/L
Xylene (total)	5 ug/L

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CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY
SITE MANAGEMENT PLAN

GROUNDWATER ANALYTICAL MAP 2021

ARCADIS

FIGURE
7C

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: avi00976
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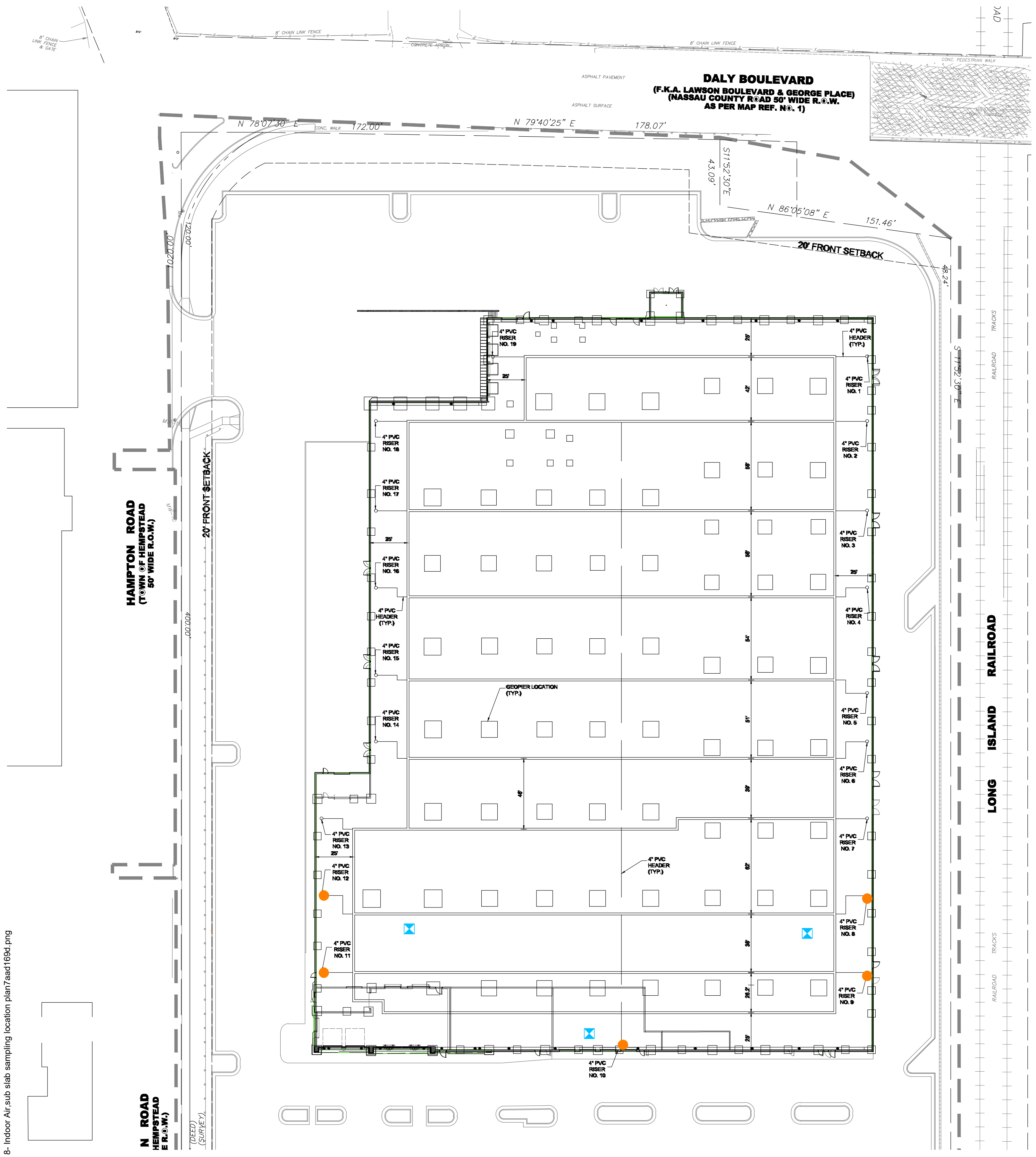


LEGEND

○	6" PVC RISER LOCATIONS
═	CETCO GEOVENT LOCATIONS
—	SOLID 4" PVC PIPE LOCATIONS
●	SUB-SLAB SAMPLING LOCATION
⧗	INDOOR AIR SAMPLING LOCATION

NOTES:

1. UTILIZE ONLY MANUFACTURER SPECIFIED PRODUCTS AND PARTS INDICATED OR BETTER THAN APPROVED EQUAL.
2. ULTIMATE OPERATION AND MAINTENANCE IS THE OWNER'S RESPONSIBILITY UNDER THE DIRECTION AND GUIDELINES OF THE ENGINEER
3. ALL PIPING-SUBGRADE SOILS SHALL BE A STRUCTURAL FILL WITH 95% RELATIVE COMPACTION AND FREE OF STANDING WATER.
4. ALL LATERAL PIPING IS TO BE INSTALLED LEVEL AND WITH NO SAGGING.
5. REFER TO THE PROJECT SPECIFICATIONS FOR ALL SYSTEM SPECIFICATIONS AND REQUIREMENTS DURING CONSTRUCTION.
6. REFER TO PROJECT SPECIFICATIONS FOR ALL STORAGE HANDLING, COLOR, SIZE, TYPE, JOINING AND CONSTRUCTION REQUIREMENTS OF ALL INDICATED PIPING.
7. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXPOSED CABLES, CONDUITS, PIPING AND THE LIKE UNDERGROUND UTILITIES AND STRUCTURES WHICH MAY BE ENCOUNTERED EITHER ABOVE OR UNDERGROUND. ALL NECESSARY PRECAUTIONS MUST BE TAKEN BY THE CONTRACTOR TO PREVENT DAMAGE TO THEIR EXISTING/PROPOSED IMPROVEMENTS. IN THE EVENT THAT SUCH DAMAGE SHOULD OCCUR FROM THE CONTRACTOR'S OPERATIONS, THE CONTRACTOR SHALL REPAIR, REPLACE OR BRING THE ORIGINAL CONDITION TO THE DAMAGED UTILITIES OR IMPROVEMENTS AT THE CONTRACTOR'S EXPENSE.
8. ALL PIPE LENGTHS INDICATED ON THIS PLAN ARE APPROXIMATE AND WILL VARY DURING CONSTRUCTION. HENCE, THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING AND VERIFYING ACTUAL LENGTHS AND SHALL NOT BID BASED ON THE VALUES PROVIDED ON THIS PLAN.
9. ALL MATERIALS SHALL BE NEW AND WITHOUT FLAWS OR DEFECTS OF ANY TYPE AND SHALL HAVE A MINIMUM GUARANTEE OF ONE YEAR AGAINST MATERIAL DEFECTS OR DEFECTIVE WORKMANSHIP.
10. ALL PVC PIPE SHALL BE CONTINUOUSLY AND PERMANENTLY MARKED WITH THE MANUFACTURER'S NAME OR TRADE MARK, SIZE SCHEDULE, TYPE, WORKING PRESSURE AT 73 DEGREES F., SDR NUMBER, PRODUCTS STANDARD NUMBER AND NATIONAL SANITATION FOUNDATION (NSF) APPROVAL.
11. ALL PVC PIPES SHALL BE SOLVENT WELDED. SOLVENT WELDED PIPE FITTINGS SHALL BE MOLDED FITTINGS, SCHEDULE 40, MANUFACTURED OF THE SAME MATERIAL AS THE PIPE, AND SHALL BE SUITABLE FOR SOLVENT WELD SLIP JOINT RING, TIGHT SEAL OR THREADED CONNECTION.
12. CEMENT SHALL BE CLEAR PLASTIC, NON-CRACKING PIPE CEMENT FOR USE ON ALL SIZES AND SCHEDULES OF PVC PIPE AND FITTINGS. CEMENT MUST BE NSF APPROVED AND MEET AST, D2564 SPECIFICATIONS. NO BLUE GLUE IS TO BE USED FOR ANY REASON.
13. CLEANER/PRIMER MUST BE ANY COLOR OTHER THAN CLEAR.
14. REFER TO ORIGINAL PROJECT SPECIFICATIONS AS WELL AS SPECIFICATIONS, DETAILS AND INSTALLATION GUIDE PROVIDED BY LIQUID BOOT AS REFERENCE.
15. THE CONTRACTOR IS TO INSTALL THE INDICATED LATERALS AS SHOWN, ANY RELOCATION OF PROPOSED LATERALS, HEADERS OR RISERS IS TO BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.
16. ALL VERTICAL RISERS WILL BE LABELED "GAS COLLECTION SYSTEM DO NOT ALTER". CAST IRON PIPING MAY BE REQUIRED FOR VERTICAL RISERS PER FIRE CODE. (TO BE DETERMINED BY ARCHITECT)
17. LIQUID BOOT VAPOR BARRIER SYSTEM WILL BE INSTALLED UNDER THE COMPLETE BUILDING SLAB AND ALONG EXTERIOR WALLS IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
18. ANCHORS AND/OR ANY OTHER PENETRATIONS THROUGH LIQUID BOOT MUST BE RESEALED AS PER LIQUID BOOT SPECIFICATIONS.
19. SEALING AROUND PENETRATIONS PER LIQUID BOOT BROWNFIELD / MEMBRANE LINER SPECIFICATIONS:
    - A. CLEAN ALL PENETRATIONS. ALL METAL PENETRATIONS SHALL BE SANDED CLEAN WITH EMERY CLOTH.
    - B. FOR APPLICATIONS REQUIRING LIQUID BOOT R BASEFABRIC GEOTEXTILE, ROLL OUT GEOTEXTILE ON SUB-GRADE WITH THE HEAT-ROLLED SIDE FACING UP, OVERLAPPING SEAMS A MINIMUM OF SIX INCHES (6"). CUT THE GEOTEXTILE AROUND PENETRATIONS SO THAT IT LAYS FLAT ON THE SUB-GRADE. LAY GEOTEXTILE TIGHT AT ALL INSIDE CORNERS. APPLY A THIN (10 MIL) TACK COAT OF LIQUID BOOT R "A" SIDE WITHOUT CATALYST WITHIN THE SEAM OVERLAP.
    - C. AT THE BASE OF PENETRATION INSTALL A MINIMUM 3/4 INCH THICK MEMBRANE CANT OF LIQUID BOOT R , OR OTHER SUITABLE MATERIAL AS APPROVED BY THE MANUFACTURER. EXTEND THE MEMBRANE AT A 60 MIL THICKNESS THREE INCHES (3") AROUND THE BASE OF PENETRATION AND UP THE PENETRATION A MINIMUM OF THREE INCHES (3"). **ALLOW TO CURE OVERNIGHT BEFORE THE APPLICATION OF LIQUID BOOT R MEMBRANE. (SEE ATTACHED MANUFACTURER'S STANDARD DETAIL.)**
    - D. SPRAY APPLY LIQUID BOOT R TO A 60 MILS MINIMUM DRY THICKNESS AROUND THE PENETRATION, COMPLETELY ENCAPSULATING THE COLLAR ASSEMBLY AND TO A HEIGHT OF ONE AND ONE HALF INCHES (1 1/2") MINIMUM ABOVE THE MEMBRANE IN THE LIQUID BOOT BROWNFIELD / MEMBRANE LINER SPECIFICATIONS. SPRAY LIQUID BOOT R TO SURROUNDING AREAS AS SPECIFIED FOR THE PARTICULAR APPLICATION. (SEE MANUFACTURER'S STANDARD DETAIL)
    - E. ALLOW LIQUID BOOT R TO CURE COMPLETELY BEFORE PROCEEDING TO STEP "F".
    - F. WRAP PENETRATION WITH POLYPROPYLENE CABLE TIE AT A POINT TWO INCHES (2") ABOVE THE BASE OF PENETRATION. TIGHTEN THE CABLE TIE FIRMLY SO AS TO SQUEEZE, BUT NOT CUT, THE CURED MEMBRANE COLLAR.

PASSIVE/ACTIVE SUB-SLAB DEPRESSURIZATION SYSTEM NOTES:

1. IF A FAN IS REQUIRED TO CHANGE THE SYSTEM FROM PASSIVE TO ACTIVE, A CERTIFIED RADON MITIGATOR MUST INSTALL THE FAN.
2. THE CONSTRUCTION TECHNIQUES UTILIZED IN THE CONSTRUCTION ARE IN COMPLIANCE WITH THE MINIMAL SYSTEM-SPECIFIC RECOMMENDATIONS REQUIRED BY THE "FINAL NYSDOH CEH BEEI SOIL VAPOR INTRUSION GUIDANCE", DATED OCTOBER 2006.
3. ALL PENETRATIONS OF CONDITIONED ENVELOPE SHALL BE SEALED TO PREVENT AIR PASSAGE.
4. VAPOR MITIGATION SYSTEM VENT PIPES SHALL BE IDENTIFIED AND CLEARLY LABELED AT INTERVALS OF NOT MORE THAN 25' IN CONCEALED LOCATIONS, NOT MORE THAN 50' IN EXPOSED LOCATIONS, AND NOT LESS THAN ONCE IN ANY ROOM OR SPACE.
5. ELECTRICAL JUNCTION SHALL BE INSTALLED NEAR WHERE FUTURE INLINE VENT PIPE FAN AND SYSTEM FAILURE ALARMS MAY BE INSTALLED.
6. TO AVOID ENTRY OF EXTRACTED SUBSURFACE VAPORS INTO THE BUILDING, THE VENT PIPE'S EXHAUST SHOULD BE
    - i. ABOVE THE EAVE OF THE ROOF (PREFERABLY, ABOVE THE HIGHEST EAVE OF THE BUILDING AT LEAST12 INCHES ABOVE THE SURFACE OF THE ROOF),
    - ii. AT LEAST 10 FEET ABOVE GROUND LEVEL.
    - iii. AT LEAST 10 FEET AWAY FROM ANY OPENING THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT.
    - iv. 10 FEET FROM ANY ADJOINING OR ADJACENT BUILDINGS, OR HVAC INTAKES OR SUPPLY REGISTERS.
7. MONITORING PORTS TO BE INSTALLED AT ALL RISER LOCATIONS PER RISER DETAILS.

0 40' 80'
GRAPHIC SCALE

SOURCE:

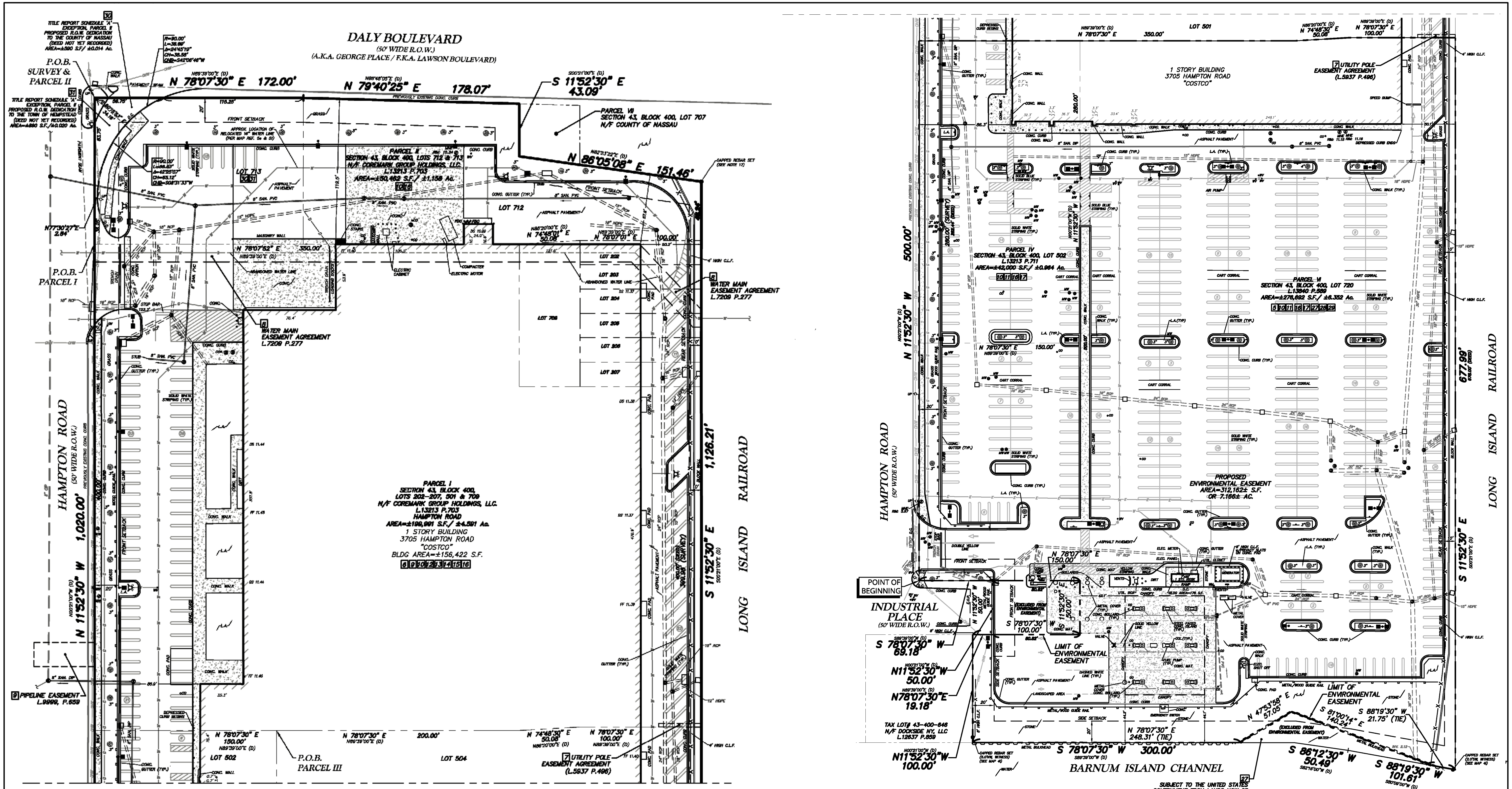
BASEMAP FROM PDF FILE CREATED BY MASER CONSULTING P.A.
DRAWING NAME: SUBSLAB VAPOR MITIGATION SYSTEM FOR COSTCO WHOLESALE, OCEANSIDE, NEW YORK,
SHEET NUMBER: VBD-1, LAST REVISED: 5/22/15

CHEVRON CORPORATIONOCEA
NSIDE, NEW YORK
SITE MANAGEMENT PLAN

SUB-SLAB AND INDOOR AIR SAMPLE LOCATION MAP

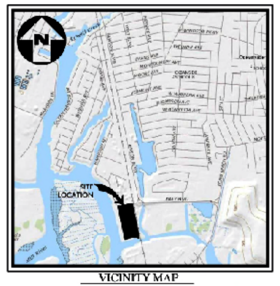
ARCADIS

FIGURE
8



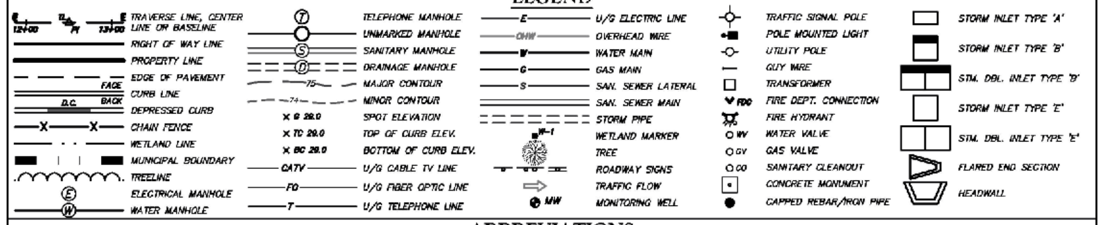
NOTE:

1. ORIGINAL FIGURE DEVELOPED BY MASER ENGINEERING.



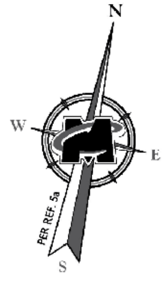
VICINITY MAP
U.S.G.S. QUADRANGLE MAP

LEGEND



ABBREVIATIONS

D.C. = DEPRESSED CURB
BC = BOTTOM OF CURB
TC = TOP OF CURB
BOL = BOLLARD
GRT = GRATE
MB = MAILBOX
FF = FINISH FLOOR
UV = UNKNOWN VALVE
MH = MANHOLE
DEP. = DEPRESSED
CL = CENTERLINE
PM = PARKING METER
MHWL = MEAN HIGH WATERLINE
MLWL = MEAN LOW WATERLINE
TW = TOP OF WALL
BW = BOTTOM WALL
INV. = INVERT ELEV
DS = DOOR SILL ELEV
CONC. = CONCRETE
⑫ PARKING SPACE COUNT
5 SCHEDULE Bii EXCEPTION



CHEVRON FACILITY 6518040
3705 HAMPTON RD
OCEANSIDE, NY
SITE MANAGEMENT PLAN

SITE SURVEY AND DRAINAGE FEATURES

ARCADIS

FIGURE
9

City: SYR Div/Group: IMDV Created By: J.Rapp Last Saved By: jrapp
T:\ ENV\Chevron Oceanside NY\3Q2022Report\MXD\MaserFigure.mxd 9/20/2022 10:00:23 AM

APPENDICES

APPENDIX A
ENVIRONMENTAL EASEMENT

60 2025 00043097

Nassau County
Maureen OConnell
County Clerk
Mineola, NY 11501

Instrument Number: 2025- 00043097
As
D06 - AGREEMENT

Recorded On: July 11, 2025
Parties: KLEIN COSTCO LLC
TO

Billable Pages: 14
Num Of Pages: 15

Recorded By: JANE PERDUE ADAMS

Comment:

** Examined and Charged as Follows: **

D06 - AGREEMENT	115.00	Blocks - Deeds - $300	300.00	Tax Affidavit TP 584	5.00

Recording Charge: **420.00**

	Amount	Consideration Amount	RS#/CS#				
Tax-Transfer	0.00	0.00	RE 23216	Basic	0.00	Spec ASST	0.00
HEMPSTEAD				Local NY CITY	0.00	Spec ADDL SONYMA	0.00
				Additional MTA	0.00	Transfer	0.00

Tax Charge: **0.00**

Property Description:

Line	Section	Block	Lot	Unit	Town Name
1	43	400	502		HEMPSTEAD
2	43	400	720		HEMPSTEAD

** THIS PAGE IS PART OF THE INSTRUMENT **

I hereby certify that the within and foregoing was recorded in the Clerk's Office For: Nassau County, NY

File Information:

Document Number: 2025- 00043097
Receipt Number: 3559121
Recorded Date/Time: July 11, 2025 10:55:45A
Book-Vol/Pg: Bk-D VI-14642 Pg-655
Cashier / Station: 0 CMC / NCCL-CDMG243

Record and Return To:

LANGDON TITLE AGENCY
132 WEST 36TH STREET SUITE 500
NEW YORK NY 10018

Maureen O'Connell

County Clerk Maureen O'Connell

Dob
14

ENVIRONMENTAL EASEMENT GRANTED PURSUANT TO ARTICLE 71, TITLE 36 OF THE NEW YORK STATE ENVIRONMENTAL CONSERVATION LAW

* having an address at 5001 Executive Parkway, Suite 200, San Ramon, CA 94583

THIS INDENTURE made as of this 14 day of May, 2025, between Owners in common Klein-Costco, LLC, 2066 East-West, LLC, Gate Oceanside LLC, Landmark Oceanside LLC, DA Oceanside LLC and 330 Oceanside LLC, collectively having an office c/o Nike Equities, 25A Hanover Road, Suite 350, Florham Park, NJ 07932 (collectively, the "Grantor"), Chevron U.S.A. Inc.* being a former property owner and responsible party related to NYSDEC Site #130165 ("Chevron"), and The People of the State of New York (the "Grantee"), acting through their Commissioner of the Department of Environmental Conservation (the "Commissioner", or "NYSDEC" or "Department" as the context requires) with its headquarters located at 625 Broadway, Albany, New York 12233; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to encourage the remediation of abandoned and likely contaminated properties ("sites") that threaten the health and vitality of the communities they burden while at the same time ensuring the protection of public health and the environment; and

WHEREAS, the Legislature of the State of New York has declared that it is in the public interest to establish within the Department a statutory environmental remediation program that includes the use of Environmental Easements as an enforceable means of ensuring the performance of operation, maintenance, and/or monitoring requirements and the restriction of future uses of the land, when an environmental remediation project leaves residual contamination at levels that have been determined to be safe for a specific use, but not all uses, or which includes engineered structures that must be maintained or protected against damage to perform properly and be effective, or which requires groundwater use or soil management restrictions; and

WHEREAS, the Legislature of the State of New York has declared that Environmental Easement shall mean an interest in real property, created under and subject to the provisions of Article 71, Title 36 of the New York State Environmental Conservation Law ("ECL") which contains a use restriction and/or a prohibition on the use of land in a manner inconsistent with engineering controls which are intended to ensure the long term effectiveness of a site remedial program or eliminate potential exposure pathways to hazardous waste or petroleum; and

Sec 43
Block 400
Lot 502
P/o 720

WHEREAS, Grantor is the owner of real property located at 1 Industrial Place, Oceanside, County of Nassau and State of New York, known and designated on the tax map of the County Clerk of Nassau County as tax map parcel numbers Section 43, Block 400, Lot 502 and part of Lot 720 being the same as that property conveyed to Grantor by deed dated November 14, 2019 and recorded in the Nassau County Clerk's Office on December 5, 2019 in Bk-D, VI-13883, Pg-743, Document No. 2019 - 00107346. The property subject to this Environmental Easement (the "Controlled Property") comprises approximately 7.166 +/- acres, and is hereinafter more fully described in the Land Title Survey dated March 12, 2025, prepared by Colliers Engineering and Design, which will be attached to the Site Management Plan. The Controlled Property description is set forth in and attached hereto as Schedule A; and *

WHEREAS, Chevron, and/or its predecessors or affiliates, is the former owner of the Former Gulf Oil Terminal, located at 1 Industrial Place, Oceanside, Town of Hempstead, Nassau County, New York. The Controlled Property is listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 130165. An Order on Consent and Administrative Settlement was entered into between Chevron and NYSDEC on December 23, 2009 (Index # W3-1142-09-08, Site #130165). The Order obligates Chevron to implement a remedial program for the contamination associated with its previous petroleum storage terminal operations.

WHEREAS, the Department accepts this Environmental Easement in order to ensure the protection of public health and the environment and to achieve the requirements for remediation established for the Controlled Property until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36; and

NOW THEREFORE, in consideration of the mutual covenants contained herein and the terms and conditions of an Order on Consent and Administrative Settlement, Index Number, W3-1142-09-08, Grantor conveys to Grantee a recorded Environmental Easement pursuant to ECL Article 71, Title 36 in, on, over, under, and upon the Controlled Property as more fully described herein ("Environmental Easement")

1. Purposes. Grantor, Chevron, and Grantee acknowledge that the Purposes of this Environmental Easement are: to convey to Grantee real property rights and interests that will run with the land until such time as this Environmental Easement is extinguished pursuant to ECL Article 71, Title 36, in order to provide an effective and enforceable means of encouraging the reuse and redevelopment of this Controlled Property at a level that has been determined to be safe for a specific use while ensuring the performance of operation, maintenance, and/or monitoring requirements; to ensure the restriction of future uses of the land that are inconsistent with the above-stated purpose; and by specifying Grantor's obligation to provide access and comply with the use restrictions set forth below.

2. Institutional and Engineering Controls. The controls and requirements listed in the Department approved Site Management Plan ("SMP") to be developed by Chevron, approved by the Department and consented to by the Grantor, including any and all amendments to the SMP approved by the Department and consented to by the Grantor are incorporated into and made part of this Environmental Easement. These controls and requirements apply to the use of the Controlled Property, run with the land, are binding on the Grantor and Chevron and the Grantor's and Chevron's successors and assigns, and are enforceable in law or equity against Chevron or any owner of the Controlled Property, any lessees and any person using the Controlled Property.

A. (1) The Controlled Property may be used for Commercial as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and Industrial as described in 6 NYCRR Part 375-1.8(g)(2)(iv). Commercial uses shall include, but not be limited to, office uses and retail uses such as grocery store, pharmacy, liquor store, restaurant, vehicle fueling facility, car wash, specialty retail store, department store, wholesale or retail general merchandise facility;

(2) The Controlled Property shall not be used for Residential or Restricted Residential purposes as defined in 6 NYCRR 375-1.8(g)(2)(i) and (ii), and the above-stated engineering controls may not be discontinued without an amendment or extinguishment of this Environmental Easement.

(3) All Engineering Controls must be operated and maintained by Chevron as specified in the Site Management Plan (SMP) developed by Chevron, approved by the Department and consented to by the Grantor;

(4) All Engineering Controls must be inspected by Chevron at a frequency and in a manner defined in the SMP;

(5) The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department;

(6) Groundwater and other environmental or public health monitoring must be performed by Chevron as defined in the SMP. Community air monitoring is required to be performed by Chevron or Grantor, as applicable, for soil disturbances within areas of residual soil impacts as defined in Appendix B, Excavation Work Plan, and Appendix F, Generic Community Air Monitoring Plan, of the SMP;

(7) Data and information pertinent to Site Management of the Controlled Property must be reported by Chevron to Grantee and Grantor at the frequency and in a manner defined in the SMP;

(8) All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with the SMP;

(9) Monitoring to assess the performance and effectiveness of the remedy must be performed by Chevron as defined in the SMP;

(10) Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical components of the remedy shall be performed by Chevron as defined in the SMP;

(11) Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this Environmental Easement.

B. The SMP describes obligations that Chevron has agreed to undertake, as the Responsible Party or its successor and assign. Chevron's assumption of the obligations contained in the SMP, which include, but are not limited to, sampling, monitoring, and/or operating a treatment system, and providing certified reports to the NYSDEC, is and remains a fundamental element of (i) the Department's determination that the Controlled Property is safe for a specific use, but not all uses, and (ii) Grantor's consent to this Environmental Easement and the SMP. The SMP may be modified in accordance with the Department's statutory and regulatory authority upon notice to, and with the consent of, Grantor. The Grantor is obligated only to provide access to the Controlled Property, to comply with the use limitations outlined in this Environmental Easement, and to comply with the restrictions in and requirements of the SMP as they apply to Grantor's activities on the Controlled Property. Grantor shall provide 30-days' notice to Chevron of any material redevelopment of and/or modifications to the Controlled Property that is inconsistent with the uses authorized by this Environmental Easement.

C. Grantor must provide all persons who acquire any interest in the Controlled Property from Grantor a true and complete copy of the approved SMP for the Controlled Property and all approved amendments to that SMP.

D. Grantor covenants and agrees that until such time as the Environmental Easement is extinguished in accordance with the requirements of ECL Article 71, Title 36 of the ECL, the property deed and all subsequent instruments of conveyance granted by Grantor relating to the Controlled Property shall state in at least fifteen-point bold-faced type:

This property is subject to an Environmental Easement held by the New York State Department of Environmental Conservation pursuant to Title 36 of Article 71 of the Environmental Conservation Law.

F. Grantor covenants and agrees that this Environmental Easement shall be incorporated in full or by reference in any leases, licenses, or other instruments granting a right to use the Controlled Property issued after the date of this Environmental Easement.

G. Chevron covenants and agrees that it shall, at such time as NYSDEC may require, submit to NYSDEC, with a simultaneous copy to Grantor, a written statement by an expert the NYSDEC may find acceptable certifying under penalty of perjury, in such form and manner as the Department may require, that:

(1) the inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under the direction of the individual set forth at 6 NYCRR Part 375-1.8(h)(3).

(2) the institutional controls and/or engineering controls employed at such site:

(i) are in-place;

(ii) are unchanged from the previous certification, or that any identified changes to the controls employed were approved by the NYSDEC and that all controls are in the Department-approved format; and

(iii) that nothing has occurred that would impair the ability of such control to protect the public health and environment;

(3) the owner will continue to allow access to such real property to evaluate the continued maintenance of such controls;

(4) nothing has occurred that would constitute a violation or failure to comply with any site management plan for such controls;

(5) the report and all attachments were prepared under the direction of, and reviewed by, the party making the certification;

(6) to the best of his/her knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program, and generally accepted engineering practices; and

(7) the information presented is accurate and complete.

H. Within ten (10) business days of any reasonable request by Chevron for available information necessary for Chevron to comply with its obligations under this Environmental Easement, including but not limited to Chevron's SMP obligations under Section 2(B) and its reporting obligations under Section 2(G), Grantor shall provide any non-privileged information in its custody and control to Chevron.

3. Right to Enter and Inspect. Grantee, its agents, employees, or other representatives of the State may enter and inspect the Controlled Property in a reasonable manner and at reasonable times to assure compliance with the above-stated restrictions.

4. Reserved Grantor's Rights. Grantor reserves for itself, its assigns, representatives, and successors in interest with respect to the Property, all rights as fee owner of the Property, including:

A. Use of the Controlled Property for all purposes not inconsistent with, or limited by the terms of this Environmental Easement;

B. The right to give, sell, assign, or otherwise transfer part or all of the underlying fee interest to the Controlled Property, subject and subordinate to this Environmental Easement;

5. Enforcement

A. Subject to the Grantor's reserved rights, this Environmental Easement is enforceable in law or equity in perpetuity by Grantor, Chevron, and Grantee, or any affected local government, as defined in ECL Section 71-3603, against, as applicable, Chevron, the owner of the Property, any lessees, and any person using the land. Enforcement shall not be defeated because of any subsequent adverse possession, laches, estoppel, or waiver. It is not a defense in any action to enforce this Environmental Easement that: it is not appurtenant to an interest in real property; it is not of a character that has been recognized traditionally at common law; it imposes a negative burden; it imposes affirmative obligations upon the owner of any interest in the burdened property; the benefit does not touch or concern real property; there is no privity of estate or of contract; or it imposes an unreasonable restraint on alienation.

B. If any person violates this Environmental Easement, the Grantee may revoke the Certificate of Completion with respect to the Controlled Property.

C. Grantee shall notify Grantor and Chevron of a breach or suspected breach of any of the terms of this Environmental Easement. Such notice shall set forth how Grantor or Chevron can cure such breach or suspected breach and give Grantor and Chevron a reasonable amount of time from the date of receipt of notice in which to cure. At the expiration of such period of time to cure, or any extensions granted by Grantee, the Grantee shall notify Grantor and Chevron of any failure to adequately cure the breach or suspected breach, and Grantee may take any other appropriate action reasonably necessary to remedy any breach of this Environmental Easement, including the commencement of any proceedings in accordance with applicable law.

D. The failure of Grantee to enforce any of the terms contained herein shall not be deemed a waiver of any such term nor bar any enforcement rights.

6. Notice. Whenever notice to the Grantee (other than the annual certification) or approval from the Grantee is required, the Party providing such notice or seeking such approval shall identify the Controlled Property by referencing the following information:

County, NYSDEC Site Number, NYSDEC Brownfield Cleanup Agreement, State Assistance Contract or Order Number, and the County tax map number or the Liber and Page or computerized system identification number.

Parties shall address correspondence to:

Site Number: 130165
Office of General Counsel
NYSDEC
625 Broadway
Albany, NY 12233-5500

With a copy to:

Site Control Section
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, NY 12233-5500

All notices and correspondence shall be delivered by hand, by registered mail or by Certified mail and return receipt requested. The Parties may provide for other means of receiving and communicating notices and responses to requests for approval.

7. Recordation. Grantor shall record this instrument, within thirty (30) days of execution of this instrument by the Commissioner or her/his authorized representative in the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

8. Amendment. Any amendment to this Environmental Easement may only be executed by the Commissioner of the New York State Department of Environmental Conservation or the Commissioner's Designee, and filed with the office of the recording officer for the county or counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

9. Extinguishment. This Environmental Easement may be extinguished only by a release by the Commissioner of the New York State Department of Environmental Conservation, or the Commissioner's Designee, and filed with the office of the recording officer for the county or

counties where the Property is situated in the manner prescribed by Article 9 of the Real Property Law.

10. Obligations Several Not Joint and Several. The obligations imposed by this instrument upon Grantor and Chevron shall be several and not joint and several.

IN WITNESS WHEREOF, Grantor has caused this instrument to be signed in their names.

Klein-Costco, LLC

By:
Print Name: JACOB KLEIN 4/9/2025
Title: MANAGER Date:

Grantor's Acknowledgment

STATE OF NJ)
) ss:
COUNTY OF ~~B~~ Morris)

On the 9th day of, April in the year 2025, before me, the undersigned, personally appeared JACOB KLEIN, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New Jersey

BENJAMIN J. KLIBANOFF
Notary Public, State of New Jersey
Comm. # [illegible]
My Commission Expires 2/8/2028

2066 East-West, LLC

By: ______________________

Print Name: LOUIS LAGIOS

Title: MANAGER   Date: 4/9/25

Grantor's Acknowledgment

STATE OF New Jersey)
) ss:
COUNTY OF MORRIS)

On the 9th day of, April in the year 2025, before me, the undersigned, personally appeared Louis Lagios, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New Jersey

BENJAMIN J. KLIBANOFF
Notary Public, State of New Jersey
Comm. # 50206641
My Commission Expires 2/8/2028

Gate Oceanside LLC

By: Laurence J Liebowitz

Print Name: Laurence J. Liebowitz

Title: Manager   Date: 4/9/25

Grantor's Acknowledgment

STATE OF New Jersey)
) ss:
COUNTY OF Union)

#Laurence J. Liebowitz ⑮

On the 9th day of, April in the year 2025, before me, the undersigned, personally appeared Laurence J Liebowitz, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New Jersey

KYLE C. STAR
Notary Public, State of New Jersey
Commission # 50055456
My Commission Expires 2/23/2027

Landmark Oceanside LLC

By: Laurence J Liebowitz

Print Name: Laurence J. Liebowitz

Title: Manager Date: 4/9/25

Grantor's Acknowledgment

STATE OF New Jersey)

) ss:

COUNTY OF Union)

x "Lawrence J. Liebowitz" KS

On the 9th day of, April in the year 2025, before me, the undersigned, personally appeared ~~[illegible]~~, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New Jersey

KYLE C. STAR
Notary Public, State of New Jersey
Commission # 50055456
My Commission Expires 2/23/2027

DA Oceanside LLC

By:

Print Name: P. Tom Tousa

BPA 6/25/25

Title: Manager Date: 4/9/25

Grantor's Acknowledgment

STATE OF New Jersey)

) ss:

COUNTY OF Union)

On the 9th day of, April in the year 2025, before me, the undersigned, personally appeared P. Tom Tousa, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of New Jersey

KYLE C. STAR
Notary Public, State of New Jersey
Commission # 50055456
My Commission Expires 2/23/2027

330 Oceanside LLC

By:
Print Name: ELLIOT JACOBY
Title: MANAGER Date: 2/19/2025

Grantor's Acknowledgment

STATE OF Florida)
) ss:
COUNTY OF Palm Bch)

On the 19 day of Feb, in the year 2025, before me, the undersigned, personally appeared Elliot Jacoby, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Notary Public - State of Florida

Print Name: Andrea Phillips

Notary Public Serial No: HH536305

Commission Expiry Date : 6/8/2028

Notary Public State of Florida
Andrea Phillips
My Commission HH 536305
Expires 6/8/2028

IN WITNESS WHEREOF, Chevron has caused this instrument to be signed in its name.

Chevron U.S.A. Inc.:
By:
Print Name: Scott M. Banks
Title: Assistant Secretary Date: May 1, 2025

Chevron's Acknowledgment

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

STATE OF CALIFORNIA

COUNTY OF CONTRA COSTA

On the 1st day of May, in the year 2025, before me, A. Freschi, Notary Public, personally appeared Scott M. Banks, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

I certify under PENALTY OF PERJURY under the laws of the State of California that the foregoing paragraph is true and correct. WITNESS my hand and official seal.

Notary Public - State of California

WITNESS my hand and official seal

A. FRESCHI
Notary Public - California
San Joaquin County
Commission # 2470107
My Comm. Expires Nov 7, 2027

Signature A. Freschi (Seal)

THIS ENVIRONMENTAL EASEMENT IS HEREBY ACCEPTED BY THE PEOPLE OF THE STATE OF NEW YORK, Acting By and Through the Department of Environmental Conservation as Designee of the Commissioner,

By: ______________________

Andrew Guglielmi, Director

Division of Environmental Remediation

Grantee's Acknowledgment

STATE OF NEW YORK)

) ss:

COUNTY OF ALBANY)

On the 14th day of May , in the year 2025, before me, the undersigned, personally appeared Andrew Guglielmi, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/ executed the same in his/her/ capacity as Designee of the Commissioner of the State of New York Department of Environmental Conservation, and that by his/her/ signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Notary Public - State of New York

Cheryl A. Salem
Notary Public State of New York
Registration No. 01SA0002177
Qualified in Albany County
My Commission Expires March 3, 2027

SCHEDULE "A" PROPERTY DESCRIPTION

All that certain lot, tract or parcel of land situate, lying and being in the Town of Hempstead, the County of Nassau, and the State of New York, and being an environmental easement encompassing all of Lot 502, Block 400 and a portion of Lot 720, in Block 400, Section 43 as shown on the plan entitled, "Boundary Survey for Arcadis 'Chevron facility 6518040', Section 43, Block 400, Tax Lots 502 & A Portion of Tax Lot 720, Town of Hempstead, Nassau County, New York," prepared by Colliers Engineering & Design, dated 04/14/2023, last revised on 03/12/2025, and being more particularly bounded and described as follows:

BEGINNING at a point of intersection formed by the northerly line of Industrial Place (50' wide R.O.W.) With the easterly line of Hampton Road (50' wide R.O.W.), and from said point of beginning, running, thence -

1. **N 11°52'30" W 500.00 feet,** along the easterly line of Hampton Road to a point where the same is intersected by the northerly line of Lot 502, Block 400; thence –

Along the said northerly line of Lots 502 and 720, Block 400 the following three (3) courses;

2. **N 78°07'30" E 350.00 feet,** thence -
3. **N 74°48'30" E 50.08 feet,** thence -
4. **N 78°07'30" E 100.00 feet,** to the easterly line of said Lot 720, thence -
5. **S 11°52'30" E 677.99 feet,** along said easterly line of said Lot 720, to the southerly line of said Lot 720, thence -
6. **S 88° 19' 30" W 21.75 feet,** along the southerly line of said Lot

   720, thence - Running through said Lot 720, and along a metal

   bulkhead the following **two (2)** courses:
7. **S 81° 00' 14" E 140.24 feet,** thence -
8. **N 47° 53' 58" E 57.05 feet,** to the aforesaid southerly line of lot 720, thence -
9. **S 78° 07' 30" W 248.31 feet,** to a point on the line dividing Lots 646 and 720, Block 400, thence -
10. **N 11°52'30" W 100.00 feet,** along the said dividing line, to a point on the southerly line of Industrial Place (50' wide R.O.W.), thence -
11. **N 78° 07' 30" E, 100.00 feet,** along the said southerly line of Industrial Place and beyond, through a portion of Lot 720, Block 400, thence -

12. **N 11° 52' 30" W, 50.00 feet,** to the northeastward extension of the northerly line of said Industrial Place, thence -

13. **S 78° 07' 30" W, 150.00 feet,** along the said northeastward extension, and beyond, along the said northerly line of industrial place to the point and place of **BEGINNING**.

Containing: ±312,162 square feet of land more or less or ±7.166 acres of land more or less.

Record + Return:
Langdon Title Agency
132 West 36th Street
Suite 500
New York, NY 10018

APPENDIX B
EXCAVATION WORK PLAN

Chevron Environmental Management Company

Appendix B
Excavation Work Plan

Former Gulf Oil Terminal
Nassau County
Oceanside, New York
NYDEC Site Number: 130165

September 2022

Appendix B

Excavation Work Plan

Former Gulf Oil Terminal
Nassau County
Oceanside, New York
NYDEC Site Number: 130165

September 2022

Prepared By:
Arcadis U.S., Inc.
6041 Wallace Rd Ext, Suite 300
Wexford
Pennsylvania 15090
Phone: 724 742 9180
Fax: 724 742 9189

Prepared For:
Chevron Environmental Management Company

Our Ref:
30062947

Alexandria Newbrough
Certified Project Manager

Manan Dalal
Assistant Project Manager

Contents

Tables

Acronyms and Abbreviations

bgs	below ground surface
CAMP	Community Air Monitoring Plan
CEMC	Chevron Environmental Management Company
COC	Contaminants of Concern
EWP	Excavation Work Plan
HASP	Health and Safety Plan
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
PCB	Polychlorinated Biphenyl
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SPDES	State Pollution Discharge Elimination System
SVOC	Semi volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
VOC	Volatile Organic Compound
VRU	Vapor Recovery Unit

1 NOTIFICATION

At least 15 days prior to the start of any non-emergency excavation activity that is anticipated to encounter remaining soil within the established areas of remaining soil impacts (Figure 6C) or groundwater contamination, the owner of the property, or their representative will notify Chevron Environment Management Company (CEMC) and the New York State Department of Environmental Conservation (NYSDEC). Areas where remaining contamination may be potentially encountered:

- Shallow fill unit exhibits remaining impacts at various depths ranging from 4 to 12 feet below ground surface (bgs) based on the former surface grade elevations prior to fill import and existing final design grade. Thickness of imported fill is on average 4 feet. These areas of residual impacted soil are based on sample locations that exceed the protection of groundwater and/or the commercial soil cleanup objectives that have not been excavated or remediated (Figure 6C)
- Meadow mat and lower sand unit exhibit remaining impacts at depths ranging from 20 to 30 feet bgs based on the former surface grade elevations. These areas are based on soil samples that exceed the protection of groundwater and/or commercial soil cleanup objectives that have not been excavated or remediated (Figure 6C).

Section 2.5 in the Site Management Plan (SMP) describes in more detail the remaining impacts at the site.

Currently, this notification will be made to:

R. Scott Deyette
Chief, Inspection Unit
NYSDEC
Division of Environmental Remediation
Remedial Bureau C
625 Broadway, 11th Floor
Albany, New York 12233-7014
518.402.9794

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the site cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control.
- A summary of environmental conditions anticipated in the work areas that contain remaining soil impacts (Figure 6C) or groundwater contamination, including the nature and concentration levels of contaminants of concern (COCs) of potential remaining contamination and plans for any pre-construction sampling.
- A schedule for the work, detailing the start and completion of all intrusive work.
- A summary of the applicable components of this *Excavation Work Plan* (EWP).
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120.
- A copy of the contractor’s Health and Safety Plan (HASP), in electronic format.
- Identification of disposal facilities for potential waste streams.
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into known or potentially contaminated material. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the Certificate of Completion.

Soils will be segregated (based on previous environmental data and screening results) into material that requires off-site disposal, material that requires testing, material that can potentially be returned to the subsurface, and material that can be used as cover soil. Soil/fill potential suitable for reuse shall be sampled and analyzed (as described in Section 7 of this EWP) to evaluate whether material can be reused or transported off-site for treatment and/or disposal.

3 STOCKPILE METHODS

Stockpiles of excavated material will, at minimum, be placed on top of polyethylene sheeting. If required by NYSDEC, stockpiles of excavated material shall be placed within an engineering staging area. Stockpiles will be covered using polyethylene sheeting to reduce potential infiltration of precipitation, migration of wind-blown dust, and direct contact exposures. Damaged polyethylene sheeting will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work in the potentially contaminated areas (Section 1), and the excavation and load-out of all excavated material. The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this EWP.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under the Site Management Plan (SMP) is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and New York State Department of Transportation (NYSDOT) requirements (and all other applicable transportation requirements).

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. To the extent any trucks are operating in areas of exposed residual contamination, the qualified environmental professional will monitor all outbound trucks for cleanliness and have equipment on hand to wash down trucks (as necessary) or as required by local construction permitting or compliance requirements. Any wash waters will be collected and disposed off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

5 MATERIALS TRANSPORTED OFF-SITE

All transportation of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used. As necessary, all trucks will be washed prior to leaving the site. As indicated above, truck wash waters will be collected and disposed off-site in an appropriate manner.

The truck transport route for all vehicles leaving the site with material destined for off-site treatment and/or disposal should be reviewed and approved by the Nassau County Police Department (Fourth Precinct) prior to implementation.

All trucks loaded with site materials will exit the vicinity of the site using only the approved truck route. The most appropriate route would also take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and, (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the site. Queuing of trucks will be performed on-site, to minimize off-site disturbance. Off-site queuing will be prohibited.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during excavation activities.

6 MATERIALS DISPOSED OFF-SITE

All soil/fill/solid waste excavated and removed from potentially contaminated area of the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from potentially contaminated areas of this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials excavated from potentially contaminated areas of this site will not occur without formal NYSDEC approval.

Off-site treatment and/or disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate (e.g. waste disposal facility, treatment facility, C/D recycling facility, etc.). Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Project Reports (described in Section 5.0 of the SMP). This documentation will include waste profiles, laboratory analytical test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted Soil Cleanup Objectives (SCO) is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

7 MATERIALS REUSED ON-SITE

Material used for on-site reuse must meet NYSDEC 6NYCRR 375-6.7(d) Restricted Commercial SCOs. Chemical criteria for on-site reuse of material in the areas of residual impacts (Figure 6C) are provided in Table B-1. The qualified environmental professional will ensure that procedures defined for materials reuse in the SMP are followed and that unacceptable material does not remain on-site. On-site material, including historic fill and impacted soil, that is acceptable for re-use on-site will be placed below a demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Concrete crushing or processing on site and will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. At a minimum, water encountered in excavations shall be sampled and analyzed for the target compound list (TCL) volatile organic compound (VOCs), SVOCs (semivolatile organic compound), and Target Analyte List (TAL) metals as well as analytes required by potential off-site treatment/disposal facilities. Water shall be transported off-site for proper disposal or treated on-site via a treatment system that has been approved by the NYSDEC, as appropriate.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river), if feasible, will be performed under a State Pollution Discharge Elimination System (SPDES) permit. Runoff from surface discharges (if any) shall be controlled. No discharges shall enter a surface water body without proper permits. Dewatering and development fluids will not be recharged back to the land surface or subsurface of the site but will be managed off-site.

9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities on site, the cover system will be restored in a manner that complies with the December 10, 2021 NYSDEC Record of Decision. The demarcation layer, or equivalent material, will be replaced to provide a visual reference to the top of the areas of remaining soil impacts, the zone that requires adherence to special conditions for disturbance of remaining impacted soils defined in this Site Management Plan**.**

If the type of cover system changes on site from that which exists prior to the excavation (e.g., a soil or stone cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contaminated areas. A figure showing the modified surface will be included in the subsequent Periodic Project Report and in any updates to the SMP.

10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site for backfill use in areas of residual contamination (Figure 6c) ("Imported Material") will be approved by the qualified environmental professional and will be in compliance with provisions in the SMP prior to receipt.

Such Imported Material shall be sampled in accordance with the frequency requirements presented in Table 5.4(e) 10 of NYSDEC *DER-10: Technical Guidance for Site Investigation and Remediation* (DER-10 and meet the commercial/industrial use levels presented in Appendix 5 of DER-10, with the exception that any fill to be placed within the Ecological Buffer Zones located within 50 feet of the shoreline as identified on Figure 2 of the SMP must meet the unrestricted use levels presented in Appendix 5 of DER-10.

Topsoil used for the final cover shall be fertile, friable, natural loam surface soil, capable of sustaining plant growth, and free of clods or hard earth, plants or roots, sticks or other extraneous material that could discourage plant growth. Topsoil shall be seeded with a sustainable perennial mixture and appropriate erosion control measures shall be taken until the perennial grass is established.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site. All Imported Material will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with Imported Materials will be securely covered with tight fitting covers. Imported Materials will be stockpiled separately from excavated materials and covered to prevent dust releases.

11 STORMWATER POLLUTION PREVENTION

General stormwater pollution prevention activities to be conducted in support of site excavation activities including the following:

- Silt fence (e.g., synthetic, hay bales, etc.) will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.
- Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.
- All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.
- Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

- Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.
- Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

12 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminated materials are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product surrounding soils as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for full a full list of analytes (TAL metals; TCL VOCs and SVOCs, TCL pesticides and Polychlorinated biphenyls [PCBs]), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive work will be promptly communicated by phone to NYSDEC's Project Manager (identified in Section 1). Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 6 of the SMP.

13 COMMUNITY AIR MONITORING

Community air monitoring for volatile organic compounds (VOCs) and particulates will be conducted for soil disturbance activities (including roll-off and truck loading) conducted within established areas of residual soil impacts (Figure 6c), in accordance with the New York State Department of Health (NYSDOH) Community Air Monitory Plan (CAMP) included as Appendix F to SMP. The quantity and locations of community air monitoring stations will be determined in conjunction with the NYSDOH, based on the size and location of the proposed excavation; however, at a minimum there will be one upwind and one downwind monitoring location. CAMP monitoring results will be included in the following project report. Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers on a weekly basis. Historically, the CAMP data has been provided to the Nassau County Environmental Health Office as per their request.

14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors on-site and off-site. Specific odor control methods to be used on a routine basis are discussed below and in the NYSDOH CAMP included as Appendix F to the SMP. If nuisance odors are identified at the site boundary, or if odor complaints are received, in connection with work done in the established areas of remaining soil impacts (Figure 6c), work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's

Remediation Engineer, and any measures that are implemented will be discussed in the subsequent Periodic Project Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (a) direct load-out of soils to trucks for off-site disposal; (b) use of chemical odorants in spray or misting systems; and (c) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

15 DUST CONTROL PLAN

In connection with work done in the established areas of remaining soil impacts (Figure 6c), dust (i.e., particulate) monitoring will be performed in accordance with the CAMP included as Appendix F to the SMP. A dust suppression plan that addresses dust management during invasive work within areas identified as potentially containing contaminated will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, un-vegetated soils vulnerable to dust production.

Table

Table B-1
Criteria for On-site Reuse of Excavated Materials or Imported Soils
Excavation Work Plan
Former Gulf Oil Terminal
Oceanside, New York

Location	Criteria
Within 6 inches of grade; and within 50 horizontal feet from shore	SCOs for Commercial Site Use; SCOs for Protection of Ecological Resources; and Plantable Soil (6-20% by weight of fine textured stable organic material)
Within 6 inches of grade; and greater than 50 horizontal feet from shore	SCOs for Commercial Site Use; SCOs for Protection of Ecological Resources; and Plantable Soil (6-20% by weight of fine textured stable organic material)
Within 6 to 24 inches below grade; and within 50 horizontal feet from shore	SCOs for Commercial Site Use; SCOs for Protection of Ecological Resources; and Plantable Soil (6-20% by weight of fine textured stable organic material)
Within 6 to 24 inches below grade; and greater than 50 horizontal feet from shore	SCOs for Commercial Site Use
Greater than 24 inches below grade	Soil is not Grossly Impacted; Total SVOCs are less than 500 ppm; and covered by a demarcation warning layer

Legend:
ppm : parts per million
SCOs: Soil Cleanup Objectives per 8 NYCRR Subpart 375-6
SVOC: Semivolatile Organic Compound

Documentation of the fill source will be provided to the NYSDEC for approval before use onsite in accordance with DER-10 Technical Guidance for Site Investigation and Remediation Sections 5.4(e)5-6 and Table 5.4(e)10. All fill material brought to the Site will meet the requirements for the identified Site use as set forth in 6 NYCRR Part 375-6.7(d). Imported soil (sand, stone, and topsoil) must be free of odors and sheens.

Arcadis U.S., Inc.
6041 Wallace Road Extension, Suite 300
Wexford
Pennsylvania 15090
Phone: 724 742 9180
Fax: 724 742 9189
www.arcadis.com

Arcadis. Improving quality of life.

APPENDIX C

SITE RELATED CONTACT INFORMATION

APPENDIX C – SITE RELATED CONTACT INFORMATION

Name	Phone/Email Address
Property Onwer/Facility Owner: Klein-Costco, LLC, 2066 East-West, LLC, Gate Oceanside, LLC, Landmark Oceanside, LLC and 330 Oceanside, LLC , collectively a successor to Coremark Group Holdings, DST, and Coremark Group Holdings, LLC. Contact: Louis Lagios – Facilities/Office Manager, Nike Equities, LLC	O: 973-845-6444 C: 973-670-9901 Email: lpl@nikeequities.com
Responsible Party: Chevron Environmental Management Company Contact: Rob Speer - Portfolio Manager East	O: 932-854-5648 C: 713-301-7274 Email: RSpeer@chevron.com
Responsible Party Environmental Consultant: Arcadis Contact: Alex Newbrough – Project Manager	O: 724-934-9532 Email: alex.newbrough@arcadis.com
NYSDEC DER Project Manager Contact: Steven Scharf	O: 518-402-9702 Email: steven.scharf@dec.ny.gov
NYSDOH Project Manager Contact: Jacquelyn Nealon	Email: jacquelyn.nealon@health.ny

APPENDIX D

MONITORING WELL CONSTRUCTION LOGS

Date Start/Finish: 11/30/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164690.55
Easting: 1080941.49
Casing Elevation: 7.53

Borehole Depth: 10' bgs
Surface Elevation: 5.41

Descriptions By: MWE

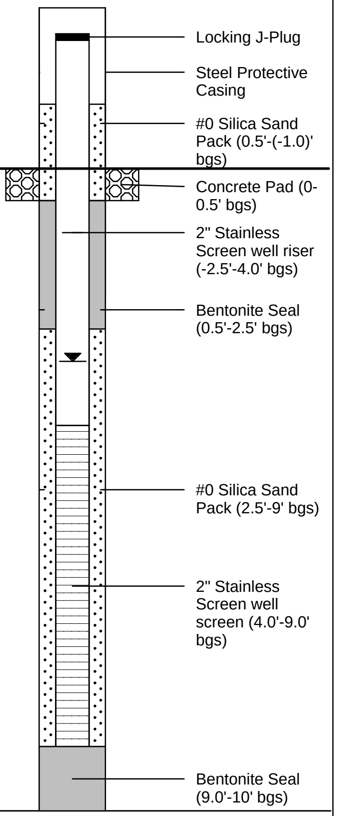
Well/Boring ID: **AMW-3**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	273		Brown to grey fine to coarse SAND and fine to coarse GRAVEL, trace Silt, Organics (M,NP)
		2	2-4	Grab	384		moderate petroleum-like odor, increase with depth
5	0	3	4-6	Grab	339		heavy petroleum-like odor
		4	6-8	Grab	211		Grey fine to medium SAND, little fine to medium Gravel (S,NP)
		5	8-10	1.0	67.8		Grey SILT and CLAY, little Peat, trace Organics, fine Sand (S,P) moderate petroleum-like odor, decrease with depth
10	-5						End of boring at 10' bgs
15	-10						

Well/Boring Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ AMW-3 (0-2'), (2-4'), (4-6') & Dup-2-113010 @ (2-4') / MS/MSD @ (4-6') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Project: B0047517.0000 Template: G:\Rockware\LogPlot 2001\LogFiles\Chevron-Oceanside\boring_well geoprobe 2007 .ldfx
Data File:AMW-3 Date: 5/5/2011 Created/Edited by: MWE

Date Start/Finish: 11/18/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164369.13
Easting: 1081225.55
Casing Elevation: 6.36

Borehole Depth: 12' bgs
Surface Elevation: 6.60

Descriptions By: MWE

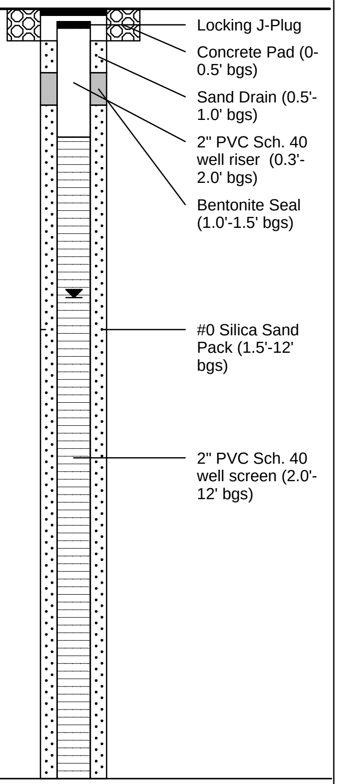
Well/Boring ID: **AMW-4**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0		1	0-2	Grab	0.2		Red to brown fine to medium SAND, little subangular Gravel, Silt, and trace Organics (M,NP)
	5						
		2	2-4	Grab	0.0		
		3	4-6	Grab	455		Grey to brown fine to coarse SAND, little Silt, Clay, and fine to medium Gravel (S,NP) moderate petroleum-like odor, decreses with depth
5							
	0	4	6-8	Grab	155		
		5	8-10	0.3	27.8		
10		6	10-12	2.0	11.7		increase Silt and Clay with depth
	-5						Grey SILT and CLAY, trace fine Sand, Organics (S,MP)
							End of boring at 12' bgs
15							

Well/Boring Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ AMW-4 (2-4'), (4-6'), (6-8') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Date Start/Finish: 11/2910
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164319.6
Easting: 1081050.81
Casing Elevation: 6.43

Borehole Depth: 12' bgs
Surface Elevation: 6.74

Descriptions By: MWE

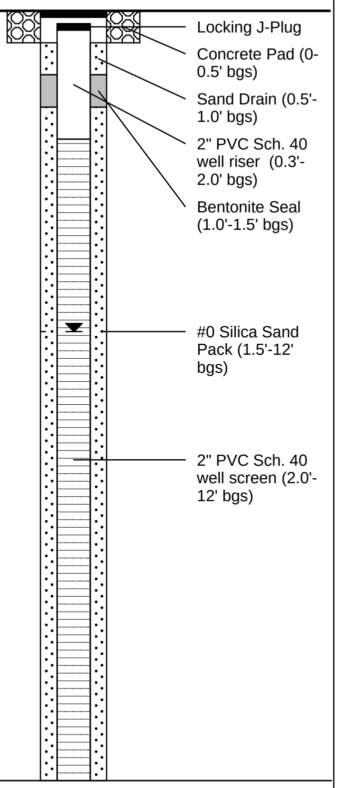
Well/Boring ID: **AMW-7**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	0.0		Brown fine to medium SAND, little fine to coarse Gravel, trace Silt (M,NP)
		2	2-4	Grab	0.0		
5		3	4-6	Grab	0.0		
	0	4	6-8	Grab	0.4		faint petroleum-like odor
		5	8-10	2.0	18.9		
10	-5	6	10-12	2.0	1.7		Brown fine to medium SAND, little grey fine Sand, trace fine Gravel (S,NP) odor Grey to brown fine SAND, little to some Silt, trace Clay (layered between sand seams (1-2 mm))
15							End of boring at 12' bgs

Well/Boring Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ AMW-7 (4-6'), (8-10'), (10-12') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Date Start/Finish: 11-30-10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164748.61
Easting: 1080920.06
Casing Elevation: 7.90

Borehole Depth: 16' bgs
Surface Elevation: 5.41

Descriptions By: MWE

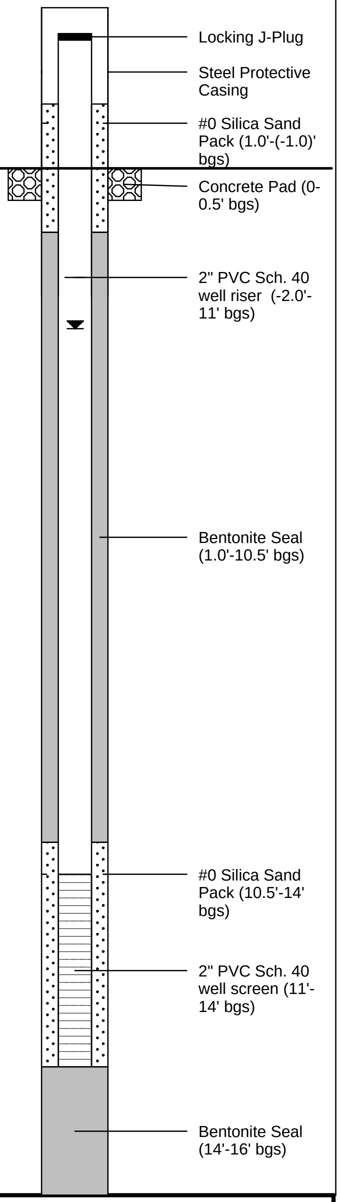
Well/Boring ID: **AMW-8**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	10.0		Brown fine to coarse SAND, some fine to medium subangular Gravel, trace Silt, Organics (M,NP) faint petroleum-like odor, increase with depth
		2	2-4	Grab	43.8		Grey to brown fine to coarse SAND, little fine to medium Gravel (S,NP) moderate petroleum-like odor, trace sheen in water at water table
5	0	3	4-6	Grab	6.9		
		4	6-8	Grab	3.9		
		5	8-10	0.2	18.9		No Recovery
10	-5	6	10-12	1.0	4.7		Grey SILT and CLAY, some Peat, little fine Sand (S,MP) moderate sulfur-like odor, trace petroleum-like odor
		7	12-14	2.0	18.7		
15	-10	8	14-16	2.0	8.6		Grey to brown fine to medium SAND, little Silt, Organics, Peat, Clay (S,NP) End of boring at 16' bgs

Well/Boring Construction



ARCADIS
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Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ AMW-8 (10-11'), (12-14'), (14-15') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Date Start/Finish: 6/14 - 6/15/2016
Drilling Company: Summit Drilling
Driller's Name: Ninevski, Mobus, Crandall
Drilling Method: Rotary Sonic
Bit Size: NA
Auger Size: NA
Rig Type: Track-mounted Fraste Rotary Sonic
Sampling Method: NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 70' bgs
Surface Elevation: 9.40' AMSL

Descriptions By: Levia Terrell

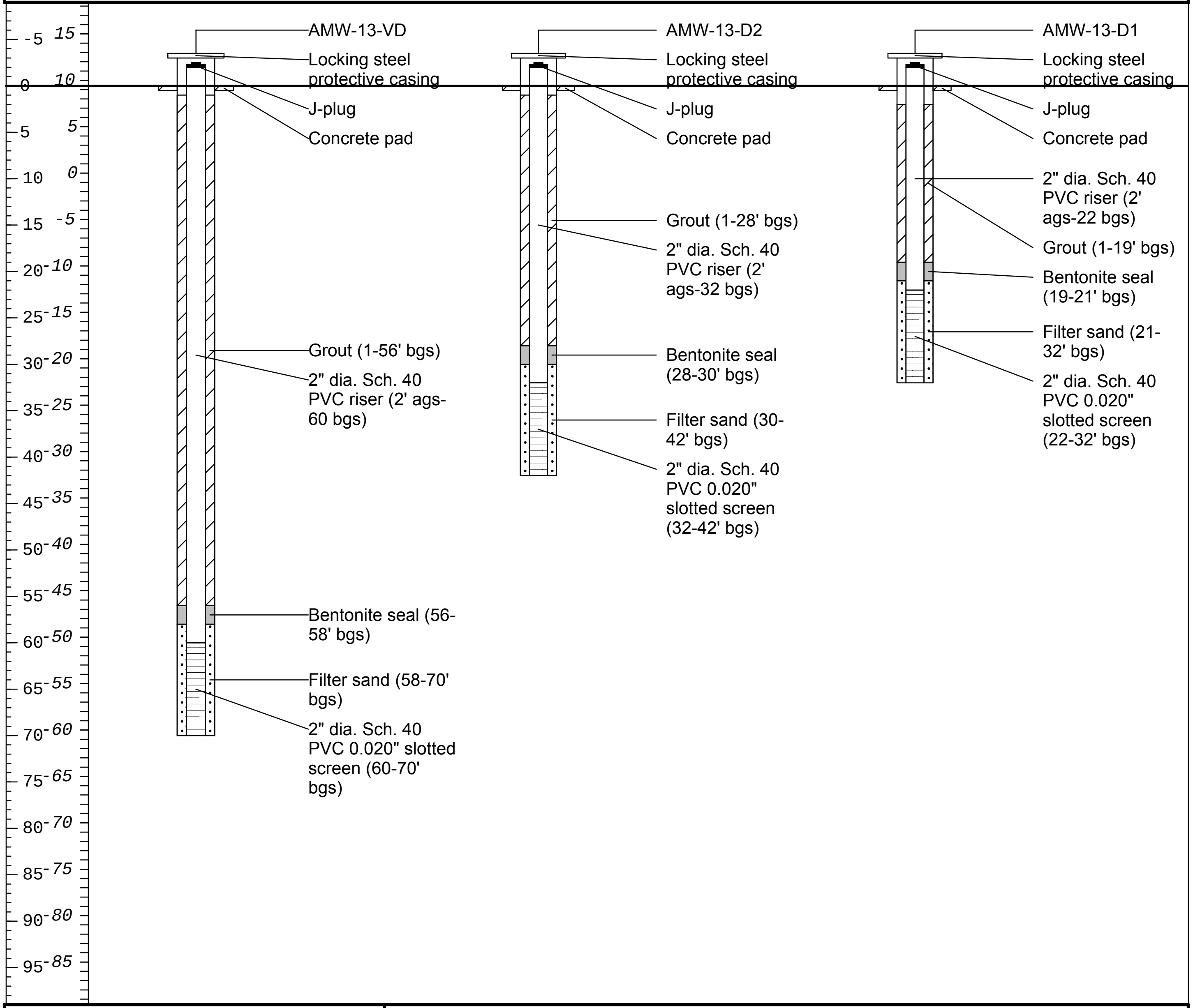
Well ID: **AMW-13 well cluster**

Client: Chevron Environmental Management Company

Location: Former Gulf Oil Terminal
Oceanside, New York

Well Construction

AMW-13-VD **AMW-13-D2** **AMW-13-D1**



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Remarks: AMSL = above mean sea level; bgs = below ground surface; NA = not available;

Ground surface elevation is approximate.

Well construction logs for AMW-13-VD, AMW-13-D1, and AMW-13-D2.
For soil descriptions and drilling notes, see boring log for ASB-8.

Date Start/Finish: 6/15 - 6/16/2016
Drilling Company: Summit Drilling
Driller's Name: Ninevski, Mobus, Crandall
Drilling Method: Rotary Sonic
Bit Size: NA
Auger Size: NA
Rig Type: Track-mounted Fraste Rotary Sonic
Sampling Method: NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 75' bgs
Surface Elevation: 9.40' AMSL

Descriptions By: Levia Terrell

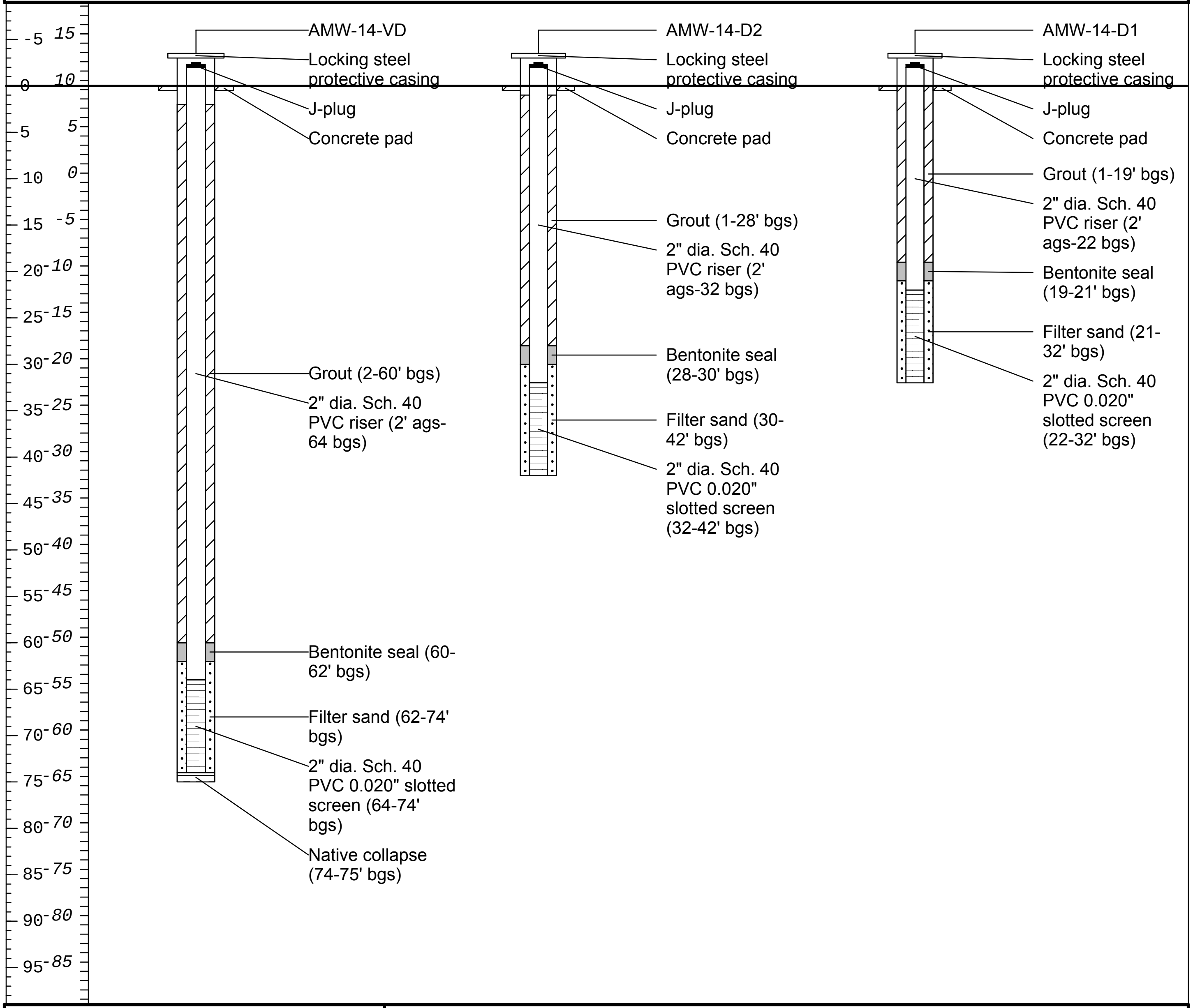
Well ID: **AMW-14 well cluster**

Client: Chevron Environmental Management Company

Location: Former Gulf Oil Terminal
Oceanside, New York

Well Construction

AMW-14-VD **AMW-14-D2** **AMW-14-D1**



ARCADIS Design & Consultancy for natural and built assets

Remarks: AMSL = above mean sea level; bgs = below ground surface; NA = not available;

Ground surface elevation is approximate.

Well construction logs for AMW-14-VD, AMW-14-D1, and AMW-14-D2.
For soil descriptions and drilling notes, see boring log for ASB-6.

Date Start/Finish: 6/9 - 6/13/2016
Drilling Company: Summit Drilling
Driller's Name: Ninevski, Mobus, Crandall
Drilling Method: Rotary Sonic
Bit Size: NA
Auger Size: NA
Rig Type: Track-mounted Fraste Rotary Sonic
Sampling Method: NA

Northing: NA
Easting: NA
Casing Elevation: NA

Borehole Depth: 72' bgs
Surface Elevation: 9.40' AMSL

Descriptions By: Levia Terrell

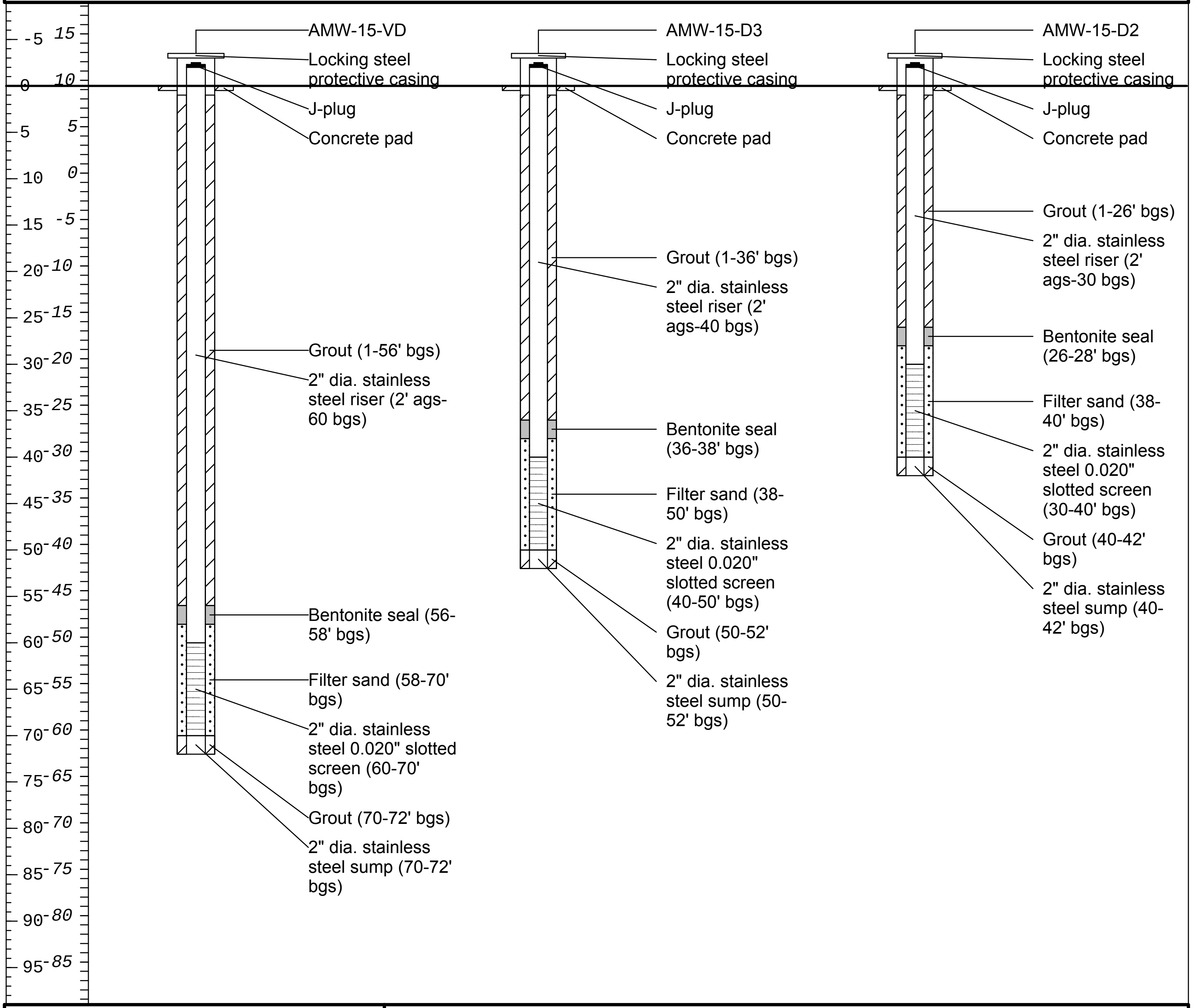
Well ID: **AMW-15 well cluster**

Client: Chevron Environmental Management Company

Location: Former Gulf Oil Terminal
Oceanside, New York

Well Construction

AMW-15-VD **AMW-15-D2** **AMW-15-D3**



ARCADIS Design & Consultancy for natural and built assets

Remarks: AMSL = above mean sea level; bgs = below ground surface; NA = not available;

Ground surface elevation is approximate.

Well construction logs for AMW-15-VD, AMW-15-D1, AMW-15-D2, and AMW-15-D3. For soil descriptions and drilling notes, see boring log for ASB-1.

Date Start/Finish: 1/29/2013-2/13/2013
Drilling Company: Parratt-Wolff Inc.
Driller's Name: J.Price/R.Navatka
Drilling Method: 6 1/4" HSA / Mud Rotary
Sampling Method: 3" x 2' Split Spoon
Rig Type: IR A-300 Truck Mounted Rig

Northing: 164800.4100
Easting: 1080951.5500
Casing Elevation: NA

Borehole Depth: 29' bgs
Surface Elevation: 7.88' AMSL

Descriptions By: J.Oliver

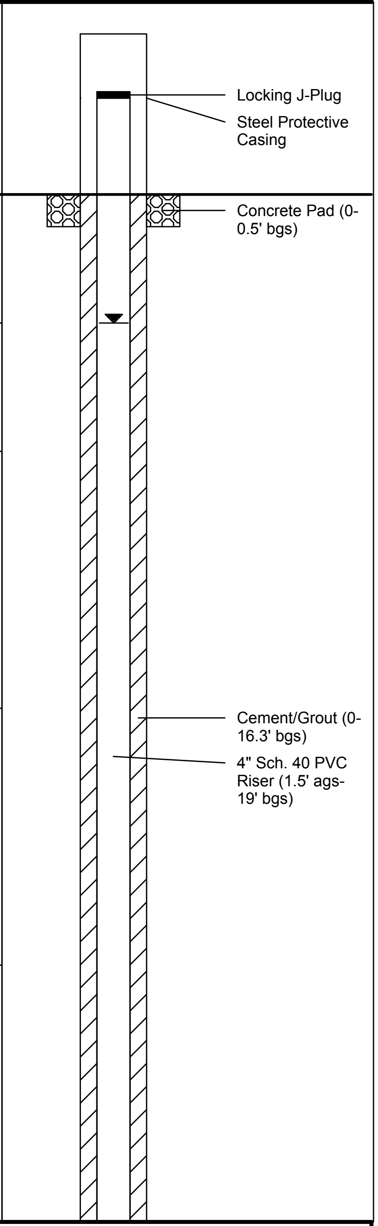
Well/Boring ID: **IW-02-D1**

Client: Chevron EMC

Location: Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
	10						
0		1	0-1	NA	0.0		Light brown fine to medium SAND, trace coarse Sand and fine Gravel, moist to wet.
		2	1-2	NA	0.4		
	5	3	2-3	NA	0.4		Gray/brown fine to coarse SAND, trace fine Gravel, wet.
		4	3-4	NA	0.9		
5	0	NA	NA	NA	NA		Unable to collect samples due to borehole collapse.
		5	8-10	1.0	23.9		Gray SILT and CLAY, trace Peat and fine Sand, plastic, wet, odor.
10		6	10-12	1.0	17.0		Little to trace fine Sand.
	-5	7	12-14	2.0	5.1		Gray SILT and CLAY, trace to llittle fine Sand, plastic, trace.
15		8	14-16	1.3	32.7		Trace fine Sand, Shell fragments at 15' bgs, wet, odor.

Well/Boring Construction



ARCADIS Design & Consultancy for natural and built assets

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Client: Chevron EMC

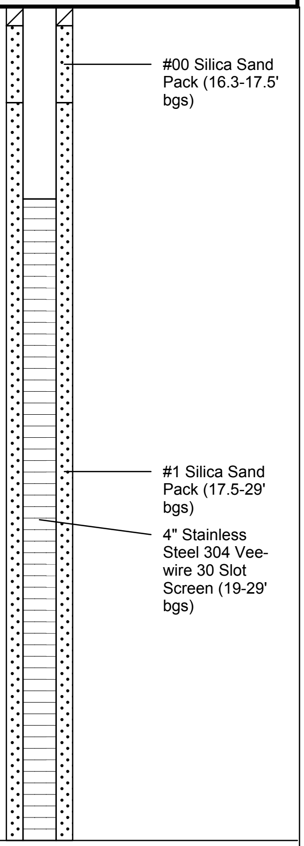
Well/Boring ID: **IW-02-D1**

Borehole Depth: 29' bgs

Site Location:
Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
		9	16-18	1.6	27.3		Trace Shell fragments, wet, odor.
	-10						Gray fine to medium SAND, moderately dense, odor, wet. [Trace coarse Sand and Gravel in tip of spoon.] Trace coarse Sand.
		10	18-20	1.3	11857 110		Brown to light brown fine to medium SAND, trace coarse Sand, trace Organics at 18.9' bgs, odor, wet.
20		11	20-22	1.4	130 125		Light brown fine to medium SAND, trace coarse Sand, odor, wet.
	-15	12	22-24	1.9	101 97.9		Light brown/very light gray fine to medium SAND, odor, wet.
25		13	24-26	1.6	15.7 45.1		Light brown/light gray fine to medium SAND, little coarse Sand after 24.7' bgs, wet, odor.
	-20	14	26-28	0.9	10.1		Light gray fine to coarse SAND, fine Gravel lamination at 26.7' bgs, wet, dense from 26-26.5' bgs.
		15	28-29	0.5	11.2		Very light gray fine to medium SAND, trace coarse Sand, wet, grain size decreasing with depth.
30 35	-25						End of boring at 29' bgs.

Well/Boring Construction



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

ARCADIS Design & Consultancy for natural and built assets

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Engineering and Environmental Services, Inc.

LOG OF BORING LB-6/TW-6 **SHEET** 1 **OF** 2

PROJECT	FMR GOLF FACILITY	PROJECT NO.	1836704
LOCATION	OCEANSIDE, NY	ELEVATION AND DATUM	
DRILLING AGENCY	ZEBRA	DATE STARTED 3/11/04	DATE FINISHED 3/11/04
DRILLING EQUIPMENT	GEOPROBE 6600 w/ HSA	COMPLETION DEPTH 20-FT	ROCK DEPTH —
SIZE AND TYPE OF BIT	—	NO. SAMPLES: DIST. — UNDIST. 2	CORE —
CASING	3-IN OD STEEL CASING	WATER LEVEL: FIRST 1.6' COMPL. —	24 HR. —
CASING HAMMER	WEIGHT — DROP —	FOREMAN	CHARLES GREEN
SAMPLER	2-IN MACROCORE		
SAMPLER HAMMER	WEIGHT — DROP —	INSPECTOR	MARSHALL KING

UNIT	SAMPLE DESCRIPTION	DEPTH SCALE	NO.LOC.	TYPE	RECOV. FT.	PENETR. RESIST BL/6 in.	PID ppm	W/C	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
FILL	CONCRETE DEBRIS LIGHT BROWN M-F SAND	0–2	S-1	MC	2.8	—	0 0 0 0	MOIST wet	START 13:15 PID = OVM 10.8V MC'S COLLECTED USING DISCRETE SAMPLING METHOD
SAND	Brown-Black F-SAND, tr silt	2–3.5							
	Brown-Grey M-F SAND, tr F gravel SAME	4–8	S-2	MC	1.5	—	0 0 0 0	wet	SAMPLE #024: 7.5'-8'
ORGANIC	Grey SILT, sm. tr fibrous organics, tr clay	8–12	S-3	MC	1.9	—	1.3 1.2 2.1 0.5	wet	
	SAME	12–14	S-4	MC	2.4	—	3.2 4.1	wet	

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Engineering and Environmental Services, Inc.

JOB NO. 1836704
DATE 3/11/04

LOG OF BORING NO. LB-6/TW-6.

SHEET 2 OF 2

UNIT	SAMPLE DESCRIPTION	DEPTH SCALE	SAMPLES NO. LOG.	SAMPLES TYPE	SAMPLES RECOV. FT.	SAMPLES PENETR. RESIST BL/6 IN.	PID ppm	W/C	REMARKS (DRILLING FLUID, DEPTH OF CASING, CASING BLOWS, FLUID LOSS, ETC.)
ORGANIC	Grey SILT, sm tr fibrous organics, tr clay	15	S-4 (Cont)	MC	24	1	37 2.1	wet	STEEL CASING PUSHED TO 16-FT
SAND	Brown M-F SAND, tr silt Tan M-F SAND	16 17 18 19	S-5	MC	3.3	1	12.7 12.3 17.1 2.3	wet	SAMPLE # 025 18-18.5
		20 21 22 23 24 25 26 27 28 29 30 31							END BORING 20-FT @ 1430 BORING GROUTED TO SURFACE AS CASING WAS PULLED

086100

Date Start/Finish: 1/30/2013
Drilling Company: Parratt-Wolff Inc.
Driller's Name: J.Price/R.Navatka
Drilling Method: 6 1/4" HSA / Mud Rotary
Sampling Method: 2" x 2' Split Spoon
Rig Type: DT22 Geoprobe System

Northing: 164617.4000
Easting: 1081290.4300
Casing Elevation: NA

Borehole Depth: 7' bgs
Surface Elevation: 8.85' AMSL

Descriptions By: JRO

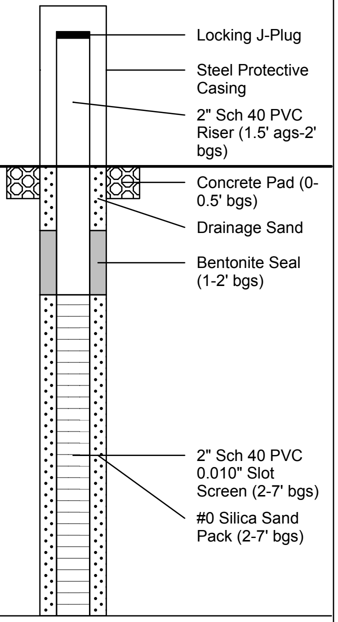
Well/Boring ID: **MW-18R**

Client: Chevron EMC

Location: Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
	10						
0		1	0-1	NA	374.8		Dark gray fine to medium SAND, trace fine Gravel and Debris (Wood and Concrete), moist, strong odor.
		2	1-2	NA	448.1		Moist-wet.
	5	3	2-5	NA	450.7		COBBLES and fine to medium GRAVEL, some to little fine to coarse Sand and debris, wet.
5		4	5-7	NA	NA		
10 15	0 -5						Blind drilled to 7' bgs. End of boring at 7' bgs.

Well/Boring Construction



ARCADIS Design & Consultancy for natural and built assets

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Borehole hand-cleared to 8.0' bgs.

Ground water sampling interval, 20.0' - 25.0' bgs.

Date Start/Finish: 9/23/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moratis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 26.5 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-23D-1

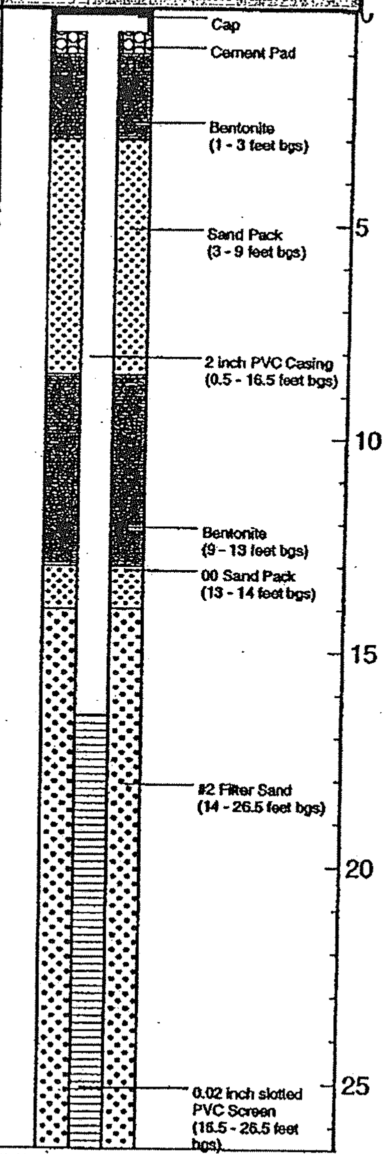
Client: CEMC

MW-23D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0					0		Dark to light brown coarse to fine SAND and GRAVEL, moist.	
		2.3 / 4						
					0		Dark grey coarse to fine SAND and GRAVEL, moist.	
					0			
5					0		Dark grey coarse to fine SAND and GRAVEL, moist.	
		3.0 / 4						
					0.6			
		2.6 / 4	NA		1.1		Dark grey coarse to fine SAND and GRAVEL, some silt moist.	
					1.0		Dark grey SILT, some clay, trace organics, wet.	
10					5.7			
					5.2			
		4.0 / 4			0		Dark grey SILT, some clay, trace organics, wet.	
					10.3			
15					26.1		Dark grey SILT and coarse to fine SAND, little clay, wet.	
		2.0 / 4					Light grey to brown coarse to fine SAND and GRAVEL, wet.	
					25.9			
20							GRAVEL and SAND.	
25								

Well/Boring Construction



BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-23D-1.dat
Date:09/23/04

Page: 1 of 1

Date Start/Finish: 9/23/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moratis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 41 feet
Surface Elevation:

Geologist: Joe List

Well/Boring ID: MW23D-2

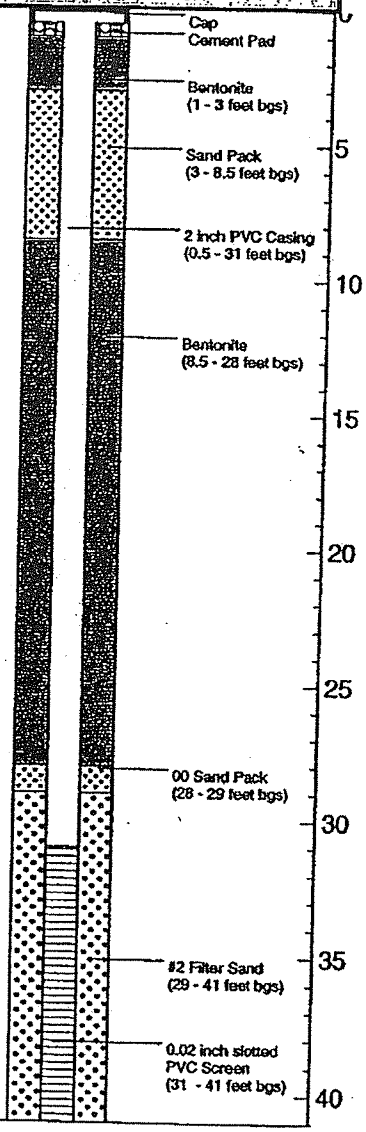
Client: CEMC

MW-23D-2

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0								
					0		Dark to light brown coarse to fine SAND and GRAVEL, moist.	
		2.3 / 4			0		Dark grey coarse to fine SAND and GRAVEL, moist.	
5		3.0 / 4			0 0 0.6		Dark grey coarse to fine SAND and GRAVEL, moist.	
		2.6 / 4	NA		1.1		Dark grey coarse to fine SAND and GRAVEL, some silt moist.	
10					1.0 5.7 5.2		Dark grey SILT, some clay, trace organics, wet.	
		4.0 / 4			0 10.3		Dark grey SILT, some clay, trace organics, wet.	
15					26.1		Dark grey SILT and coarse to fine SAND, little clay, wet.	
		2.0 / 4			25.9		Light grey to brown coarse to fine SAND and GRAVEL, wet.	
20							GRAVEL and SAND.	
25								
30								
35								
40								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-23D-2.dat

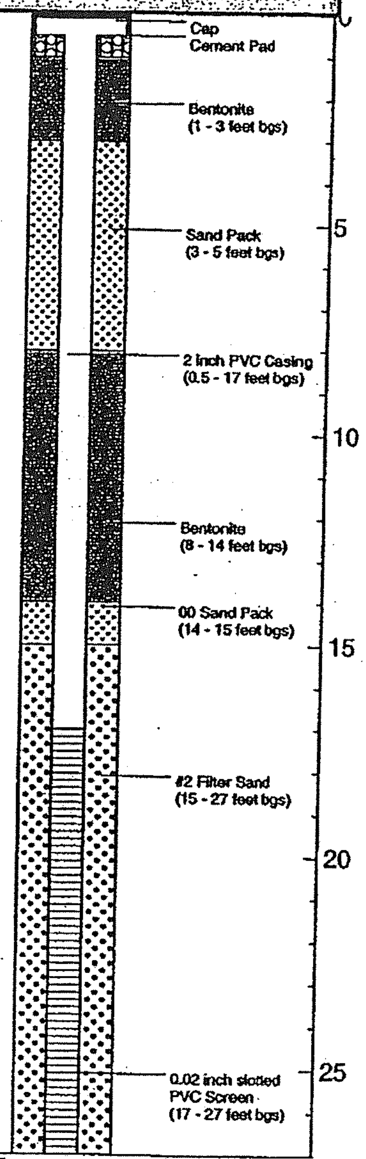
Date:09/23/04

Page: 1 of 1

Date Start/Finish: 9/27/04	Northing:	Well/Boring ID: MW-24D-1
Drilling Company: Zebra Drilling	Easting:	Client: CEMC
Driller's Name: Evan Moralis	Casing Elevation:	**MW-24D-1**
Drilling Method: Direct Push Drilling	Borehole Depth: 27 feet	Location: Former Gulf Oil Terminal Industrial Road and Hampton Road Oceanside, NY
Sampling Method: Macrocore 4 feet by 2 inch diameter	Surface Elevation:	
	Geologist: Joe Lisi	

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
							Brown fine to coarse SAND, some fine gravel, trace concrete.	
					28.3		Brown coarse SAND and coarse to fine GRAVEL, trace quartz pieces, wet.	
		2.5 / 4						
					27.7		Dark green coarse to fine SAND, some gravel, wet.	
					31.2			
							Dark green coarse to fine SAND, some gravel, wet.	
5								
					30.8			
		3.8 / 4					Dark grey fine SAND, some silt, trace gravel, wet.	
					22.2		Dark green coarse to fine SAND, some gravel, wet.	
			NA					
					20.7			
		3.0 / 4			16.4		Dark grey SILT, some clay, trace organices, sulfur odor, wet.	
					16.2			
10								
					19.2			
		1.7 / 4			2.1		Dark grey SILT, some clay, trace organices, sulfur odor, wet.	
					10.7			
15					13.8			
							Light grey fine to coarse SAND, some silt, trace fine gravel, wet.	
					2.0		Brown fine to coarse SAND and GRAVEL, wet.	
					16.1			
		1.5 / 4						
					2.1			
20							SAND and GRAVEL.	
25								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

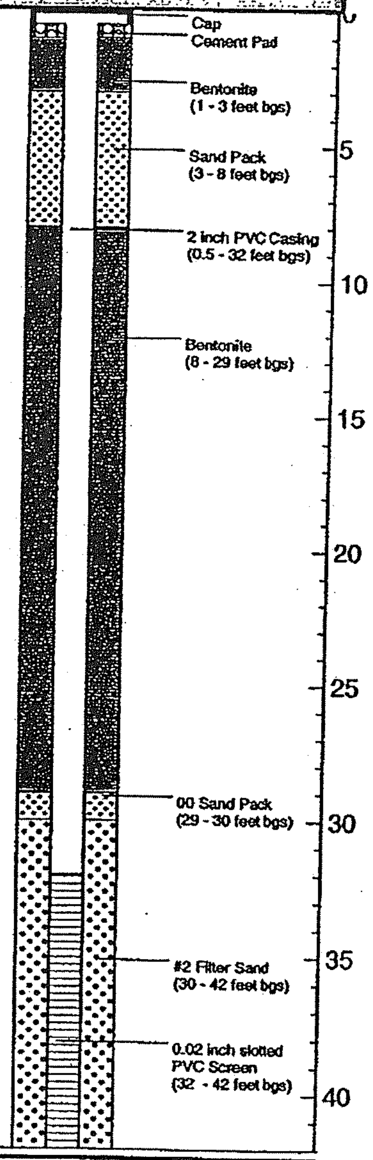
Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-24D-1.dat
Date:09/27/05

Date Start/Finish: 9/27/04 Drilling Company: Zebra Drilling Driller's Name: Evan Moratis Drilling Method: Direct-Push Drilling Sampling Method: Macrocore 4 feet by 2 inch diameter	Northing: Easting: Casing Elevation: Borehole Depth: 42 Surface Elevation: Geologist: Joe Lisi	Well/Boring ID: MW-24D-2 Client: CEMC Location: Former Gulf Oil Terminal Industrial Road and Hampton Road Oceanside, NY

MW-24D-2

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0					28.3		Brown fine to coarse SAND, some fine gravel, trace concrete.	
		2.5 / 4			27.7		Brown coarse SAND and coarse to fine GRAVEL, trace quartz pieces, wet.	
5					31.2		Dark green coarse to fine SAND, some gravel, wet.	
		3.8 / 4			30.8		Dark green coarse to fine SAND, some gravel, wet.	
					22.2		Dark grey fine SAND, some silt, trace gravel, wet.	
		3.0 / 4	NA		20.7		Dark green coarse to fine SAND, some gravel, wet.	
10					16.4 16.2 19.2		Dark grey SILT, some clay, trace organics, sulfur odor, wet.	
		1.7 / 4			2.1 10.7		Dark grey SILT, some clay, trace organics, sulfur odor, wet.	
15					13.8 2.0		Light grey fine to coarse SAND, some silt, trace fine gravel, wet.	
		1.5 / 4			16.1 2.1		Brown fine to coarse SAND and GRAVEL, wet.	
20 25 30 35 40							SAND and GRAVEL.	

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf

Data File:MW-24D-2.dat

Date:09/27/04

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Log of Boring **MW-24VD** Sheet 1 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/7/06	Date Finished: 12/22/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 75 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 19 / Undisturbed 0	Core 0
Casing Diameter (in): 8"/4"	Casing Depth (ft): 9'/63'	Water Level (ft.): First ▽ 4 / Completion ▼	24 HR. ▼
Casing Hammer	Weight (lbs): NA / Drop (in): NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon		Inspecting Engineer: Anthony Sfeir/Andrew Racz	
Sampler Hammer	Weight (lbs): 140 / Drop (in): 30		

Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Light Brown coarse to fine SAND, some coarse to fine gravel		0						1015 - Begin drilling from 0'-5' bgs using hollow-stem auger.
	Brown coarse to fine SAND, little coarse to fine gravel		2						
	▽		4						1023 - Drilling complete to 5' bgs. Begin split-spoon sampling.
	Brown coarse SAND, some medium sand, little coarse to fine gravel (wet)	0	5	1	SS	12	4 3 4 4	7	
	Grey coarse SAND little coarse to fine gravel (Wet)		6.5						Auger to 7ft bgs
	Grey coarse SAND, little medium to fine sand, trace coarse to fine gravel (Wet, Petroleum Odorl)	0	7	2	SS	17	4 2 1 1	3	
	Dark Grey CLAY, some peat, trace of silt (Organic and Petroleum Odor)		7.5						
	Dark Grey CLAY, some peat, trace of silt (Organic and Petroleum Odorl)	0	9	3	SS	3	1 1/12" 1	Refusal	Auger to 9 ft bgs 8" casing installed at 9 ft bgs
	Brown coarse to fine SAND, some coarse to fine gravel		10						
	Dark grey CLAY, some shells and silt, soft (Wet, Strong Petroleum Odor)	27.2	11	4	SS	24	1/12" 1/12"	Refusal	1040 - Stop Drilling Resume drilling at 1045 on 12/20/2006
	Dark grey CLAY, some silt, soft (Wet, Strong Sulfur Odor)	25.5	13	5	SS	24	1 1 1 3	2	Auger to 15 ft bgs
		45.5	15	6	SS	20	1 1 1 1	2	
		34.9	17	7	SS	24	3 6 6 7	12	Auger to 19 ft bgs
	Grey fine to medium SAND, trace silt and clay (Wet, strong petroleum odor)		18.5						
	Brown fine to medium SAND, trace coarse sand (Wet, strong petroleum odor)		19	8	SS	10	8 16	31	
			20						

Project	Former Chevron/Gulf Petroleum Oil Terminal	Project No.	1836740
Location	Oceanside, NY	Elevation and Datum	Not Surveyed

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data Number	Sample Data Type	Sample Data Recov. (in)	Sample Data Penetr. resist BL/6in	Sample Data N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			89.7	20	8	SS	10	15 20	31	
				21						
				22						
				23	9	SS	10	6 5 6 6		Auger to 23 ft bgs Begin sampling at 5ft intervals
			55.9	24					11	
				25						
				26						
				27						
		Fine rounded GRAVEL gray, white yellow and clear		28	10	SS	10	10 15 17 15		Auger to 28 ft bgs
		White coarse to fine SAND, some fine rounded gravel (Wet, Petroleum Odor)	61.5	29					32	
		White coarse to medium SAND		30						
				31						
				32						
				33	11	SS	10	6 8 10 12		Auger to 33 ft bgs
			67.6	34					18	
		White coarse to medium SAND, some fine sand (Wet, Petroleu Odor)		35						
				36						
				37						
				38	12	SS	8	5 10 14 14		Auger to 38 ft bgs
			14	39					24	
		White Coarse to Medium SAND, soem f gravel and fine sand (Wet, very slight odor)		40						
				41						
				42						
				43	13	SS	10	6 7 8 8		Auger to 43 ft bgs
			0	44					15	
				45						

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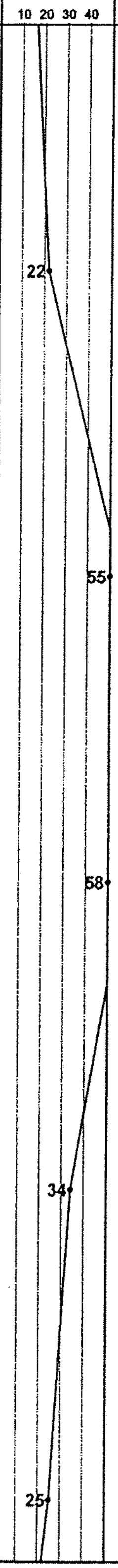
Log of Boring **MW-24VD** Sheet 3 of 4

Project Former Chevron/Gulf Petroleum Oil Terminal	Project No. 1836740
Location Oceanside, NY	Elevation and Datum Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		White Coarse to Medium SAND, some f gravel and fine sand (Wet)		45						
				46						
				47						
				48	14	SS	8	5 10 12 12		Auger to 48 ft bgs Stop Drilling
			0	49					22	
		White medium to fine SAND, trace f gravel (Wet, slight odor)		50						
				51						
				52						
				53	15	SS	5	15 25 30 30		Resume Drilling at 0800 on 12/21/2006 Auger to 53 ft bgs
			0.8	54					55	
		Light Brown medium-fine SAND, trace f gravel (Wet, very slight odor)		55						
				56						
				57						
				58	16	SS	10	4 20 38 37		Auger to 58 ft bgs
			0	59					58	
		Light Brown to white fine to medium SAND, trace fine gravel (Wet)		60						
				61						
				62						
				63	17	SS	10	5 16 18 30		Auger to 63 ft bgs
			0	64					34	
		Light Brown fine to medium SAND (Wet)		65						
				66						
				67						
				68	18	SS	10	9 9 16 16		Auger to 68 ft bgs
			0	69					25	
				70						



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Log of Boring **MW-24VD** Sheet 4 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
▨		Dark grey-green silty CLAY, very stiff, moist (no odor)		70						
				71						
				72						Auger to 73 ft bgs
			0	73	19	SS	16	3 3 6 9	9	
				74						
				75						End of Boring at 75 ft bgs Remove temporary 4" steel casing Drill with 6" roller bit from 0 to 63 ft bgs 4" permanent steel casing installed from 0 to 63 ft bgs (grout in place) Monitoring well installed at 73 ft bgs
				76						
				77						
				78						
				79						
				80						
				81						
				82						
				83						
				84						
				85						
				86						
				87						
				88						
				89						
				90						
				91						
				92						
				93						
				94						
				95						

Date Start/Finish: 9/27/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moratis
Drilling Method: Direct-Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 27 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-25D-1

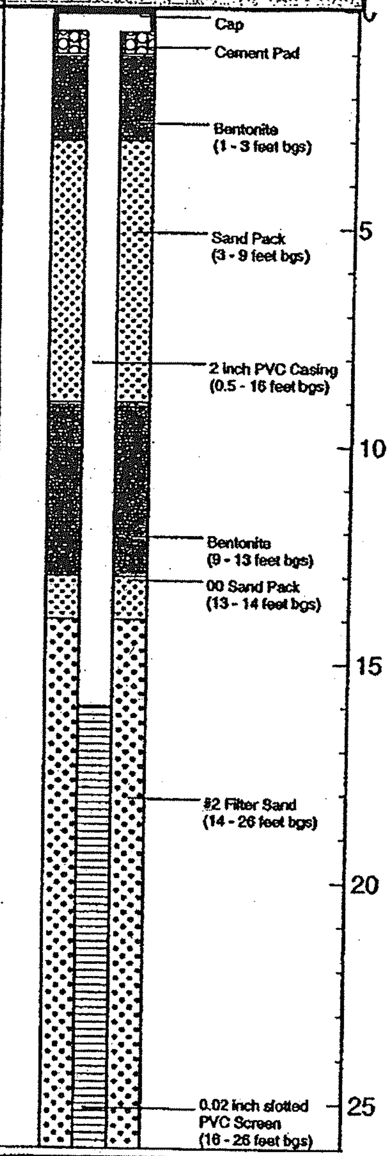
Client: CEMC

MW-25D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							CONCRETE and REBAR.	
					0		Lightbrown coarse to fine SAND and GRAVEL, wet.	
		2.0 / 4			0		Brown coarse to fine GRAVEL, some coarse to fine sand, wet.	
					0			
5					0		Brown coarse to fine GRAVEL, some coarse to fine sand, wet.	
		3.8 / 4			0			
		1.5 / 4	NA		25.5		Dark grey coarse to fine SAND, some coarse gravel, some silt, wet.	
					24.7		Dark grey coarse to fine SAND, some coarse gravel, some silt, wet.	
10					228		Dark grey SILT, some clay, trace organics, sulfur odor, wet.	
					48.3			
		4.0 / 4			9.7		Dark grey SILT, some clay, trace organics, sulfur odor, wet.	
					8.0			
15					28.1		Dark brown coarse to fine SAND, some fine gravel, trace silt, wet.	
							GRAVEL and SAND.	
20								
25								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-25D-1.dat
Date:09/27/04

Date Start/Finish: 9/25/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Mocatis
Drilling Method: Direct-Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 41 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-25D-2

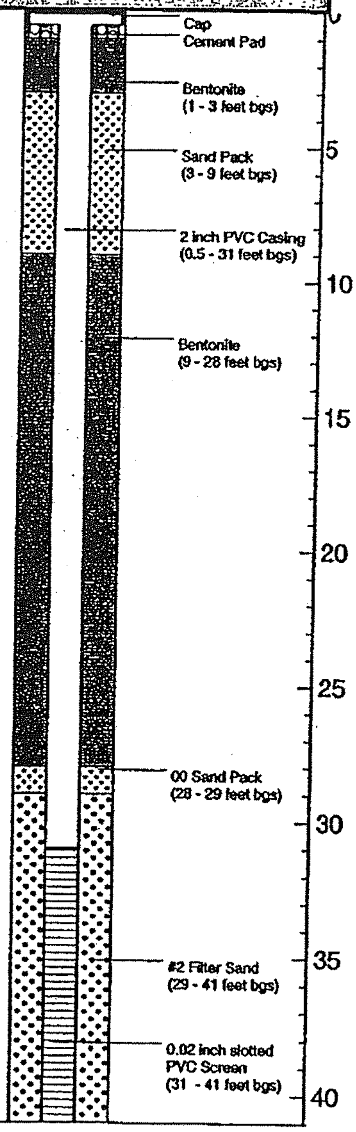
Client: CEMC

MW-25D-2

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							CONCRETE and REBAR.	
		2.0 / 4			0		Lightbrown coarse to fine SAND and GRAVEL, wet.	
					0		Brown coarse to fine GRAVEL, some coarse to fine sand, wet.	
					0			
5		3.8 / 4			0		Brown coarse to fine GRAVEL, some coarse to fine sand, wet.	
					0		Dark grey coarse to fine SAND, some coarse gravel, some silt, wet.	
		1.5 / 4	NA		25.5 24.7		Dark grey coarse to fine SAND, some coarse gravel, some silt, wet.	
10					228			
					48.3		Dark grey SILT, some clay, trace organics, sulfur odor, wet.	
		4.0 / 4			9.7		Dark grey SILT, some clay, trace organics, sulfur odor, wet.	
					8			
15					28.1		Dark brown coarse to fine SAND, some fine gravel, trace silt, wet.	
							GRAVEL and SAND.	
20								
25								
30								
35								
40								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-25D-2.dat
Date:09/25/04

Date Start/Finish: 12/2/10 & 12/9/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164759.23
Easting: 1080931.65
Casing Elevation: 5.66

Borehole Depth: 50' bgs
Surface Elevation: 5.49

Descriptions By: MWE

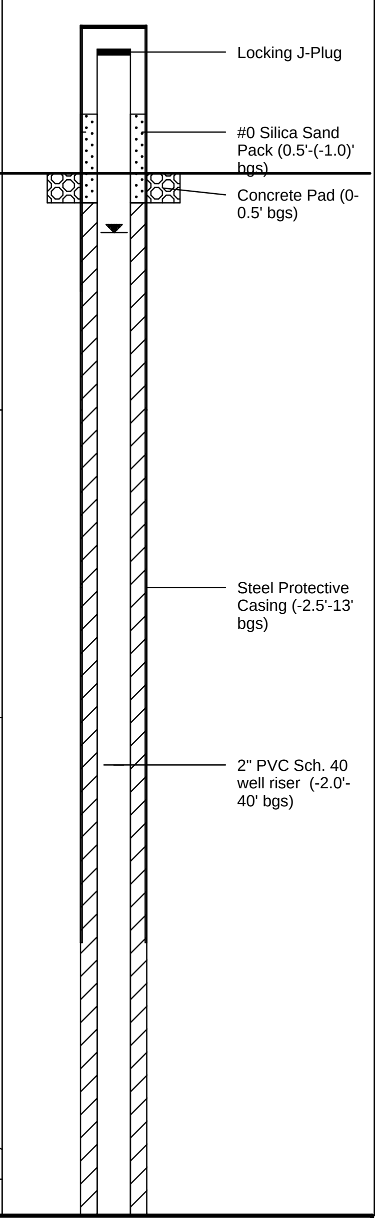
Well/Boring ID: **MW-25-D3**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	0.0		Brown fine to medium SAND, little fine to medium Gravel, Organics (roots), Silt (M,NP)
		2	2-4	Grab	1,031		moderate to heavy petroleum-like odor
5	0	3	4-6	Grab	82.6		Grey to brown fine to medium SAND, some fine to medium Gravel, little Silt (S,NP)
		4	6-8	Grab	45.6		moderate petroleum-like odor
		5	8-10	2.0	27.8		Grey SILT and CLAY, little Organics (peat, roots), trace fine Sand (S,P)
10	-5	6	10-12	2.0	38.3		
		7	12-13	1.0	17.2		set 4" steel casing and switched to Mud-Rotary at 13' bgs
		8	13-15	2.0	23.2		
15	-10	9	15-17	2.0	17.8		
		9	15-17	2.0	17.8		Brown to grey fine to medium SAND, little Peat, Silt, trace Clay (S,NP) faint odor
							Brown fine to medium SAND, trace fine Gravel (S,NP)

Well/Boring Construction



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Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-25-D3 (21-23') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Date Start/Finish: 12/2/10 & 12/9/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164759.23
Easting: 1080931.65
Casing Elevation: 5.66

Borehole Depth: 50' bgs
Surface Elevation: 5.49

Descriptions By: MWE

Well/Boring ID: **MW-25-D3**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		10	17-19	2.0	17.9		faint petroleum-like odor (possibly drawdown)	Cement/Bentonite Grout (0.5'-35' bgs)
20	-15	11	19-21	2.0	23.7			
		12	21-23	2.0	39.8			
		13	23-25	2.0	3.2			
25	-20	14	25-27	2.0	0.3		Brown fine to coarse SAND, trace fine Gravel (S,NP)	
		15	27-29	2.0	0.3			
30	-25	16	29-31	2.0	0.0			
		17	31-33	2.0	0.0		Brown medium to coarse SAND, little fine Sand, trace fine Gravel (S,NP) drilled to 38' bgs	
35	-30							Bentonite Seal (35'-38' bgs)

Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-25-D3 (21-23') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

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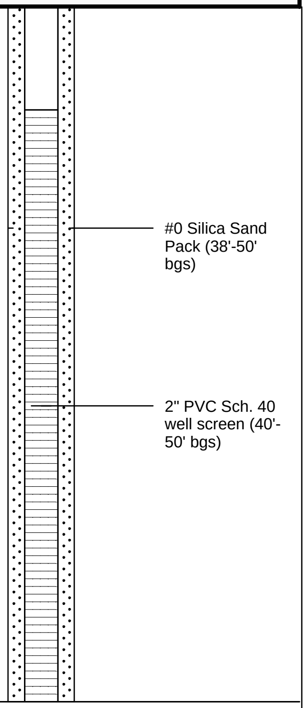
Date Start/Finish: 12/2/10 & 12/9/10 **Drilling Company:** Parratt Wolff **Driller's Name:** J. Price **Drilling Method:** 4.24" HSA **Sampling Method:** 2" x 2' Split Spoon **Rig Type:** Vac Unit/IR 466	**Northing:** 164759.23 **Easting:** 1080931.65 **Casing Elevation:** 5.66 **Borehole Depth:** 50' bgs **Surface Elevation:** 5.49 **Descriptions By:** MWE	**Well/Boring ID:** **MW-25-D3** **Client:** Chevron **Location:** Oceanside Former Gulf Terminal Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
		18	38-40	2.0	0.0		Brown medium to coarse SAND, little fine Sand, trace fine Gravel (S,NP) drilled to 43' bgs
40	-35						
		19	43-45	2.0	0.0		Brown medium to coarse SAND, little fine Sand, trace fine Gravel (S,NP) drilled to 48' bgs
45	-40						
		20	48-50	2.0	0.0		Brown medium to coarse SAND, little fine Sand, trace fine Gravel (S,NP)
50	-45						End of boring at 50' bgs

Well/Boring Construction



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Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-25-D3 (21-23') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

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Log of Boring **MW-25VD** Sheet 1 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/6/06	Date Finished: 12/19/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 75 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 21	Undisturbed 0 Core 0
Casing Diameter (in): 8"/4"	Casing Depth (ft): 14'/63'	Water Level (ft.): First ▽ 5	Completion ▼ 24 HR. ▼
Casing Hammer	Weight (lbs): NA Drop (in): NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon		Inspecting Engineer: Anthony Sfeir/Andrew Racz	
Sampler Hammer	Weight (lbs): 140 Drop (in): 30		

Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Light Brown medium to fine SAND, some coarse to fine gravel	0.8	0–2	1	SS	10	8 12 8 8	20	1330 - Begin drilling with a hollow-stem auger
	Black coarse SAND, some medium sand, little coarse to fine gravel (Petroleum Smell)	30	2–4	2	SS	10	6 5 8 6	13	Auger to 4 ft bgs
	Black coarse SAND, some medium sand, some coarse to fine gravel (Wet, Petroleum odor) ▽	20.5	4–6	3	SS	12	5 5 7 7	12	
	Black coarse to fine SAND, little coarse to fine gravel (Wet, Petroleum odor)	34	6–8	4	SS	22	7 4 3 4	7	Auger to 8 ft bgs
	(No Recovery)		8–10	5	SS	0	2 1/12" 1	Refusal	
			10	6	SS	0	WH/2"	Refusal	
	Dark gray CLAY, trace of peat, trace of silt (Wet,Petroleum and organic smell)	475	12–14	7	SS	24	1/12" 1/12"	Refusal	Auger to 14 ft bgs 8" Casing Placed at 14 ft bgs
	Dark brown CLAY, some coarse to fine gravel, little peat (Petroleum and organic smell)	20	14–16	8	SS	3	WH/12" 1 1	Refusal	Stop Drilling at 1430 on 12/06/2006
	Dark brown CLAY, some coarse to fine gravel, little peat (Petroleum and organic smell) Brown fine to medium SAND, trace coarse sand and fine white quartz gravel (Wet, organic and chemical odor)	21.5	16–18	9	SS	14	3 5 12 20	17	Resume drilling at 0915 on 12/14/2006
	Brown to gray fine to medium SAND (Wet, strong chemical odor)	33	18–20	10	SS	15	10 15 20 22	35	

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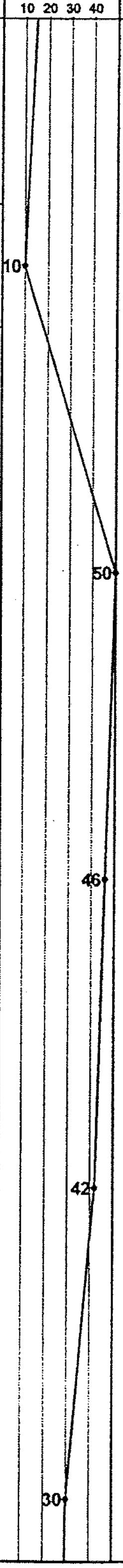
Log of Boring **MW-25VD** Sheet 2 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Brown fine to medium SAND, trace fine white quartz gravel (Wet, strong chemical odor)		20						
				21						
				22						
				23						Auger to 23 ft bgs Start sampling at 5 ft intervals
			16.7	24	11	SS	8	5 6 7 10	13	
		Gray to white medium to coarse SAND, trace fine sand (Wet, chemical odor)		25						
				26						
				27						
				28						Auger to 28 ft bgs
			16.1	29	12	SS	8	10 17 18 13	35	
		White fine to medium SAND (Wet, organic/chemical odor)		30						
				31						
				32						
			3.4	33						Auger to 33 ft bgs Sand is caving need a larger bit of casing (break down for the day)
				34	13	SS	10	13 19 22 22	41	Resume Drilling on 12/15/2006 at 1015 Install temporary 4" casing from 0-14 ft bgs Drill from 0 to 33 ft using 4" mud rodary
		White medium to coarse SAND, some fine sand (Wet, slight organnc chemical odor)		35						
				36						Borehole filling in with Sand, installa additional temporary 4" steel casing to 29 ft bgs
			0.0	37						Drill to 38 ft bgs Too much sand in mud stop to change mud
				38						
				39	14	SS	12	9 12 14 12	26	
		Fine gravel (gray, white and yellow)		40						
			0.0	41						
				42						
				43						Drill to 43 ft bgs
		Medium to coarse gray to yellow SAND, some fine sand and fine gravel (Wet)		44	15	SS	10	6 7 9 10	16	
				45						

Log of Boring **MW-25VD** Sheet 3 of 4

Project	Former Chevron/Gulf Petroleum Oil Terminal	Project No.	1836740
Location	Oceanside, NY	Elevation and Datum	Not Surveyed



Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Brown and gray medium coarse SAND and fine rounded gravel, trace fine sand (Wet)	0.0	45						
				46						
				47						Drill to 48 ft bgs
				48	16	SS	16	7 3 7 20		
			0.0	49					10	
		White fine to medium SAND (Wet)		50						
				51						
				52						Drill to 53 ft bgs
				53	17	SS	14	19 20 30 35		
			0.0	54					50	
		White fine to medium SAND, some coarse sand, trace fine gravel (Wet)		55						Mud pad empty, mud is being quickly sucked up by the gravel layer. Stop to mix new mud
				56						
				57						Drill to 58 ft bgs
				58	18	SS	10	15 22 24 28		
			0.0	59					46	
		White to light brown fine to medium SAND, trace fine rounded gravel (Wet)		60						
				61						
				62						Drill to 63 ft bgs
				63	19	SS	10	12 20 22 25		
			0.0	64					42	
		Light brown fine to medium SAND, trace coarse sand (Wet)		65						
				66						
				67						Drill to 68 ft bgs
				68	20	SS	10	12 15 15 17		
			0.0	69					30	
				70						

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Log of Boring **MW-25VD** Sheet 4 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
▨		Darg gray-green silty CLAY, very dense moist		70						
▨				71						
▨				72						
▨				73				10		Dril to 73 ft bgs
▨				74	21	SS	24	10 17 20	27	
				75						End of boring at 75 ft bgs Install 4" steel inner casing from 0 to 63 ft bgs 2" PVC Monitoring well installed at 73 ft bgs
				76						
				77						
				78						
				79						
				80						
				81						
				82						
				83						
				84						
				85						
				86						
				87						
				88						
				89						
				90						
				91						
				92						
				93						
				94						
				95						

Date Start/Finish: 9/24/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Morais
Drilling Method: Direct-Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 25 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-26D-1

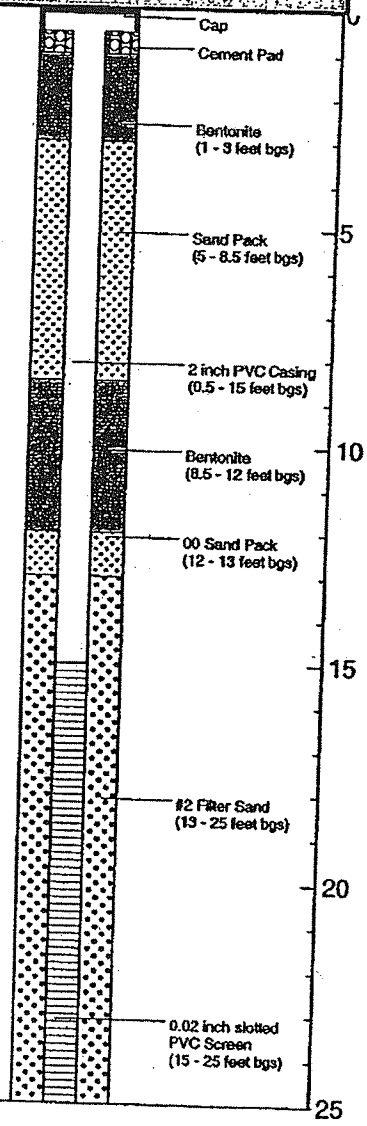
Client: CEMC

MW-26D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (fbgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							Dark grey coarse to medium SAND and coarse to fine GRAVEL, wet.	
					0			
		2.5 / 4						
					0			
					0			
5							Dark brown coarse to fine SAND and coarse GRAVEL, trace silt, wet.	
					0			
		0.9 / 4						
					0			
			NA					
		2.3 / 4			25.5			
					24.7		Dark grey SAND, some silt, moist to wet.	
							Dark grey SILT, some clay, trace organics and wood, sulfur odor, wet.	
10					228			
					48.3			
		1.4 / 4						
					9.7		Dark grey SILT, some clay, trace organics and wood, sulfur odor, wet.	
					8.0		Brown coarse to fine SAND, trace shells and gravel, wet.	
15					28.1			
							GRAVEL and SAND.	
20								
25								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001
Data File:MW-26D-1.dat

Template:P:\Chevron SAR\SAR - NEWY Site\Oceanside Terminal\LobPlog\Well.ldf

Date:09/24/04

Date Start/Finish: 9/24/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moralis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 40 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-26D-2

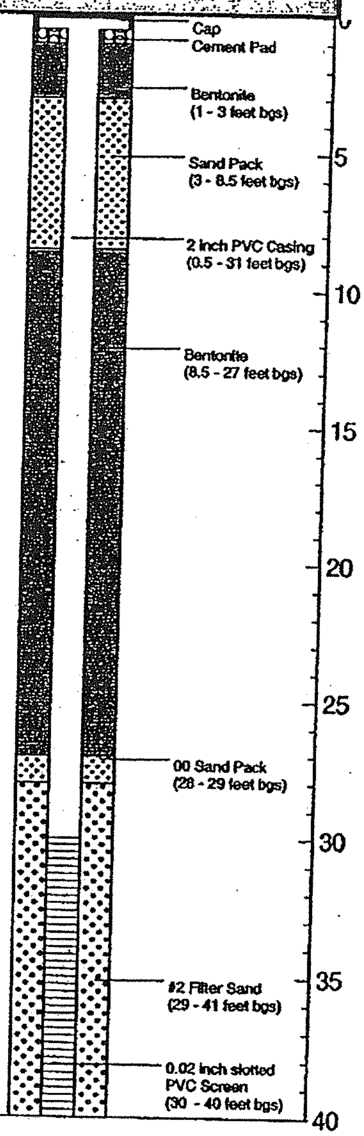
Client: CEMC

MW-26D-2

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	'N' - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							Dark grey coarse to medium SAND and coarse to fine GRAVEL, wet.	
					1.0			
		2.5 / 4						
					0			
					1.3		Dark brown coarse to fine SAND and coarse GRAVEL, trace silt, wet.	
-5								
		0.9 / 4						
					1.9			
		2.3 / 4	NA				Dark grey SAND, some silt, moist to wet.	
					8.4		Dark grey SILT, some clay, trace organics and wood, sulfur odor, wet.	
10					20.5			
					21.9			
		1.4 / 4			16.8		Dark grey SILT, some clay, trace organics and wood, sulfur odor, wet.	
					9.8		Brown coarse to fine SAND, trace shells and gravel, wet.	
15					12.3			
							GRAVEL and SAND.	
20								
25								
30								
35								
40								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

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Log of Boring **MW-26VD** Sheet 1 of 4

roject: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/5/06	Date Finished: 12/28/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 70 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 18	Undisturbed 0 Core 0
Casing Diameter (in): 8"/4"	Casing Depth (ft): 16'/60'	Water Level (ft.): First ▽ 3	Completion ▼ 24 HR. ▼
Casing Hammer	Weight (lbs): NA Drop (in): NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon			
Sampler Hammer	Weight (lbs): 140 Drop (in): 30	Inspecting Engineer: Anthony Sfeir/Andrew Racz	

Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (In)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Blac coarse to fine SAND, some coarse to fine gravel (Petroleum Odor)		0						1420 - Start drilling using a 10" hollow-stem auger
	▽		3						
	Black coarse SAND, some medium to fine sand, some coarse to fine gravel (Wet)	3.5	5	1	SS	1.5	1 1/12" 1		Auger to 5 ft bgs
	Black coarse to fine SAND, some coarse to fine gravel (Wet)		7	2	SS	0	WH/24"	Refusal Refusal	
		0	9	3	SS	1	WH/18"	Refusal	Auger to 9 ft bgs
			10				1		
	Black coarse SAND, some medium to fine sand, some fine gravel (Wet)	0	11	4	SS	0.5	WH/12" 1	Refusal	
			12.5				1		Auger to 13 ft bgs
	Black coarse SAND, little medium sand, little fine gravel (Wet)	0	13	5	SS	2	2 1 2 5	3	
	Dark brown CLAY, some peat some silt (organic and petroleum odor) Light brown medium SAND, some fine sand	2	15	6	SS	14	2 4 4 5	8	
	Brown medium SAND, some fine sand, trace silt (Petroleum odor, wet)	1.5	17	7	SS	24	7 8 9 10	17	Auger to 17 ft bgs 8" Casing installed at 16 ft Stop Drilling at 1600 on 12/5/2006 Resume Drilling on 12/28/2006 Install temporary 4" steel casing from 0 to 15 ft bgs Drill to 19 ft bgs
	Brown medium to fine SAND, some fine rounded gravel, trace mica flakes (Wet, strong chemical odor)		19	8	SS	6	8 11	24	
			20						

oject: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data Number	Type	Recov. (ft)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			10.1	20	8	SS	6	13 17	24	
		Brown coarse to medium SAND, some fine rounded gravel (Wet, Strong chemical odor)		21						
				22						Drill to 23 ft bgs
				23	9	SS	7	21 31 57 50/3"		
			5.2	24					88	
		Whte fine to medium SAND (Wet, faint chemical odor)		25						
				26						Gravel is clogging the hole, drive additional temporary 4 " steel casing to 25 ft bgs
				27						Drill to 28 ft bgs
				28	10	SS	6	21 47 38 42		
			0	29					85	
		Whte fine to medium SAND, some coarse sand (Wet, slight chemical odor)		30						
				31						
				32						Resume Drilling on 12/29/2006 Drill to 33 ft bgs
				33	11	SS	6	20 18 22 25		
			2.4	34					40	
		White coarse to fine SAND (Wet)		35						
				36						
				37						Drill to 38 ft bgs
				38	12	SS	6	22 27 23 40		
			0	39					50	
		Light Brown to white Coarse SAND and fine GRAVEL, some medium to fine sand (Wet)		40						
				41						
				42						Drill to 43 ft bgs
				43	13	SS	6	19 22 30 38		
			0	44					52	
				45						

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Log of Boring **MW-26VD** Sheet 3 of 4

Project Former Chevron/Gulf Petroleum Oil Terminal	Project No. 1836740
Location Oceanside, NY	Elevation and Datum Not Surveyed

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		White fine to medium SAND, trace coarse sand (Wet)		45						
				46						
				47						Drill to 48 ft bgs
				48	14	SS	6	27 26 33 38	59	
				49						
		Light brown medium to fine SAND, some coarse sand (Wet, very faint odor)		50						
				51						
				52						Drill to 53 ft bgs
				53	15	SS	6	28 33 40 50/3"	73	
			0.7	54						
		Light Brown to white medium to fine SAND, trace fine gravel (Wet)		55						
				56						
				57						Drill to 58 ft bgs
				58	16	SS	6	34 36 35 55	71	
			0	59						
		Darg grey medium to fine SAND, some silt and clay, some fine gravel (Wet)		60						
				61						
				62						Drill to 63 ft bgs
				63	17	SS	10	43 50 50 50	100	
			0	64						
		Dark grey SILT, some fine white shell fragments, moist		65						
				66						
				67						
				68	18	SS	6			
			0	69						
				70						

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Log of Boring **MW-26VD** Sheet 4 of 4

Project	Former Chevron/Gulf Petroleum Oil Terminal	Project No.	1836740
Location	Oceanside, NY	Elevation and Datum	Not Surveyed

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
					Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	
				70						End of Boring at 70 ft bgs
				71						
				72						
				73						
				74						
				75						
				76						
				77						
				78						
				79						
				80						
				81						
				82						
				83						
				84						
				85						
				86						
				87						
				88						
				89						
				90						
				91						
				92						
				93						
				94						
				95						

Date Start/Finish: 9/27/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moralis
Drilling Method: Direct-Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 28 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-27D-1

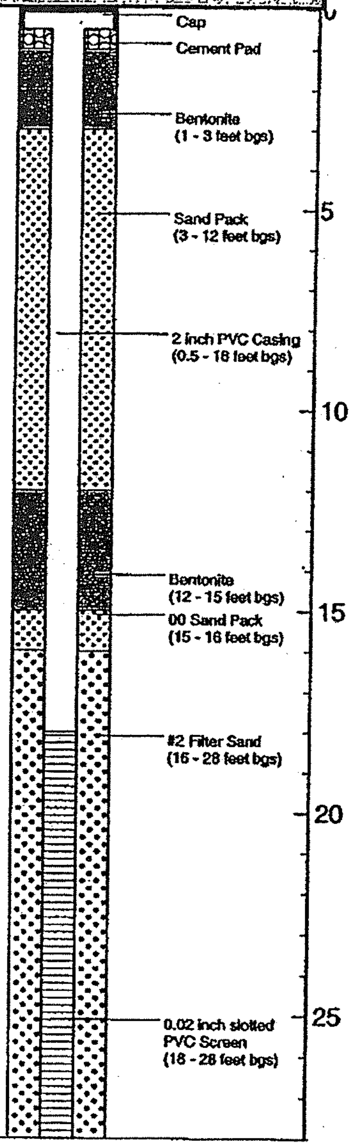
Client: CEMC

MW-27D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Stratigraphic Description	Water Level
0						Brown fine to coarse SAND, trace organics.	
					0	Grey coarse SAND, some coarse to fine gravel, odor, moist.	
		2.7 / 4					
					3.2		
					41.1		
						Grey coarse SAND, some coarse to fine gravel, odor, moist.	
5							
					8.4		
		3.5 / 4					
					11.3		
						Brown coarse to fine SAND, some gravel, little silt, no odor.	
			NA				
					2.1		
		0.0 / 4				No recovery.	
10							
		3.0 / 4			0	Dark grey SILT, some clay, trace organics, sulfur odor, moist.	
					0		
15					0		
						Dark grey SILT, some clay, trace organics, sulfur odor, moist.	
					2.8		
						Brown fine to coarse SAND and GRAVEL, wet.	
					0		
		2.2 / 4					
					11.3		
20						SAND and GRAVEL.	
25							

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-27D-1.dat
Date:09/27/04

Date Start/Finish: 9/29/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moralis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 43 feet
Surface Elevation:

Geologist: Joe Lisi

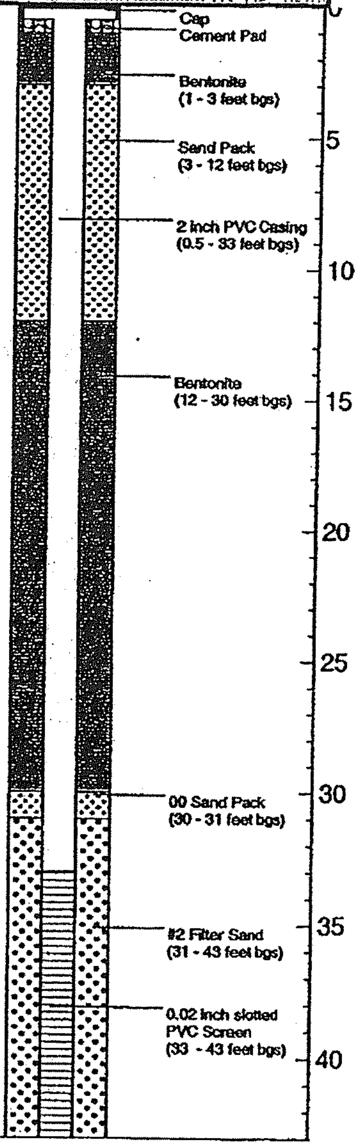
Well/Boring ID: MW-27D-2

Client: CEMC

MW-27D-2

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0							Brown fine to coarse SAND, trace organics.		
		2.7 / 4			0 3.2 41.1		Grey coarse SAND, some coarse to fine gravel, odor, moist.		
5		3.5 / 4			8.4		Grey coarse SAND, some coarse to fine gravel, odor, moist.		
			NA		11.3 2.1		Brown coarse to fine SAND, some gravel, little silt, no odor.		
10		0.0 / 4			0 8.1 13.4		No recovery.		
		3.0 / 4			0 0		Dark grey SILT, some clay, trace organics, sulfur odor, moist.		
15					0 2.8		Dark grey SILT, some clay, trace organics, sulfur odor, moist.		
		2.2 / 4			0 11.3		Brown fine to coarse SAND and GRAVEL, wet.		
20 25 30 35 40							SAND and GRAVEL.		



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf

Data File:MW-27D-2.dat

Date:09/29/04

Date Start/Finish: 10/6/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moralis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 27.5 feet
Surface Elevation:

Geologist: Joe Lisi

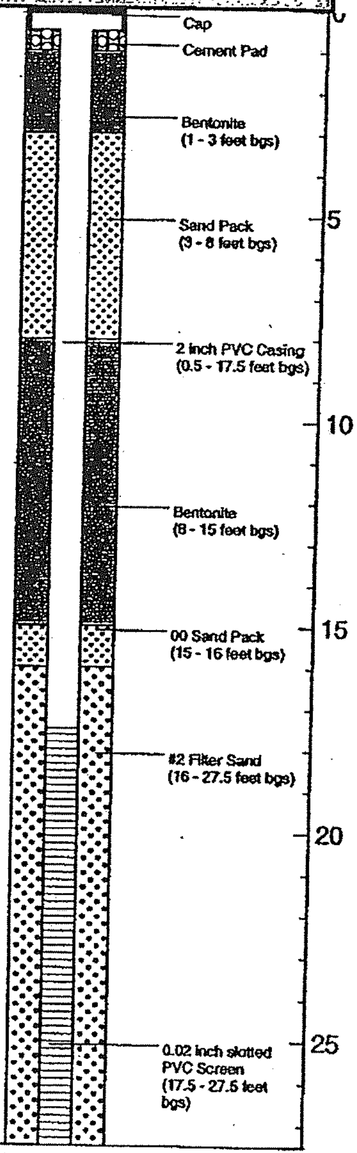
Well/Boring ID: MW-28D-1

Client: GEMC

MW-28D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0							CONCRETE.		
		1.5 / 4					Brown coarse to fine SAND, moist to wet.		
					7.5		Light grey coarse SAND and fine GRAVEL, wet.		
5		2.0 / 4	NA		14.1		Light grey coarse SAND and fine GRAVEL, wet.		
		1.0 / 4							
10					58.7		Dark grey CLAY, some silt, trace organics and wood.		
15		0.5 / 4			3.5		Dark grey CLAY, some silt, trace organics and wood.		
					12.3		Dark grey CLAY, some silt, trace organics and wood.		
		3.0 / 4			99.4		Brown to grey medium to fine SAND, trace coarse gravel, wet.		
20 25							SAND and GRAVEL.		



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-28D-1.dat
Date:10/06/04

Date Start/Finish: 10/5/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moratis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 42.5 feet
Surface Elevation:

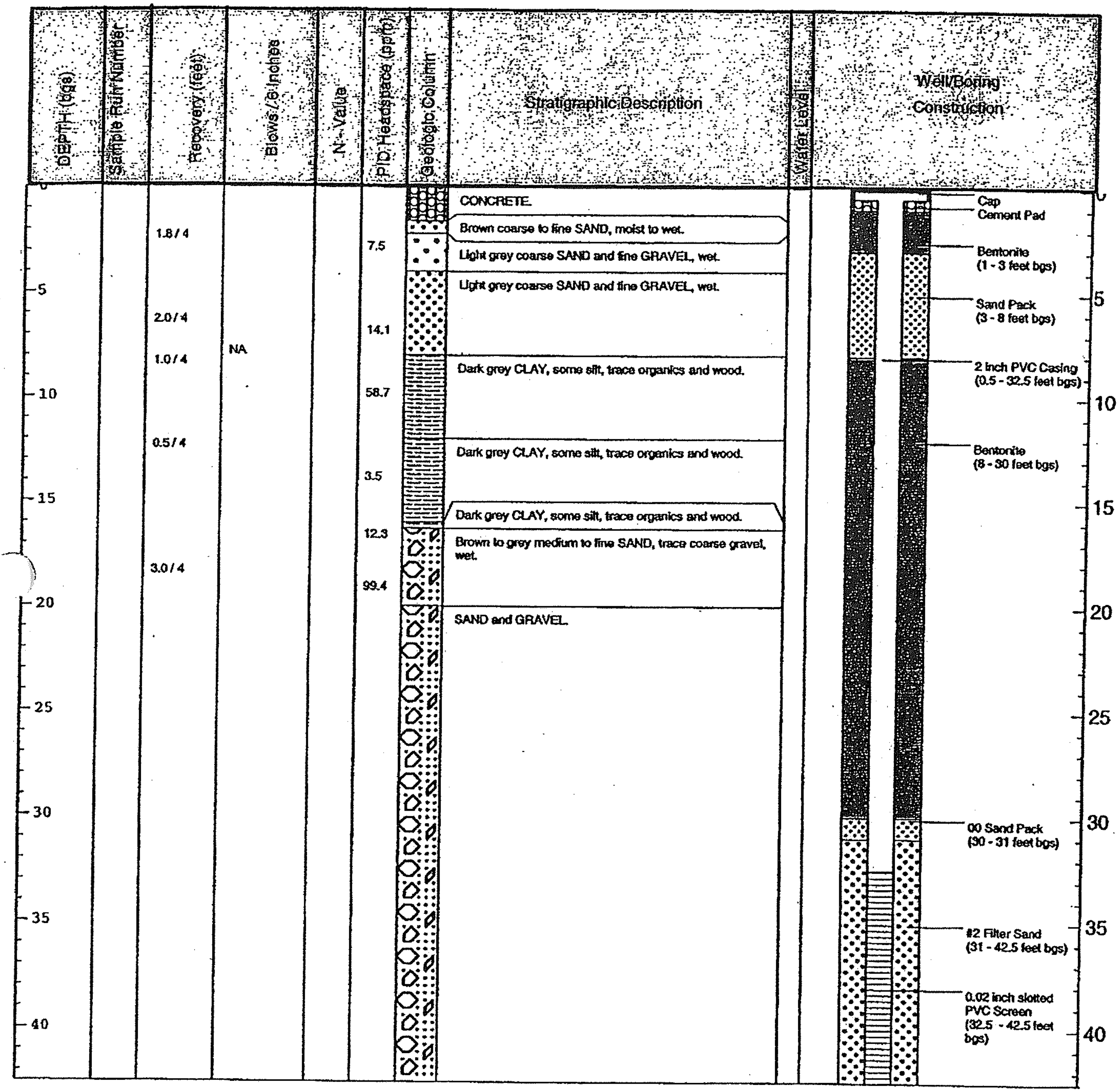
Geologist: Joe Lisi

Well/Boring ID: MW-28D-2

Client: GEMC

MW-28D-2

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY



DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							CONCRETE.	
							Brown coarse to fine SAND, moist to wet.	
		1.8 / 4			7.5		Light grey coarse SAND and fine GRAVEL, wet.	
5							Light grey coarse SAND and fine GRAVEL, wet.	
		2.0 / 4			14.1			
		1.0 / 4	NA				Dark grey CLAY, some silt, trace organics and wood.	
10					58.7			
		0.5 / 4					Dark grey CLAY, some silt, trace organics and wood.	
					3.5			
15							Dark grey CLAY, some silt, trace organics and wood.	
					12.3		Brown to grey medium to fine SAND, trace coarse gravel, wet.	
		3.0 / 4			99.4			
20							SAND and GRAVEL.	
25								
30								
35								
40								

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Remarks: bgs - Below ground surface.

Date Start/Finish: 6/17/2016
Drilling Company: Summit Drilling
Driller's Name: Ninevski, Mobus, Crandall
Drilling Method: Rotary Sonic
Sampling Method: 5'x3" Rotary Sonic Sampler
Rig Type: Track-mounted Fraste Rotary Sonic

Northing: 164618.6100
Easting: 1080862.1500
Casing Elevation: NA

Borehole Depth: 46' bgs
Surface Elevation: 9.00' AMSL

Descriptions By: Levia Terrell

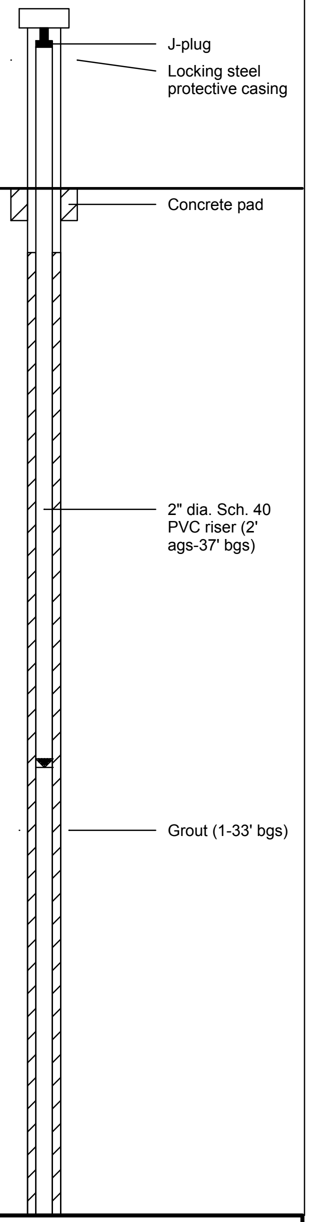
Well/Boring ID: **MW-28-D2R**

Client: Chevron Environmental Management Company

Location: Former Gulf Oil Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
	10						
0		1	0-8	NA	0.0		Hand-cleared by AirVac Truck to 8.0' bgs.
					0.0		
					0.0		
					0.0		
	5				0.0		
5					0.0		
					0.0		
					0.0		
		2	8-15	5.5	0.0		Dark Gray medium to fine SAND, some fine to coarse Gravel, rounded, wet.
	0				0.0		Water approximately at 9.0' bgs.
10					0.0		Dark Gray CLAY, some Organics (grass), little Silt. [Meadow Mat]
					0.0		
					0.3		Dark Gray CLAY, little Organics (grass and shells), moist. [Meadow Mat]
					0.2		
	-5				1.3		
15					0.3		

Well/Boring Construction



Remarks: AMSL = above mean sea level; bgs = below ground surface; NA = not available; PID = photoionization detector; ppm = parts per million; NR = no recovery.

Ground surface elevation is approximate.

ARCADIS Design & Consultancy for natural and built assets

Client: Chevron Environmental Management Company

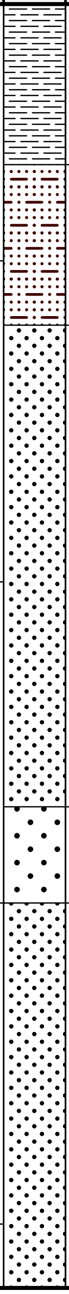
Well/Boring ID: **MW-28-D2R**

Borehole Depth: 46' bgs

Site Location:
Former Gulf Oil Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)
		3	15-20	5.5	8.8 7.5 14.0 45.0
20	-10	4	20-25	5.0	2.6 7.5 0.0 0.3 14.0
25	-15	5	25-30	4.0	0.0 0.0 0.0 0.0 0.0
30	-20	6	30-35	2.0	0.0 0.0 0.0 0.0
35	-25				0.0

Geologic Column



Stratigraphic Description

Dark Gray medium to fine SAND and SILT, trace medium to fine Gravel, rounded, moist.

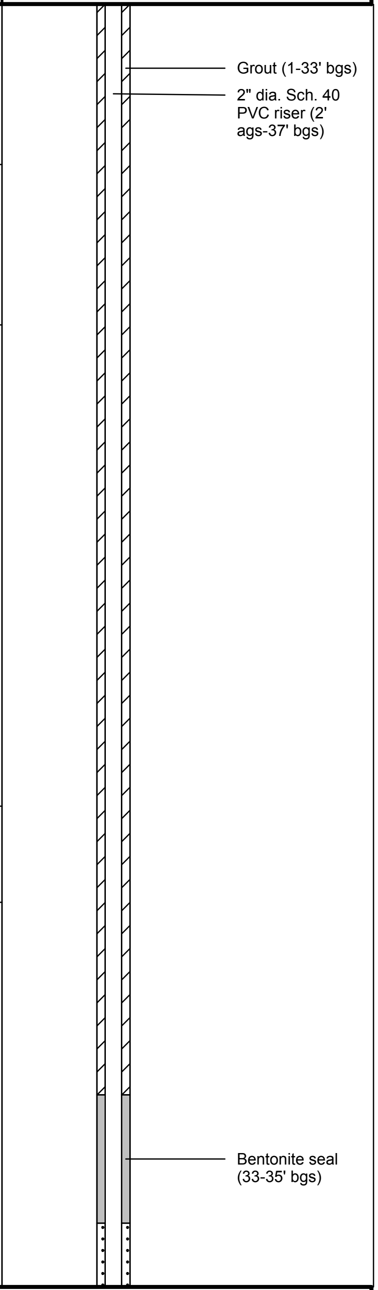
Brown fine to medium SAND, trace medium to fine Gravel, round, mica.

Some medium to fine, rounded Gravel. Wet.

Brown to light brown coarse to medium SAND, some coarse to fine Gravel.

Light Gray coarse to medium SAND and fine Gravel, rounded.

Well/Boring Construction



Remarks: AMSL = above mean sea level; bgs = below ground surface; NA = not available; PID = photoionization detector; ppm = parts per million; NR = no recovery.

Ground surface elevation is approximate.

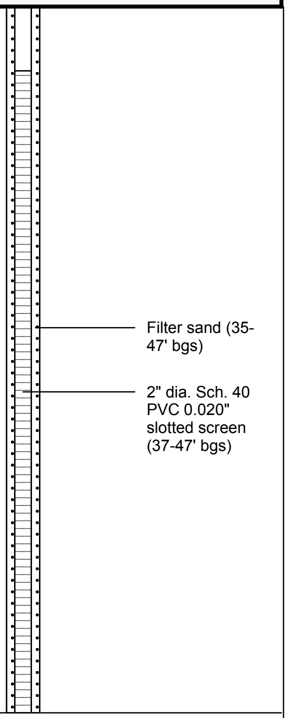
ARCADIS Design & Consultancy for natural and built assets

Client: Chevron Environmental Management Company

Well/Boring ID: **MW-28-D2R**

Borehole Depth: 46' bgs

Site Location:
Former Gulf Oil Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
		7	35-40	4.5	0.0 0.0	⁘	Trace medium to coarse rounded Gravel. 1-inch color change to orange-brown.	
	-30				0.0 0.0	∴	Light Gray medium to fine SAND, little medium to fine Gravel, rounded, mica present.	
40 45	-35	8	40-46	NR	0.0 0.0 0.0 0.0 0.0		No Recovery. Overdrilled to 46.0' bgs for well placement. End of boring 46' bgs.	
50 55	-40 -45							

Design & Consultancy for natural and built assets

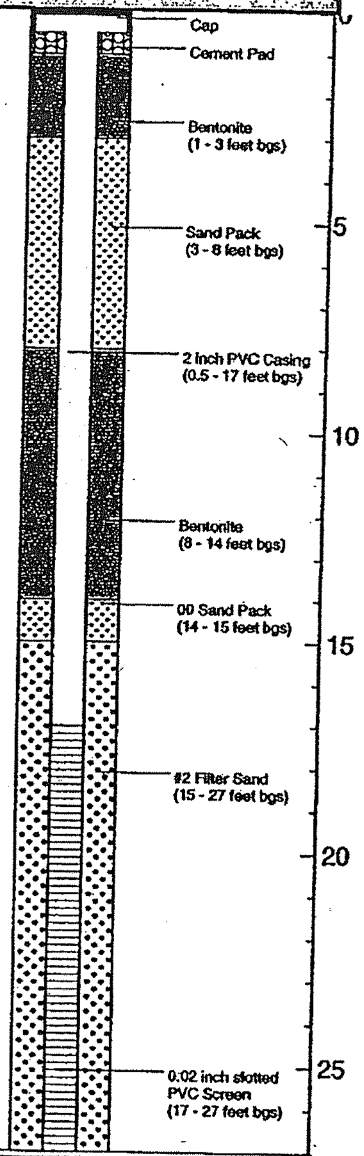
Remarks: AMSL = above mean sea level; bgs = below ground surface; NA = not available; PID = photoionization detector; ppm = parts per million; NR = no recovery.

Ground surface elevation is approximate.

Date Start/Finish: 9/30/04 Drilling Company: Zebra Drilling Driller's Name: Evan Moratis Drilling Method: Direct Push Drilling Sampling Method: Macrocore 4 feet by 2 inch diameter	Northing: Easting: Casing Elevation: Borehole Depth: 27 feet Surface Elevation: Geologist: Joe Lisi	Well/Boring ID: MW-29D-1 Client: CEMC **MW-29D-1** Location: Former Gulf Oil Terminal Industrial Road and Hampton Road Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							GRAVEL and ASPHALT	
					0		Light brown coarse to fine GRAVEL, little sand, moist.	
		3.5 / 4					Grey coarse to fine SAND and GRAVEL, wet.	
					61.2			
					186			
							Grey coarse to fine SAND and GRAVEL, wet.	
5					20.6			
		4.0 / 4						
					20.3			
			NA				Grey coarse to fine SAND and GRAVEL, some silt, wet.	
		3.4 / 4			0			
					0		Grey SILT, trace clay and organics, wood, and shells, wet.	
10					0			
					0			
		2.7 / 4			0		Grey SILT, trace clay and organics, wet.	
					0			
15					0			
							Dark grey to black SILT and fine SAND, trace fine gravel, wet.	
					0		Brown coarse to fine SAND, some fine gravel, wet.	
					0			
		3.5 / 4						
					0			
20							SAND and GRAVEL	
25								

Well/Boring Construction



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Remarks: bgs - Below ground surface.

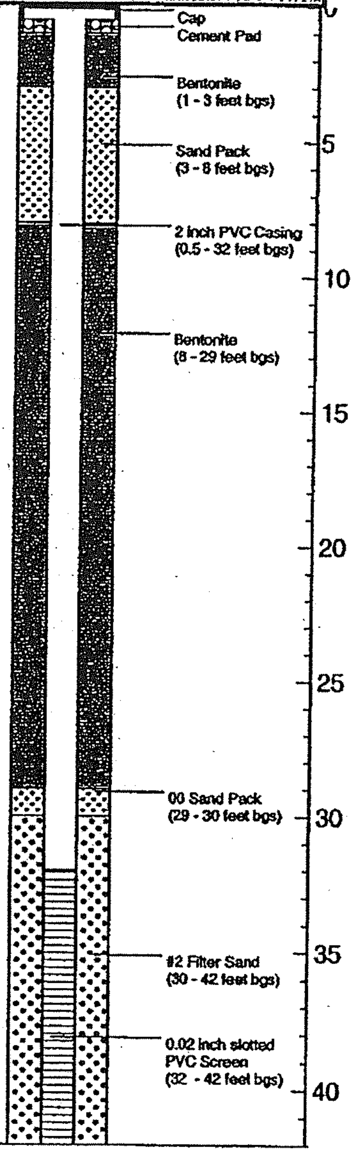
Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-29D-1.dat

Date:09/30/04

Date Start/Finish: 9/30/04 **Drilling Company:** Zebra Drilling **Driller's Name:** Evan Moralis **Drilling Method:** Direct Push Drilling **Sampling Method:** Macrocore 4 feet by 2 inch diameter	**Northing:** **Easting:** **Casing Elevation:** **Borehole Depth:** 42 feet **Surface Elevation:** **Geologist:** Joe Lisi	**Well/Boring ID:** MW-29D-2 **Client:** CEMC **Location:** Former Gulf Oil Terminal Industrial Road and Hampton Road Oceanside, NY

MW-29D-2

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0							GRAVEL and ASPHALT		
		3.5 / 4			0		Light brown coarse to fine GRAVEL, little sand, moist.		
					61.2 186		Grey coarse to fine SAND and GRAVEL, wet.		
5		4.0 / 4			20.6 20.3		Grey coarse to fine SAND and GRAVEL, wet.		
			NA				Grey coarse to fine SAND and GRAVEL, some silt, wet.		
10		3.4 / 4			0 0 0 0		Grey SILT, trace clay and organics, wood chips, and shells, wet.		
		2.7 / 4			0 0		Grey SILT, trace clay and organics, wet.		
15					0		Dark grey to black SILT and fine SAND, trace fine gravel, wet.		
		3.5 / 4			0 0 0		Brown coarse to fine SAND, some fine gravel, wet.		
20 25 30 35 40							SAND and GRAVEL.		



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf

Data File:MW-29D-2.dat

Date:09/30/04

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Log of Boring **MW-29VD** Sheet 1 of 3

Project: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/4/06	Date Finished: 12/26/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 65 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 17	Undisturbed 0 / Core 0
Casing Diameter (in): 8"/4"	Casing Depth (ft): 15'/54'	Water Level (ft.): First ▽ 3	Completion ▼ / 24 HR. ▼
Casing Hammer: Weight (lbs) NA	Drop (in) NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon		Inspecting Engineer: Anthony Sfeir/Andrew Racz	
Sampler Hammer: Weight (lbs) 140	Drop (in) 30		

Depth Scale	Elev. (ft)	Sample Description	PID Reading (ppm)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
0		Black coarse to fine SAND, some coarse to fine gravel, tarce silt							0950 - Start drilling using a 10" hollow-stem auger
3		▽							
5		Black coarse to fine SAND, some coarse to fine gravel (Wet, Petroleum odor)		1	SS	3	2 2 4 5	6	Auger to 5 ft bgs
6			0						
7		Black coarse to fine SAND, little coarse to fine gravel (Wet, Petroleum odor)		2	SS	2	WH 1 1 1	2	Auger to 7 ft bgs
8			0.5						
9		Black coarse to fine SAND, little coarse to fine gravel (Wet, Petroleum odor)		3	SS	0.25	WH/24"	Refusal	Auger to 9 ft bgs
10			0				1		
11		CLAY, some silt, trace fine sand		4	SS	3	WH/18"	Refusal	Auger to 11 ft bgs
12			0				2		
13				5	SS	0	WR/12" WH/12"	Refusal	Auger to 13 ft bgs
15		Black coarse to medium SAND, trace fine sand, trace gravel		6	SS	1.5	WH/18"	Refusal	Auger to 15 ft bgs 8" Casing installed at 15 ft Stop Drilling at 1110 on 12/4/2006 Resume Drilling on 12/26/2006 at 0900 Install temporary 4" steel casing from 0 to 13 ft bgs Drill to 15 ft
16			4.2				2		
17		Black to brown medium SAND, some fine sand, trace fine gravel (Petroleum Odor, wet)		7	SS	8	7 14 14 15	28	
18			0.7						
19		Brown medium to fine SAND (Petroleum odor, wet)		8	SS	14	12 29	45	Drill to 19 ft bgs Install 4" temporary casing to 19 ft bgs
20									

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Log of Boring **MW-29VD** Sheet 2 of 3

roject Former Chevron/Gulf Petroleum Oil Terminal	Project No. 1836740
Location Oceanside, NY	Elevation and Datum Not Surveyed

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			0.4	20	8	SS	14	16 16	45	
		Brown medium to fine SAND, trace medium to fine subangular beach gravel (wet)		21						
				22						Drill to 23 ft bgs
			0.2	23 24	9	SS	10	8 14 17 18	31	
		Brown coarse to fine SAND, trace medium to fine subangular gravel (strong petroleum odor, wet)		25 26 27						
			6.9	28 29	10	SS	4	3 2 5 5	7	
		Brown to white medium to fine SAND, trace medium to fine sub angular beach gravel (strong petroleum odor, wet)		30 31 32						
			3.8	33 34	11	SS	10	3 2 2 3	4	
		Brown to light gray medium to fine SAND, trace fine to medium sub angular beach gravel (slight petroleum odor, wet)		35 36 37						
			0	38 39	12	SS	8	2 3 3 2	6	
		Brown to gray coarse to medium SAND, trace fine to medium sub angular beach gravel (slight petroleum odor, wet)		40 41 42						
			0	43 44	13	SS	12	3 3 5 5	8	
				45						

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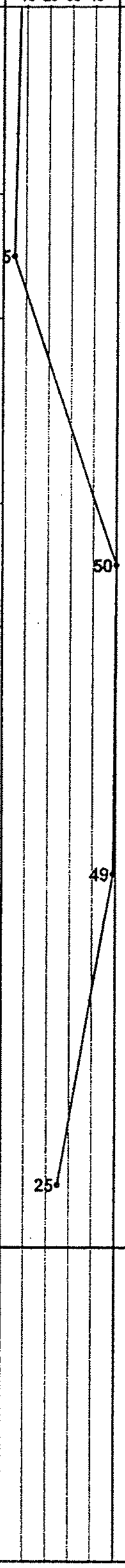
Log of Boring **MW-29VD** Sheet 3 of 3

roject: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Depth Scale	MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
45			Light brown to light gray coarse to medium SAND, trace fine to medium sub angular beach gravel							
48–50 (49)				0	14	SS	6	2 3 2 3	5	
50			Light gray mediu to fine SAND, trace medium to fine beach gravel (Wet)							
53–55 (54)				0	15	SS	16	19 24 26 23	50	
55			Light gray fine SAND, trace rock fragments, trace mediu to fine beach gravel (wet)							
58–60 (59)				0	16	SS	12	13 21 28 40	49	
60			Light Gray fine SAND, trace medium to fine beach gravel (wet)							
63–65 (64)				0	17	SS	12	11 14 11 12	25	
64.7			Gray silty CLAY							
65										Drill to 54 ft bgs using a 6" bit Install Permanent 4" steel casing from 0 to 54 ft bgs Install 2" PVC Monitoring Well from at 63 ft bgs
66–70										



Date Start/Finish: 10/1/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moralis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 28 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-30D-1

Client: CEMC

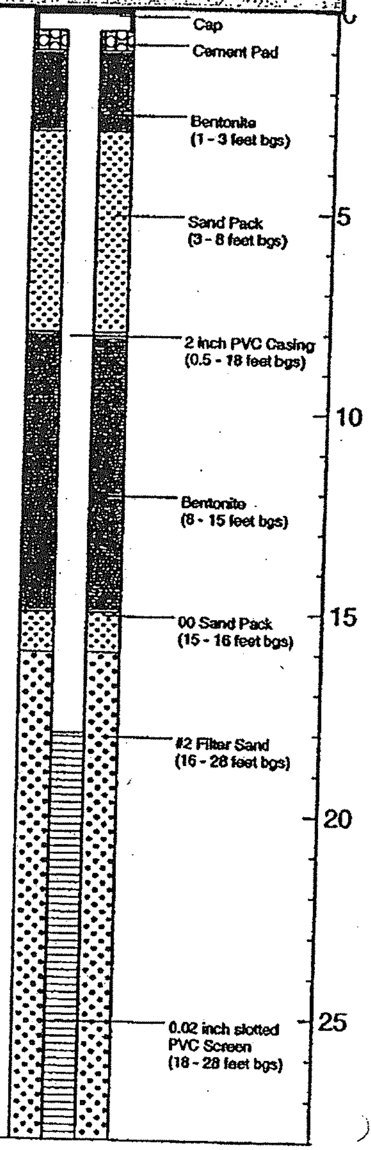
MW-30D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Stratigraphic Description
0						Coarse SAND and GRAVEL (fill).
					0	Brown coarse to fine SAND and GRAVEL, wet.
		2.5 / 4				
					30.8	
					64.1	
						Grey brown coarse to fine SAND and GRAVEL, wet.
5						
					33	Grey coarse to fine SAND, some gravel, trace silt, wet.
		2.5 / 4				
					35.1	
			NA			
					8.8	
		3.0 / 4				
					0	Grey SILT, some clay, trace fine sand and organics, wet.
10					8.1	
					13.4	
		1.5 / 4				
					0	Grey SILT, some clay, trace fine sand and organics, wet.
					0	
15					0	
					0	No recovery.
					0	
		0.0 / 4				
					0	
20						SAND and GRAVEL.
25						

Water Level

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NB\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-30D-1.dat
Date: 10/01/04

Date Start/Finish: 9/30/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Metallis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 43 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-30D-2

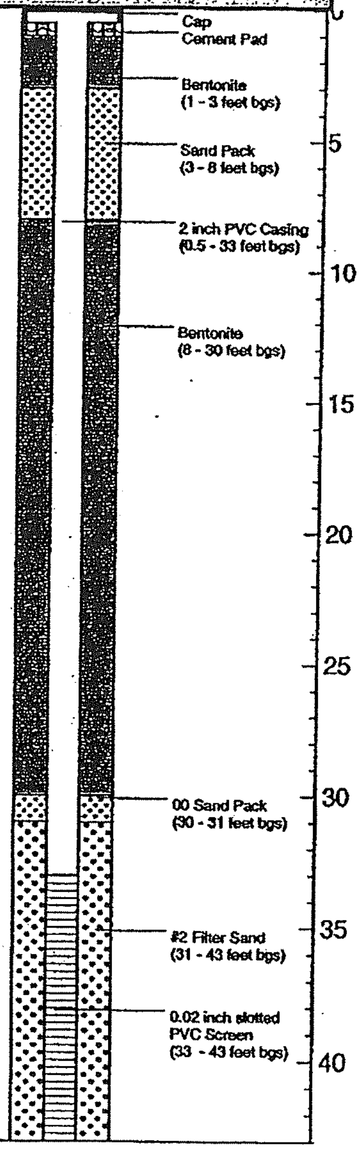
Client: CEMC

MW-30D-2

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample/Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							Coarse SAND and GRAVEL (fill).	
		2.5 / 4			0 30.8		Brown coarse to fine SAND and GRAVEL, wet.	
					64.1		Grey brown coarse to fine SAND and GRAVEL, wet.	
5		2.5 / 4	NA		33 35.1 8.8		Grey coarse to fine SAND, some gravel, trace silt, wet.	
10		3.0 / 4			0 8.1 13.4		Grey SILT, some clay, trace fine sand and organics, wet.	
15		1.5 / 4			0 0 0		Grey SILT, some clay, trace fine sand and organics, wet.	
		0.0 / 4					No recovery.	
20 25 30 35 40							SAND and GRAVEL.	

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-30D-2.dat
Date:09/30/04

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Log of Boring **MW-30VD** Sheet 1 of 4

Project	Former Chevron/Gulf Petroleum Oil Terminal	Project No.	1836740
Location	Oceanside, NY	Elevation and Datum	Not Surveyed
Drilling Agency	Advanced Drilling	Date Started	12/5/06
		Date Finished	12/27/06
Drilling Equipment	Gefco F-10 Drill Rig	Completion Depth	86 ft
		Rock Depth	NA
Size and Type of Bit	8" I.D. Hollow Stem Auger/Mud Rodary	Number of Samples	Disturbed 21 · Undisturbed 0 · Core 0
Casing Diameter (in)	8"/4"	Casing Depth (ft)	10'/73'
Casing Hammer	Weight (lbs) NA · Drop (in) NA	Water Level (ft.)	First ∇ 3 · Completion ▼ · 24 HR. ▼
Sampler	2" O.D. Split Spoon	Drilling Foreman	Chris Stratton/Chris Nigliore
Sampler Hammer	Weight (lbs) 140 · Drop (in) 30	Inspecting Engineer	Anthony Sfeir/Andrew Racz

Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
	Black coarse to fine SAND, some coarse to fine gravel (Petroleum Odor)		0						1005 - Start drilling using a 10" hollow-stem auger
			1						
			2						
	∇		3						
			4						
	Black coarse SAND and coarse to fine GRAVEL, little fine sand (Wet, Petroleum odor)		5	1	SS	3	5 4 6 4	10	
		10.2	6						Auger to 7 ft bgs
	Black coarse to fine SAND, some coarse to fine gravel		7	2	SS	18	WH/24"	Refusal	
	Dark brown CLAY, some silt, some peat (Strong petroleum and organic odor)	0.8	8						
	Dark brown CLAY, little peat, little coarse to fine gravel, little silt (organic smell)		9	3	SS	12	1 1 1 1	2	Auger to 9 ft bgs
		4.0	10						Auger to 10 ft bgs Place 8" casing at 10 ft bgs Stop drilling at 1145 Resume drilling on 12/27/2006 Install temporary 4" casing from 0 to 15 ft bgs. Drill to 13 ft bgs
	Soft gray CLAY, some silt, trace organic matter, moist strong sulfur odor		11						
			12						
			13	5	SS	24	5 5 6 4	11	
		8.9	14						
	Soft gray CLAY, some silt amd organic matter, wet, sulfur odor		15	6	SS	18	3 5 5 10	10	
		8.2	16						
	Brown medium to fine SAND, chemical odor (wet)		17	7	SS	8	17 21 30 40	51	
		0	18						
	Coarse to medium SAND, and fine rounded GRAVEL some fine sand, (strong petroleum odor, wet)		19						
			20						

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Log of Boring **MW-30VD** Sheet 2 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Depth Scale	Elev. (ft)	Sample Description	PID Reading (ppm)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20–23									Drill to 23 ft bgs
23–25			0	9	SS	5	18 23 29 35	52	
25–28		Brown Coarse to fine SAND, some fine GRAVEL, trace silt wet strong chemical odor							Drill to 28 ft bgs
28–30			7.3	10	SS	8	9 16 18 21	34	
30–33		Brown to white coarse to fine SAND, wet Strong Chemical odor							Drill to 33 ft bgs
33–35			6	11	SS	6	10 14 23 20	37	
35–38		White coarse to medium SAND, some fine sand wet Strong Chemical odor							Drill to 38 ft bgs
38–40			0	12	SS	7	4 26 19 24	45	
40–43		Light Brown medium SAND, some coarse sand, trace fine sand (wet, slight odor)							Drill to 43 ft bgs
43–45			0	13	SS	6	25 27 18 10	45	

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Log of Boring **MW-30VD** Sheet 3 of 4

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Light brown to white medium SAND, some coarse to fine sand (wet, very slight odor)		45						
				46						
				47						Drill to 48 ft bgs
				48				20		
			0	49	14	SS	6	22 30 29	52	
		Light brown to white coarse to fine SAND, some fine rounded gravel (wet)		50						
				51						
				52						Drill to 53 ft bgs
				53				30		
			0	54	15	SS	8	58 65 74	123	
		White fine to medium SAND, wet		55						
				56						
				57						Drill to 58 ft bgs
				58				50		
			0	59	16	SS	4	50 50 50	100	
		White fine to medium SAND, some coarse sand, wet		60						
				61						
				62						Drill to 63 ft bgs
				63				50		
			0	64	17	SS	10	50 50 50	100	
		White fine to medium SAND, some coarse sand, wet		65						
				66						
				67						Drill to 68 ft bgs
				68				16		
			0	69	18	SS	12	29 41 58	70	
				70						

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Log of Boring **MW-30VD** Sheet 4 of 4

roject: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Brown to white medium to fine SAND, some medium to fine rounded gravel, wet		70						
				71						
				72						Drill to 72 ft bgs
			0	73	19	SS	14	22 48 54 54	102	
		White fine SAND very dense, wet, trace mica flakes		74						Resume drilling on 12/28/2006 Drill to 74 ft bgs
			0	75	20	SS	10	22 48 54 54	102	
				76						
				77						
		White fine SAND very dense, wet, trace mica flakes		78						Drill to 78 ft bgs
			0	79	21	SS	10	38 52 35 50	87	
				80						
				81						
				82						
		Brown coarse to medium SAND, some fine sand, trace of silt Brown clayey SAND, some medium to fine rounded gravel		83						Drill to 83 ft bgs
		White fine to medium SAND, some silt and fine gravel	0	84	22	SS	16	26 22 26 32	48	
		Gray sandy CLAY, some fine to medium rounded gravel Medium to coarse SAND, some silt and clay (greenish), some fine to medium rounded gravel. Lense f grey silty clay		85						End of boring at 85 ft on 12/27/2006
			0	86	23	SS	20	8 12 38 40	50	Drill from 0 to 73 ft bgs with 6" bit Install 4" steel casingfrom 0 to 73 ft bgs Well installed at 83 ft bgs
				87						
				88						
				89						
				90						
				91						
				92						
				93						
				94						
				95						

Date Start/Finish: 10/7/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moratis
Drilling Method: Direct Push Drilling
Sampling Method: Macrocore,
4 feet by 2 inch diameter

Northing:
Easting:
Casing Elevation:

Borehole Depth: 27.5 feet
Surface Elevation:

Geologist: Joe Lisi

Well/Boring ID: MW-31D-1

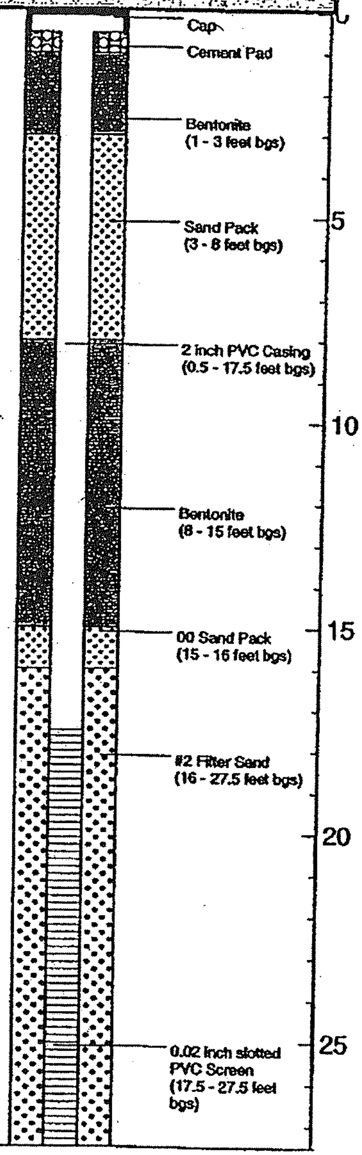
Client: CEMC

MW-31D-1

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level
0							CONCRETE.	
		1.2 / 4			4.0		Brown coarse to fine SAND, some fine gravel, moist.	
5		2.0 / 4			47.4		Brown coarse to fine SAND, some fine gravel, wet.	
			NA				Brown coarse to fine SAND, some fine gravel, moist.	
10		3.1 / 4			34.6 58.7 64.9		Dark grey CLAY, some silt, trace organics, wet.	
15		0.0 / 4			3.5		No recovery	
					440		Dark grey CLAY, some silt, trace organics, wet.	
20		2.4 / 4			460		Dark brown coarse to fine SAND, little fine gravel, trace organics, wet.	
25							SAND and GRAVEL.	

Well/Boring Construction



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Remarks: bgs - Below ground surface.

Project: 43948.001 Template:P:\Chevron SAR\SAR - NE\NY Site\Oceanside Terminal\LobPlog\Well.ldf
Data File:MW-31D-1.dat
Date:10/07/04

Date Start/Finish: 11/16/10 - 12/6/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164601.03
Easting: 1080906.14
Casing Elevation: 6.62

Borehole Depth: 27' bgs
Surface Elevation: 5.21

Descriptions By: MWE

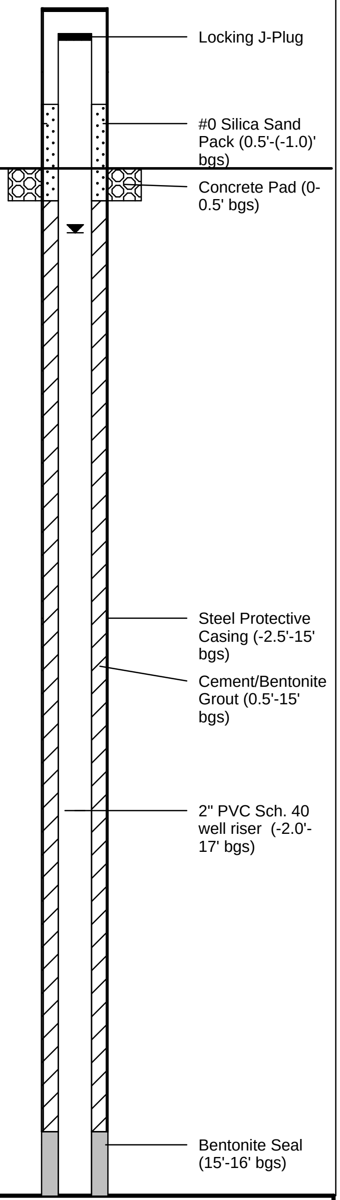
Well/Boring ID: **MW-31D-1R**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	0.6		Brown fine to coarse SAND and GRAVEL (S,NP)
		2	2-4	Grab	21.8		moderate petroleum-like odor
5	0	3	4-6	Grab	0.8		Brown fine to coarse SAND, little fine to medium Gravel (S,NP)
		4	6-8	Grab	0.5		
		5	8-10	2.0	2.6		
10	-5	6	10-12	2.0	1.7		Grey SILT and CLAY, little Wood (fibrous), Organics, trace fine Sand (S,MP)
		7	12-14	2.0	0.8		faint sulfur and petroleum-like odor (9.5'-23' bgs)
							Drilled to 15' bgs to set 4" steel casing
15	-10	8	15-17	NR	NA		No Recovery

Well/Boring Construction



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Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-31D-1R (0-2'), (2-4'), (4-6') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Client: Chevron

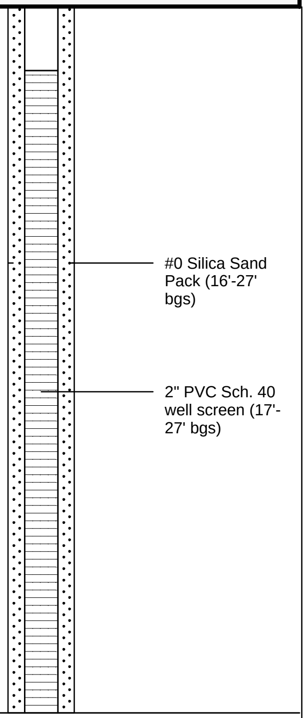
Well/Boring ID: **MW-31D-1R**

Borehole Depth: 27' bgs

Site Location:
Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
		8	15-17	NR	NA		
		9	17-19	1.2	2.5		Brown to grey fine to medium SAND, trace fine to medium Gravel (S,NP)
20	-15	10	19-21	1.0	8.6		faint sulfur and petroleum-like odor (9.5'-23' bgs)
		11	21-23	2.0	0.0		
		12	23-25	1.3	0.0		
25	-20	13	25-27	1.0	0.0		
30	-25						End of boring at 27' bgs

Well/Boring Construction



Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-31D-1R (0-2'), (2-4'), (4-6') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

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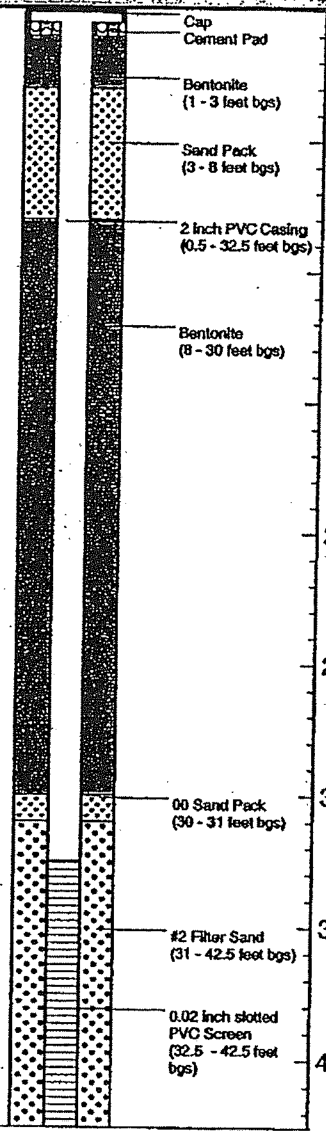
Date Start/Finish: 10/7/04 Drilling Company: Zebra Drilling Driller's Name: Evan Moralis Drilling Method: Direct Push Drilling Sampling Method: Macrocore 4 feet by 2 inch diameter	Northing: Easting: Casing Elevation: Borehole Depth: 42.5 feet Surface Elevation: Geologist: Joe Lisi	Well/Boring ID: MW-31D-2 Client: CEMC **MW-31D-2** Location: Former Gulf Oil Terminal Industrial Road and Hampton Road Oceanside, NY

DEPTH (bgs)	Sample Run Number	Recovery (feet)	Blows / 6 Inches	N - Value	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0							CONCRETE.		
		1.2 / 4			4.0		Brown coarse to fine SAND, some fine gravel, moist.		
5		2.0 / 4			47.4		Brown coarse to fine SAND, some fine gravel, wet.		
		3.1 / 4	NA				Brown coarse to fine SAND, some fine gravel, moist.		
					34.6		Dark grey CLAY, some silt, trace organics, wet.		
10					64.9				
		0.0 / 4					No recovery		
15									
					440		Dark grey CLAY, some silt, trace organics, wet.		
		2.4 / 4			460		Dark brown coarse to fine SAND, little fine gravel, trace organics, wet.		
20							SAND and GRAVEL.		
25									
30									
35									
40									



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Remarks: bgs - Below ground surface.

Date Start/Finish: 11/17/10 - 12/7/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164603.76
Easting: 1080912.75
Casing Elevation: 6.11

Borehole Depth: 42' bgs
Surface Elevation: 5.41

Descriptions By: MWE

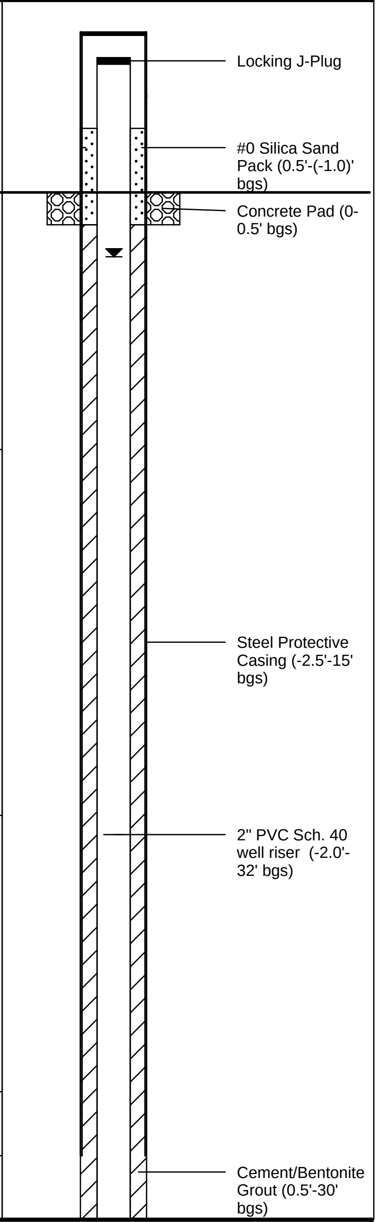
Well/Boring ID: **MW-31D-2R**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	0.2		Brown fine to coarse SAND and fine to medium subangular Gravel (S,NP)
		2	2-4	Grab	2.3		
5	0	3	4-6	Grab	78.4		Brown to grey fine to medium SAND, little to trace fine to medium Gravel (S,NP)
		4	6-8	Grab	11.7		heavy petroleum-like odor at water table
		5	8-10	2.0	6.8		
10	-5	6	10-12	2.0	3.4		Grey CLAY and SILT, little to trace fine Sand, Organics, trace fine to medium Gravel (S,MP) meadowmat material
		7	12-14	2.0	2.3		heavy sulfur-like odor
							Drilled from 14' to 15' before beginning mud rotary
15	-10	8	15-17	1.0	52.4		Grey to brown fine to medium SAND, trace fine to medium Gravel (S,NP)

Well/Boring Construction



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Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-31D-2R (2-4'), (4-6'), (6-8'), (17-19') & Dup-111710 @ (4-6') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Client: Chevron

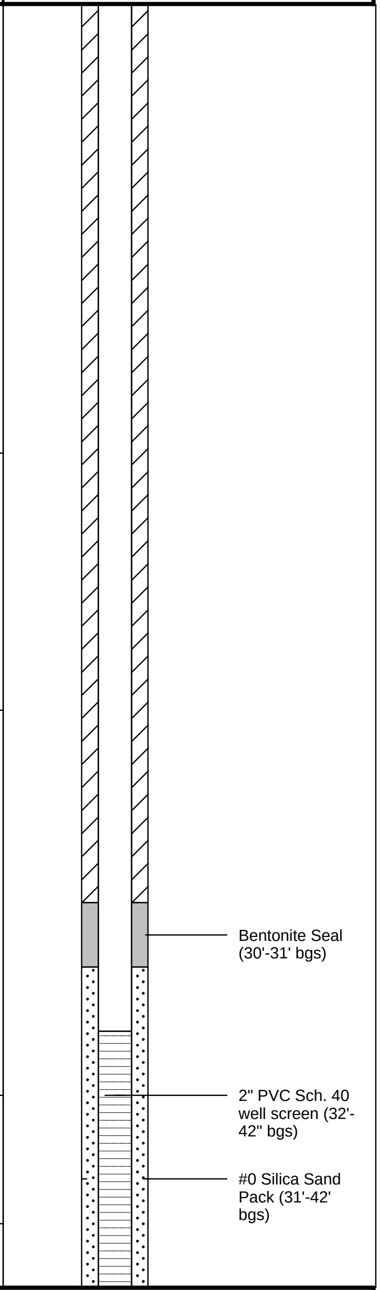
Well/Boring ID: **MW-31D-2R**

Site Location:
Oceanside Former Gulf Terminal
Oceanside, New York

Borehole Depth: 42' bgs

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
		8	15-17	1.0	52.4	⁙	
		9	17-19	1.6	20.0	⁙	
20	-15	10	19-21	2.0	6.8	⁙	
		11	21-23	2.0	2.8	⁙	
		12	23-25	2.0	1.7	⁙	Brown fine to coarse SAND
25	-20	13	25-27	2.0	0.6	⁙	
		14	27-29	2.0	0.0	⁙	Brown medium to coarse SAND, little fine Sand (S,NP)
30	-25	15	29-31	2.0	0.0	⁙	
		16	31-33	2.0	0.0	⁙	
		17	33-35	2.0	0.0	⁙	Brown coarse SAND, trace fine to medium Sand (S,NP)
35	-30						Drilled to 42' bgs, unable to keep hole open for representative sample collection

Well/Boring Construction



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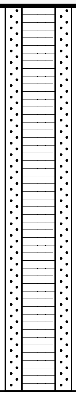
Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-31D-2R (2-4'), (4-6'), (6-8'), (17-19') & Dup-111710 @ (4-6') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Client: Chevron

Well/Boring ID: **MW-31D-2R**

Borehole Depth: 42' bgs

Site Location:
Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
40	-35							
							End of boring at 42' bgs	
45	-40							
50	-45							

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Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ MW-31D-2R (2-4'), (4-6'), (6-8'), (17-19') & Dup-111710 @ (4-6') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

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Log of Boring **MW-32D** Sheet 1 of 2

oject: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/7/06	Date Finished: 12/13/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 35 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 15	Undisturbed 0; Core 0
Casing Diameter (in): 8"	Casing Depth (ft): 17'	Water Level (ft.): First ∇ 9	Completion ▼; 24 HR. ▼
Casing Hammer: Weight (lbs) NA	Drop (in) NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon		Inspecting Engineer: Anthony Sfeir/Andrew Racz	
Sampler Hammer: Weight (lbs) 140	Drop (in) 30		

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Dark gray coarse SAND, some medium to fine sand, some coarse to fine gravel		0						1315 - Start drilling using a 10" hollow-stem auger
				1						
				2						
				3						
				4						Auger to 5 ft bgs
		Light gray coarse SAND, some medium sand, trace coarse to fine grael	0.2	5	1	SS	10	2 4 4 5	8	
				6						Auger to 7 ft bgs
		Light gray coarse SAND, soe medium sand, moist	5.0	7	2	SS	24	3 2 2 2	4	
		Dark gray CLAY, some peat (organis smell, moist) ∇		8						Auger to 9 ft bgs
		Light gray coarse SAND, some medium to fine sand, trace of brick (wet)	0.0	9	3	SS	4	1/12" 1/12"		
				10						Auger to 11 ft bgs
		Light gray coarse SAND, some medium to fine sand, trace of brick (wet)	0.0	11	4	SS	0.5	WH/24"	Refusal Refusal	
				12						Auger to 13 ft bgs
				13	5	SS	0	WH/24"	Refusal	
				14						Auger to 15 ft bgs
		Light gray coarse SAND, some medium to fine sand, wet Dark gray CLAY, some silt, little peat (organic smell)	12	15	6	SS	24	1/12" 1 1		
				16						Auger to 17 ft bgs 8" casing installed at 17 ft bsg
		Dark gray CLAY, trace peat, some silt (organic smell)	22	17	7	SS	1	WH/18" 1	Refusal Refusal	Stop drilling at 1600 on 12/7/2006 Resume drilling at 1015 on 12/13/2006 Drill to 19 ft bgs
				18						
		Dark gray CLAY, trace peat, some silt (organic smell)	0.0	19	8	SS	13	WOR/12"	Refusal	
				20						

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Log of Boring **MW-32D** Sheet 2 of 2

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No. 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Depth Scale	Sample Description	PID Reading (ppm)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20	PEAT and organic matter some clay, sulfur odor					WH/12"	Refusal	
21	gray CLAY, some silt, wet, sulfr odor	0.0	9	SS	24	WH 2 2 5	4	
22	CLAY and PEAT, brown some silt, sulfur odor							
23	White medium to coarse SAND, trace fine sand, sulfur odor	7.8	10	SS	12	7 8 22 21	30	Drill to 23 ft bgs
25		6.6	11	SS	12	12 22 19 19	41	
26.5	Yellow coarse to medium SAND, trace fine sand							Drill to 27 ft bgs
27	White medium to coarse SAND, trace fine sand	10.3	12	SS	8	11 16 16 18	32	
29	White medium to coarse SAND, trace fine sand	0.0	13	SS	18	17 18 19 18	37	
31	Yellow to white coarse to fine SAND, trace fine sand and fine gravel, slight odor	0.0	14	SS	12	5 6 9 13	15	
33		0.0	15	SS	12	11 19 17 22	36	
35								Stop drilling at 1200 on 12/13/2006 2" PVC Monitoring well installed at 34'
36								
37								
38								
39								
40								
41								
42								
43								
44								
45								

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Log of Boring **MW-33D** Sheet 1 of 2

Project: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/7/06	Date Finished: 12/12/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 29 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 12	Undisturbed 0 Core 0
Casing Diameter (in): 8"	Casing Depth (ft): 13'	Water Level (ft.): First ∇ 7	Completion ▼ 24 HR. ▼
Casing Hammer: Weight (lbs) NA	Drop (in) NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon		Inspecting Engineer: Anthony Sfeir/Andrew Racz	
Sampler Hammer: Weight (lbs) 140	Drop (in) 30		

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
		Black coarse SAND, some medium sand, some coarse to fine gravel		0						1520 - Start drilling using a 10" hollow-stem auger on 12/7/2006
			209	3						
		Black coarse SAND, some medium sand, some coarse to fine gravel (petroleum smell)	22	5	1	SS	1	2 1 1 1	2	Auger to 5 ft bgs
		Black coarse SAND, some medium sand, some coarse to fine gravel (Petroleum smell) ∇	7	7	2	SS	1	1 WH/18"	Refusal	Auger to 7 ft bgs
		Dark brown coarse SAND, some medium to fine sand, some coarse to fine garvel Petroleum odor)	35	9	3	SS	3	WH/24"	Refusal	Auger to 9 ft bgs
		Meadow Mat (No Recovery)	25	11	4	SS	0	WH/24"	Refusal	Auger to 11 ft bgs Cuttings consists of clay and peat
				13	5	SS	0	WH/12" 4 4	Refusal	Auger to 13 ft bgs 8" casing installed at 13 ft bgs
				15	6	SS	0	3 2 3 4	5	
		Light brown medium SAND, some fine sand, trace of silt (Wet, organic smell)	4	17	7	SS	18	3 3 8 12	11	Auger to 17 ft bgs Stop drilling at 1630 on 12/7/2006 Resume drilling at 1430 on 12/13/2006 Drill to 19 ft bgs
		Yellowish brown medium to fine SAND, some coarse sand (Wet, organic smell)	21	19	8	SS	11	4 6	14	
				20						

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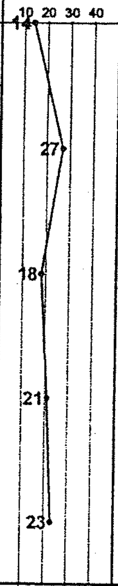
Log of Boring **MW-33D** Sheet 2 of 2

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Number	Type	Recov. (In)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
			20	8	SS	11	8 6	14	
	Light brown medium to fine SAND, some coarse sand, little fine gravel (Wet, organic odor)	8	21	9	SS	18	5 10 17 12	27	
	Coarse to medium SAND (Wet , organic odor)	2.7	23	10	SS	12	6 8 10 10	18	Drill to 25 ft bgs
	Light brown coarse to medium SAND, trace of fine sand (Wet, organic odor)	6	25	11	SS	15	10 11 10 12	21	Drill to 27 ft bgs
	White medium SAND, little coarse sand (Wet, organic smell)	14	27	12	SS	12	10 12 11 7	23	
			29						Stop drilling at 1525 on 12/13/2006 End of boring at 29 ft bgs 2" PVC Monitoring well installed at 28 ft bgs



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Log of Boring **MW-34D** Sheet 1 of 2

roject	Former Chevron/Gulf Petroleum Oil Terminal	Project No.	1836740
Location	Oceanside, NY	Elevation and Datum	Not Surveyed
Drilling Agency	Advanced Drilling	Date Started 12/8/06	Date Finished 12/12/06
Drilling Equipment	Gefco F-10 Drill Rig	Completion Depth 35 ft	Rock Depth NA
Size and Type of Bit	8" I.D. Hollow Stem Auger/Mud Rodary	Number of Samples: Disturbed 15	Undisturbed 0 / Core 0
Casing Diameter (in) 8"	Casing Depth (ft) 11'	Water Level (ft.): First ▽ 7	Completion ▼ / 24 HR. ▼
Casing Hammer	Weight (lbs) NA / Drop (in) NA	Drilling Foreman	Chris Stratton/Chris Nigliore
Sampler	2" O.D. Split Spoon	Inspecting Engineer	Anthony Sfeir/Andrew Racz
Sampler Hammer	Weight (lbs) 140 / Drop (in) 30		

MATERIAL SYMBOL	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data: Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
▩		Black coarse SAND, some medium to fine sand, some coarse to fine gravel (moist, petroleum odor)		0						1045 - Start drilling using a 10" hollow-stem auger on 12/8/2006
▩			170	3						
▩		Black coarse SAND, some medium to fine sand, some coarse to fine gravel, trace of roots (moist, petroleum smell)	200	5	1	SS	15	3 4 5 4	9	Auger to 5 ft bgs
▩		Dark brown coarse SAND, some medium to fine sand, trace brick (wet, Petroleum smell) ▽	42	7	2	SS	15	5 4 2 2	6	Auger to 7 ft bgs
▨		Dark gray CLAY, some peat, trace fine gravel, some silt (organic and petroleum odor)	40	9	3	SS	20	4 1/12" 2	Refusal	Auger to 9 ft bgs
▨		Dark gray CLAY, some silt, trace peat (organic and petroleum odor)	53	11	4	SS	10	1 1 1 1	2	Auger to 11 ft bgs 8" Casing installed at 11 ft bgs Stop drilling at 1130 on 12/8/2006
▨			33	13	5	SS	23	WH/24"	Refusal	Resume Drilling on 12/12/2006 at 0920 Drill to 13 ft bgs
▨			48	15	6	SS	24	WH 1 2 1	3	
▨			54	17	7	SS	20	WH/24"	Refusal	Drill to 17 ft bgs
▨			34	19	8	SS	20	WH 1	3	
				20						

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Log of Boring **MW-34D** Sheet 2 of 2

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Depth Scale	Sample Description	Elev. (ft)	PID Reading (ppm)	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
20–21	Brown PEAT, some clay, little silt (organic odor)			8	SS	20	2 2	3	Drill to 21 ft bgs
21–23	Light brown coarse to medium SAND, little fine sand, trace peat (Wet)		82	9	SS	18	WH 1 4 9	5	
23–25	Light gray medium SAND, some coarse sand, little fine sand, trace silt (Wet)		6	10	SS	18	13 17 14 15	31	Drill to 25 ft bgs
25–27	White Coarse to medium SAND, trace fine sand (Wet)		20	11	SS	18	6 11 12 12	23	
27–29			6.2	12	SS	16	11 16 18 18	34	Drill to 29 ft bgs
29–31	White Coarse to medium SAND, little coarse to fine gravel, trace fine sand (Wet)		15.4	13	SS	10	2 5 6 7	11	
31–33	White Coarse to medium SAND, little coarse to fine gravel (Wet)		4.2	14	SS	18	10 12 14 12	26	Drill to 33 ft bgs
33–35	Coarse to Medium SAND, some fine sand (Wet) Dark grey CLAY, some silt		0.0	15	SS	15	2 2 2 1	4	
35–45									Stop drilling at1230 on 12/12/2006 End of boring at 35 ft bgs 2" PVC Monitoring well installed at 33 ft bgs

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Log of Boring **MW-35D** Sheet 1 of 2

Project	Former Chevron/Gulf Petroleum Oil Terminal	Project No.	1836740
Location	Oceanside, NY	Elevation and Datum	Not Surveyed
Drilling Agency	Advanced Drilling	Date Started: 12/8/06	Date Finished: 12/11/06
Drilling Equipment	Gefco F-10 Drill Rig	Completion Depth: 27 ft	Rock Depth: NA
Size and Type of Bit	8" I.D. Hollow Stem Auger/Mud Rodary	Number of Samples	Disturbed: 11 · Undisturbed: 0 · Core: 0
Casing Diameter (in): 8"	Casing Depth (ft): 11'	Water Level (ft.)	First ∇ 6.8 · Completion ▼ · 24 HR. ▼
Casing Hammer	Weight (lbs): NA · Drop (in): NA	Drilling Foreman	Chris Stratton/Chris Nigliore
Sampler	2" O.D. Split Spoon		
Sampler Hammer	Weight (lbs): 140 · Drop (in): 30	Inspecting Engineer	Anthony Sfeir/Andrew Racz

Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Sample Data					Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				Number	Type	Recov. (In)	Penetr. resist BL/6in	N-Value (Blows/ft)	
	Reddish brown coarse to fine SAND, some coarse to fine gravel, trace balck coarse sand (moist)		0						1400 - Start drilling using a 10" hollow-stem auger on 12/8/2006
		0.0	3						
	Dark brown coarse to fine SAND, some coarse to fine gravel (moist)	0.0	5	1	SS	8	3 3 2 1	5	Auger to 5 ft bgs
	∇		6.8						
	Grey coarse SAND, some medium to fine sand, trace fine gravel (wet, light petroleum odor)	2.0	7	2	SS	24	3 2 2 2	4	Auger to 7 ft bgs
	Dark brown coarse SAND, some medium to fine sand, little fine gravel (Wet)	0.0	9	3	SS	24	WH/24"	Refusal	Auger to 9 ft bgs
	Grey CLAY, trace peat, some silt		9.5						
	Grey CLAY, some silt, trace peat (Organic Odor)	0.0	11	4	SS	13	1 1 1 1	2	Auger to 11 ft bgs 8" Casing installed at 11 ft bgs Stop drilling at 1440 on 12/8/2006 Auger to 13 ft bgs
	Grey CLAY, some peat, some silt (organic odor)	3.0	13	5	SS	20	WH/18"	Refusal	
			14				2		
	Dark brown coarse to medium SAND, some fine sand (Wet, petroleum odor)	6.0	15	6	SS	20	4 4 7 8	11	
		8.0	17	7	SS	20	9 15 21 20	36	
		8.0	19	8	SS	11	5 1	9	
			20						

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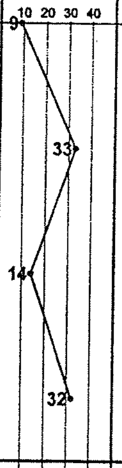
Log of Boring **MW-35D** Sheet 2 of 2

oject: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (In)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20	8	SS	11	8 12	9	
		Dark brown coarse to medium SAND, some fine sand, trace coarse to fine fravel (Wet, petroleum odor)	5.0	21	9	SS	18	10 15 18 14	33	Drill to 23 ft bgs
		Brown coarse to medium SAND, trace coarse to fine gravel (Wet, Petroleum Odor)	3.8	23	10	SS	10	4 5 9 12	14	
		Brown Coarse to medium SAND, trace coarse to fine gravel (Petroleum odor, Wet)	4.4	25	11	SS	18	16 16 16 12	32	Drill to 26 ft bgs
				27						Stop drilling at 1400 on 12/11/2006 End of boring at 27 ft bgs 2" PVC Monitoring well installed at 26 ft bgs



Depth Scale: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45

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Log of Boring **MW-36D** Sheet 1 of 2

Project: Former Chevron/Gulf Petroleum Oil Terminal		Project No.: 1836740	
Location: Oceanside, NY		Elevation and Datum: Not Surveyed	
Drilling Agency: Advanced Drilling		Date Started: 12/14/06	Date Finished: 12/20/06
Drilling Equipment: Gefco F-10 Drill Rig		Completion Depth: 33 ft	Rock Depth: NA
Size and Type of Bit: 8" I.D. Hollow Stem Auger/Mud Rodary		Number of Samples: Disturbed 14	Undisturbed 0 Core 0
Casing Diameter (in): 8"	Casing Depth (ft): 13'	Water Level (ft.): First ▽ 5	Completion ▼ 24 HR. ▼
Casing Hammer	Weight (lbs): NA Drop (in): NA	Drilling Foreman: Chris Stratton/Chris Nigliore	
Sampler: 2" O.D. Split Spoon		Inspecting Engineer: Anthony Sfeir/Andrew Racz	
Sampler Hammer	Weight (lbs): 140 Drop (in): 30		

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (in)	Penetr. resist BL/6in	N-Value (Blows/ft) 10 20 30 40	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
▩		Coarse angular gravel, concrete and brick fragments; some medium sand, some plant material, wet		0						1330 - Start drilling using a 10" hollow-stem auger on 12/14/2006
▩		▽	0.0	5	1	SS	18	6 6 6 3	12	Auger to 5 ft bgs
▩		coarse to fine SAND, wet petroleum odor		6						
▩		Coarse to fine SAND, wet slight odor	4.8	7	2	SS	24	5 4 2 2	6	Auger to 7 ft bgs
▨		Dark gray CLAY, soft, wet, spme peat and plat material, trace silt, strong sulfur odor	6.4	9	3	SS	2	1 2 1/18"		Auger to 9 ft bgs
▨		Meadow Mat (No Recovery)		11	4	SS	0.0	WH/2"	Refusal	
▨				13	5	SS	0.0	WH/2"	Refusal	8" Steel casing installed at 13 ft bgs
▨				15	6	SS	0.0	WH/2"	Refusal	Auger to 15 ft bgs Stop drilling 1410 on 12/14/2006 Resume drilling on 12/19/2006 at 1400
▨				17	7	SS	0.0	WH/2"	Refusal	
▨		Dark gray CLAY and PEAT, soft, wet, organic sulfur odor		19	8	SS	16	WH/12"		Drill to 19 ft bgs
				20						

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Log of Boring **MW-36D** Sheet 2 of 2

Project: Former Chevron/Gulf Petroleum Oil Terminal	Project No.: 1836740
Location: Oceanside, NY	Elevation and Datum: Not Surveyed

Material Symbol	Elev. (ft)	Sample Description	PID Reading (ppm)	Depth Scale	Number	Type	Recov. (In)	Penetr. resist BL/6in	N-Value (Blows/ft)	Remarks (Drilling Fluid, Depth of Casing, Fluid Loss, Drilling Resistance, etc.)
				20				2 WH/6"	Refusal	Drill to 21 ft bgs
		Brown PEAT, roots, decaying plant matter, some silt and clay		21	9	SS	20	25 30 35 40	65	
		Gray to white medium to fine SAND, trace fine gravel, wet, organic/chemical odor White coarse to fine SAND, some fine gravel, wet, organic/chemical odor	0.0	23	10	SS	18	6 5 10 13	15	
		gray to white coarse SAND and fine GRAVEL, some medium sand, trace fine sand, wet faint odor	0.0	25	11	SS	10	15 20 33 35	53	
		White medium to fine SAND, trace coarse sand, wet, faint odor	0.0	27	12	SS	12	15 20 33 35	53	Drill to 29 ft bgs
			0.0	29	13	SS	8	10 12 14 16	26	
		White coarse to fine SAND, wet very faint odor	0.0	31	14	SS	16	15 15 16 22	31	
				33						
				34						End of boring at 34 ft bgs 2" PVC Monitoring well installed at 34 ft bgs
				35						
				36						
				37						
				38						
				39						
				40						
				41						
				42						
				43						
				44						
				45						

Date Start/Finish: 1/29/2013-2/14/2013
Drilling Company: Parratt-Wolff Inc.
Driller's Name: J.Price/R.Navatka
Drilling Method: 6 1/4" HSA / Mud Rotary
Sampling Method: 2" x 2' Split Spoon
Rig Type: IR A-300 Truck Mounted Rig

Northing: 164794.2800
Easting: 1080954.7400
Casing Elevation: NA

Borehole Depth: 29' bgs
Surface Elevation: 6.70' AMSL

Descriptions By: J.Oliver

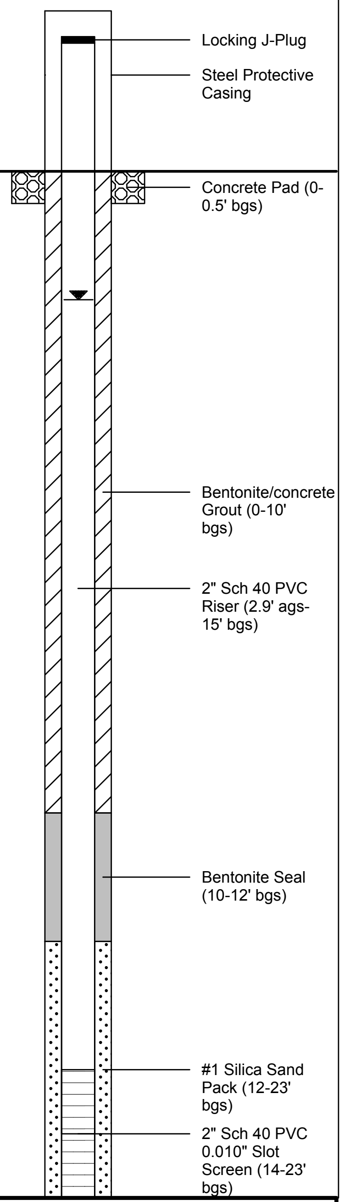
Well/Boring ID: **OW-01-D1**

Client: Chevron EMC

Location: Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Stratigraphic Description
0		1	0-1	NA	NA	CONCRETE pieces and fine to medium SAND, trace fine Gravel, Silt, Organics, odor, moist.
	5	2	1-2	NA	15.1	Brown fine to medium SAND, little to trace Silt, trace fine Gravel, odor, moist to wet.
		3	2-3	NA	2.3	
5	0	NA	NA	NA	NA	Unable to collect samples due to borehole collapse.
						Gray fine to medium SAND, trace Clay, odor, wet.
		4	8-10	0.9	11.9	Gray SILT and CLAY, little Peat, plastic, odor, wet.
10	-5	5	10-12	0.9	11.3	
		6	12-14	1.0	6.0	Gray SILT and CLAY, trace fine to medium Sand, Organics, odor, wet.
15		7	14-16	1.2	6.1 23	Gray SILT and fine SAND, some to little Clay, odor, wet.

Well/Boring Construction



ARCADIS Design & Consultancy for natural and built assets

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Client: Chevron EMC

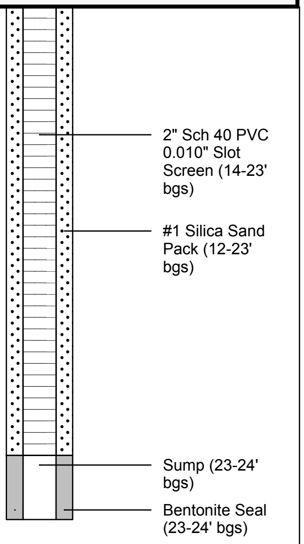
Well/Boring ID: **OW-01-D1**

Borehole Depth: 29' bgs

Site Location:

Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Well/Boring Construction
					10.4			
	-10	8	16-18	1.4	29.1		Brown fine SAND, trace Silt, Organics, odor, wet. Color becomes lighter with depth. Material coarsening with depth to [medium to fine Sand].	
		9	18-20	1.0	35 56		Light gray/light brown fine SAND, trace medium Sand, odor, wet.	
20	-15	10	20-22	1.2	20 26		Brown/ light brown fine to medium SAND, trace coarse Sand, odor, wet.	
		11	22-24	1.4	19.3 43.7			
25		12	24-26	0.8	11.4 4.6		Light brown/ light gray medium to fine SAND, trace coarse Sand, wet. Fine subrounded Gravel lamination at 24.5' bgs	
	-20	13	26-28	1.6	5.1 40.1		Light to very light gray medium to coarse SAND, little fine Sand (increasing with depth), wet.	
		14	28-29	0.4	18.4		Light fine SAND, little medium Sand, odor, wet.	
30	-25						End of boring at 29' bgs.	
35								



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Project: B0047517.0007
Data File: OW-01-D1.dat

Template: boring-well geoprobe 2007.ldfx
Date: 12/14/2016

Created/Edited by: NPS

Date Start/Finish: 1/29/2013-2/14/2013
Drilling Company: Parratt-Wolff Inc.
Driller's Name: J.Price/J. Cavelier
Drilling Method: 6 1/4" HSA / Mud Rotary
Sampling Method: 2" x 2' Split Spoon
Rig Type: IR A-300 Truck Mounted Rig

Northing: 164796.4600
Easting: 1080931.8600
Casing Elevation: NA

Borehole Depth: 29' bgs
Surface Elevation: 7.00' AMSL

Descriptions By: J.Oliver

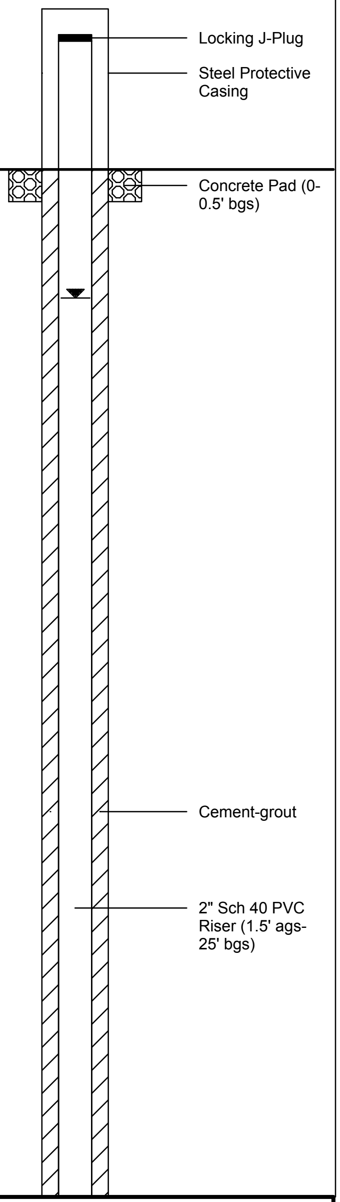
Well/Boring ID: OW-02-D1

Client: Chevron EMC

Location: Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
	10						
0		1	0-1	NA	0.0		Light brown medium to coarse SAND, some fine Sand, fine subrounded to subangular Gravel, trace Organics, moist. Gray-brown, wet.
	5	2	1-3	NA	0.9		
		3	3-5	NA	90.3		Gray fine to medium SAND, trace fine Gravel, coarse Sand, wet, odor.
5	0	NA	5-8	NA	NA		Unable to collect samples due to borehole collapse.
		4	8-10	0.7	16.9		Gray CLAY and SILT, trace fine Sand and Peat, moderate plasticity, odor, wet.
10		5	10-12	0.9	10.8		Trace Shells.
	-5	6	12-14	0.7	17.3		Gray SILT and CLAY, trace fine Sand seam at 12.2' bgs, plastic, wet, odor.
15		7	14-16	2.0	12.1 18.4		

Well/Boring Construction



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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Client: Chevron EMC

Well/Boring ID: **OW-02-D1**

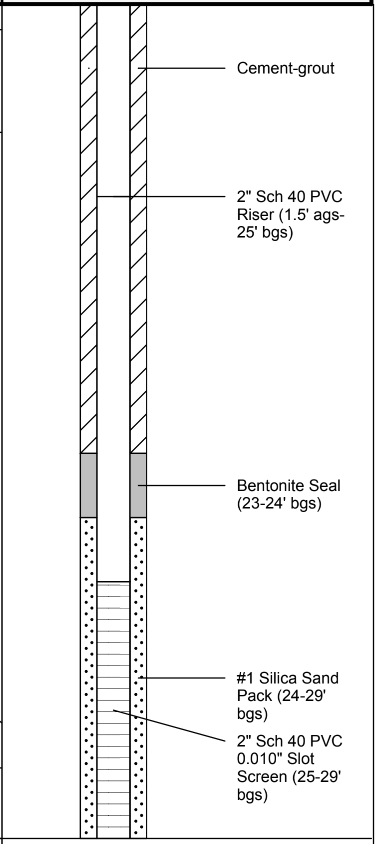
Borehole Depth: 29' bgs

Site Location:

Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
	-10	8	16-18	0.8	20.2 85		Gray to dark brown fine SAND and SILT, some CLAY, wet, odor. Brown to light brown fine to medium SAND, trace Organics, odor, wet.
		9	18-20	1.4	22.1 35.7		Brown to light brownish gray fine to medium SAND, odor, wet.
20		10	20-22	0.8	15.3 13.1		Faint odor.
	-15	11	22-24	1.6	18.7 13.3		Trace coarse Sand, faint odor.
25		12	24-26	1.0	14.1 15.3		
	-20	13	26-28	2.0	5.7 17.1		Some laminations between 26.8-27.2' bgs. Light gray medium to coarse SAND, some fine subrounded Gravel, grain size increasing with depth, wet.
		14	28-29	0.5	4.3		Light gray fine SAND, some to little medium Sand.
							End of boring at 29' bgs.
30							
	-25						
35							

Well/Boring Construction



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Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Project: B0047517.0007
Data File: OW-02-D1.dat

Template: boring-well geoprobe 2007.ldfx
Date: 12/14/2016

Created/Edited by: NPS

Date Start/Finish: 1/29/2013-2/7/2013
Drilling Company: Parratt-Wolff Inc.
Driller's Name: J.Price/J. Cavelier
Drilling Method: 6 1/4" HSA / Mud Rotary
Sampling Method: 2" x 2' Split Spoon
Rig Type: IR A-300 Truck Mounted Rig

Northing: 164822.2500
Easting: 1080963.7000
Casing Elevation: NA

Borehole Depth: 29' bgs
Surface Elevation: 6.83' AMSL

Descriptions By: J.Oliver

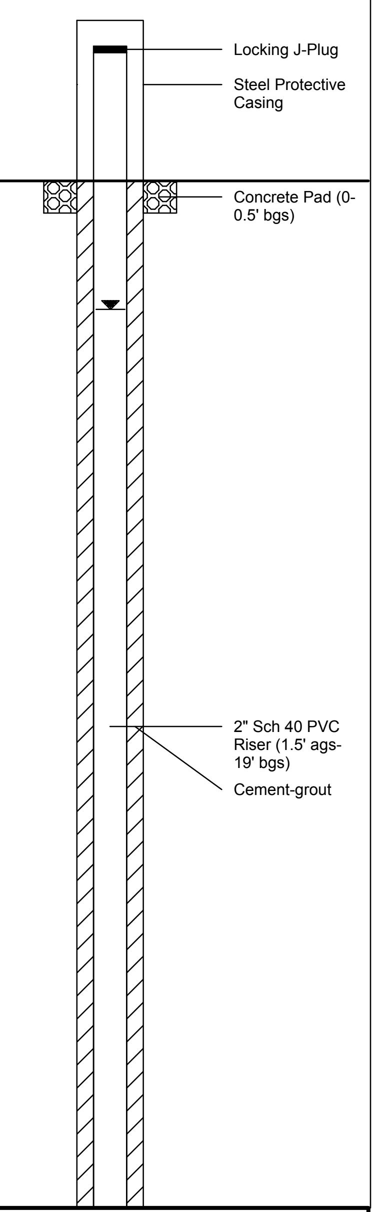
Well/Boring ID: OW-03-D1

Client: Chevron EMC

Location: Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0		1	0-1	NA	0.0		Light brown fine to medium SAND, trace coarse Sand, fine Gravel, and Organics, moist.
	5	2	1-3	NA	NA		COBBLES, trace fine to medium Gravel and fine Sand, wet.
		3	3-5	NA	20.5		Gray fine to medium SAND, trace Silt and fine Gravel, odor, wet.
5	0	NA	5-8	NA	NA		Unable to collect samples due to borehole collapse.
							Fine SAND.
		4	8-10	0.7	32 14.1		Gray SILT and CLAY, little to trace Peat, trace fine Sand, moist, plastic, odor, wet. [MEADOW MAT]
10	-5	5	10-12	0.9	11.5		Trace Shell fragments.
		6	12-14	0.7	5.8		Gray SILT and CLAY, trace fine Sand, odor, wet.
15		7	14-16	2.0	10.9		Fine Sand at the end of sampler (last 0.1').

Well/Boring Construction



ARCADIS Design & Consultancy for natural and built assets

Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Client: Chevron EMC

Well/Boring ID: **OW-03-D1**

Borehole Depth: 29' bgs

Site Location:
Oceanside Former Gulf Terminal
#6518040
Oceanside, New York

DEPTH: 20, 25, 30, 35
ELEVATION: -10, -15, -20, -25

Sample Run Number	Sample/Int/Type	Recovery	PID Headspace (ppm)
8	16-18	0.8	14.9
9	18-20	1.4	8.7
10	20-22	0.8	22.0
11	22-24	1.6	7.9
12	24-26	1.0	1.1
13	26-28	2.0	2.4
14	28-29	0.5	5.1

Geologic Column

Stratigraphic Description

Light gray fine to medium SAND, wet, odor.

Brown fine SAND, some to little Organics, trace Silt, odor, wet.

Brown to light brown fine to medium SAND, trace Organics and fine Gravel, coarsening with depth, odor, wet.

Light brown fine to medium SAND, laminations of fine to medium Sand and Silt at 20.5' bgs, odor, wet.

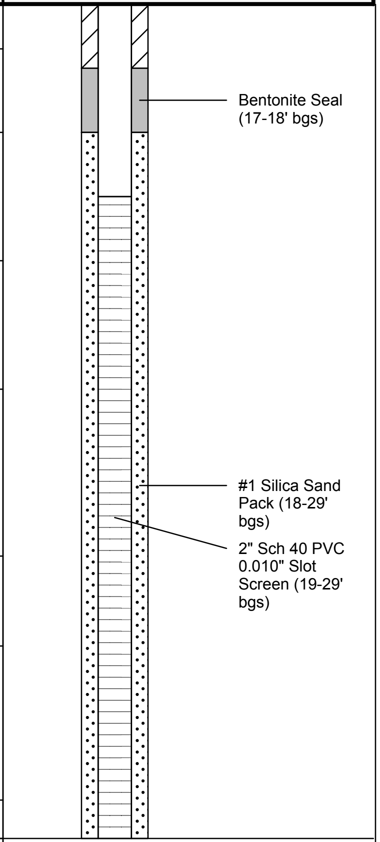
Light brown to light gray fine to medium SAND, trace coarse Sand after 22.7' bgs, odor, wet.

Light gray coarse SAND, little to trace fine Sand, trace fine subrounded Gravel, wet.

Light gray coarse SAND, little fine subrounded Gravel, trace fine to medium Sand, wet.
Some laminations between 26.8-27.2' bgs.

Light gray fine to medium SAND (fining with depth), trace coarse Sand, wet.

Well/Boring Construction



Remarks: ags = above ground surface; bgs = below ground surface; NA = Not Applicable/Available; AMSL = Above Mean Sea Level.

Ground surface elevation is approximate.

Date Start/Finish: 12/2/10
Drilling Company: Parratt Wolff
Driller's Name: J. Price
Drilling Method: 4.24" HSA
Sampling Method: 2" x 2' Split Spoon
Rig Type: Vac Unit/IR 466

Northing: 164635.52
Easting: 1080863.65
Casing Elevation: 4.64

Borehole Depth: 10' bgs
Surface Elevation: 5.07

Descriptions By: MWE

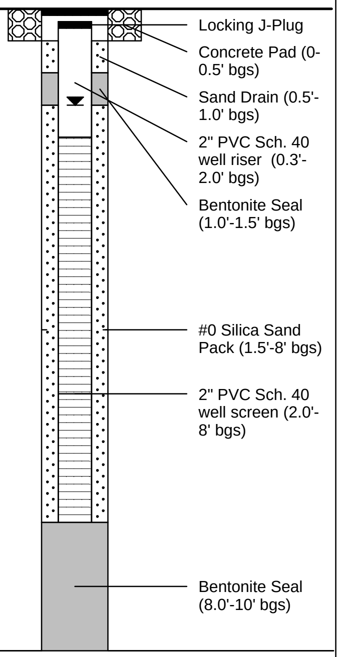
Well/Boring ID: **P-18R**

Client: Chevron

Location: Oceanside Former Gulf Terminal
Oceanside, New York

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description
0	5	1	0-2	Grab	0.0		Brown fine to medium SAND, little fine to coarse Gravel, trace Silt, Organics (M,NP)
		2	2-4	Grab	0.0		Brown fine to coarse SAND, some fine to medium Gravel, little Silt (S,NP)
5	0	3	4-6	Grab	1.9		Grey and brown fine to medium SAND, little fine Gravel, trace Silt (S,NP) moderate petroleum-like odor, decreses with depth
		4	6-8	Grab	0.8		
		5	8-10	Grab	27.2		Grey SILT and CLAY, little to trace Peat, fine Sand (S,P) moderate to heavy sulfur and petroleum-like odor
10	-5						End of boring at 10' bgs
15	-10						

Well/Boring Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Available/Applicable; AMSL = Above Mean Sea Level; P = Plastic; NP = Non-Plastic; M = Moist; S = Saturated
Horizontal datum is the North American Datum of 1983 (NAD 83); New York State Plane Long Island coordinate system, in U.S. Survey feet. Vertical datum is the North American Vertical Datum of 1988 (NAVD 88).
Sample @ P-18R (0-2'), (4-6'), (6-8') for VOCs, SVOCs, TAL metals, ferrous iron, sulfate.

Date Start/Finish: 09/22/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moraitis
Drilling Method: Direct Push
Sampling Method: 4 foot Macrocore

Northing:
Easting:
Casing Elevation:

Borehole Depth: 20
Surface Elevation:

Geologist: JDC

Well/Boring ID: VRU-4

Client: CEMC

VRU-4

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, New York

DEPTH (bgs)	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0				0		Brown fine SAND		
1				0 0				
2			Hand augered 0'-5'	0				
3								
4				0 0.5		Dark brown medium to coarse SAND, little gravel, wet		Boring backfilled with bentonite
5								
6			4	0.5				
7				0.5				
8				0.1				
9				0.4				
10	VRU-4 (9.5-10.0)		2			Dark brown SILT, some clay, little sand, wet		
11	VRU-4 (10.5-11.0)			1.0				
12				0.8		No recovery		
13								
14			0	0				
15								
16						Dark brownish gray SILT, some clay, wet		
17			4					
18	VRU-4 (17.5-18.0)					Dark brown fine to medium SAND, some silt		
19								
20								

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Remarks:

Project: 43948.001 Template: F:\PROJECTS\Chevron SAR\SAR NE\NY\Oceanside Terminal\Log Plot\VRU-4 *Page: 1 of 1*
Data File: Date:9/22/04

Date Start/Finish: 09/22/04
Drilling Company: Zebra Drilling
Driller's Name: Evan Moraitis
Drilling Method: Direct Push
Sampling Method: 4 foot Macrocore

Northing:
Easting:
Casing Elevation:

Borehole Depth: 16
Surface Elevation:

Geologist: JDC

Well/Boring ID: VRU-8

Client: CEMC

VRU-8

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, New York

DEPTH (bgs)	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0				0		Brown fine SAND		
-1				0				
				0				
-2			Hand augered 0'-5'	0				
-3								
				0				
-4				6.9		Dark Gray fine to coarse SAND, some gravel and clay, wet		Boring backfilled with bentonite
-5								
						Dark Gray and brown medium coarse SAND and GRAVEL, wet		
-6			3					
-7				9.9				
-8	VRU-8 (8.0-8.5)			12.2				
				6.4				
-9						Dark Gray CLAY and SILT, trace organics and wood, moist		
-10	VRU-8 (10.0-10.5)		2.4	4.5				
-11								
				6.8				
-12				8.6				
-13			2.4					
-14	VRU-8 (14.0-14.5)			7.7				
-15								
-16								

BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Remarks:

Project: 43948.001
Data File:

Template: F:\PROJECTS\Chevron SAR\SAR NE\NY\Oceanside Terminal\Log Plot\VRU-1
Date:9/22/04

Date Start/Finish: 09/22/04
Drilling Company: Zebra Drilling
Drillers Name: Evan Moraitis
Drilling Method: Direct Push
Sampling Method: 4 foot Macrocore

Northing:
Easting:
Casing Elevation:

Borehole Depth: 16
Surface Elevation:

Geologist: JDC

Well/Boring ID: VRU-9

Client: CEMC

VRU-9

Location: Former Gulf Oil Terminal
Industrial Road and Hampton Road
Oceanside, New York

DEPTH (bgs)	Sample Run Number	Sample/Int/Type	Recovery (feet)	PID Headspace (ppm)	Geologic Column	Stratigraphic Description	Water Level	Well/Boring Construction
0				0		Brown fine SAND		
1				0 0				
2			Hand augered 0'-5'	0				
3				0				
4				1.2		Light brown fine to coarse SAND and GRAVEL, wet		Boring backfilled with bentonite
5								
6			2.9	2.0				
7				1.6				
8	VRU-9 (7.5-8.0)			16.6		Dark gray CLAY and SILT, trace organics, wet		
9								
10	VRU-9 (9.5-10.0)		3.8	44.9				
11								
12	VRU-9 (12.5-13.0)			51.8		Dark gray CLAY and SILT, trace organics and wood pieces		
13				13.5				
14				36.7		Dark brown fine to coarse SAND, some gravel and silt, moist		
15								
16								

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Remarks:

Project: 43948.001
Data File:
Template: F:\PROJECTS\Chevron SAR\SAR NE\NY\Oceanside Terminal\Log Plot\VRU-9
Date:9/22/04

APPENDIX E

HEALTH AND SAFETY PLAN

ARCADIS Design & Consultancy for natural and built assets

Site Specific Health and Safety Plan

Revision 15a

Project Name:	Chevron - Oceanside No. 6518040, 3705 Hampton Road Oceanside, NY 11572
Project Number:	30044997
Client Name:	Chevron
Date:	7/27/2020
HASP Expires	7/27/2021
Revision:	

Approvals:

HASP Developer: Kyle Barber

Project Manager: Alex Newbrough

HASP Reviewer: Julianne Hagarty

Issued: 3/18/2010

Arcadis Field and Embedded Staff COVID-19 Guidance

Currently Arcadis is following CDC and Health Canada guidelines, as well as applicable government directives. The health and safety of our people is of utmost importance to us. During fieldwork, employees should complete the following:

Practice Good Hygiene

The best way to prevent illness is to avoid exposure to the virus. CDC and Health Canada recommend common flu and cold season preventative measures, including:

Prevent Illness Link

1) Get a flu vaccine.
2) Wash hands often with soap and water for at least 20 seconds. If soap and water are not readily available, use a hand sanitizer with at least 60% alcohol.
3) Avoid touching your eyes, nose and mouth.
4) Cover your nose and mouth with a tissue when sneezing or coughing.
5) Do not share Personal Protective Equipment (PPE).
6) Maintain and thoroughly clean PPE in accordance with manufacturer’s instructions.

Frequently Touched Surfaces

Throughout the day you will likely touch surfaces that may have been touched by others. Clean and disinfect frequently touched surfaces and work areas both before start and after completion of work.

Clean and Disinfect Link

Practice Social Distancing

The CDC definition of social distancing means remaining out of congregate settings, not shaking hands, avoiding mass gatherings, and maintaining distance (approximately 6 feet or 2 meters) from others when possible. Field situations where social distancing should be practiced are tailgate and safety briefing meetings, work in field trailers or breaks.

Complete a Risk Assessment

1) If you are sick, stay home.
2) Observe others and if they show flu-like symptoms, use Stop Work and contact Project Manager. Complete a CDC Risk Assessment and implement what is appropriate, outside of formal direction from federal, state or local directives based on the documented health risks. The CDC risk assessment can be found here:

CDC Risk Assessment Guide

For work specific situations, also consider the following:

1) If you are working with little or no contact with others, follow the instructions above.
2) If you are working in close contact with other workers or clients:
a) If feasible, prior to visiting the site, have a H&S check in to confirm all attendees are complying with CDC or Health Canada guidelines, including:
i) Confirm understanding that workers or clients should not go to the job site if they have personally tested positive for COVID-19 or have been in close contact to anyone else who has tested positive for COVID-19.

b) Out of respect for all, ask everyone to self-disclose if they are not feeling well (exhibiting flu-like symptoms), and request that they should go home.
c) Observe person(s) for symptoms, and use Stop Work, as necessary, and contact Project Manager.
d) Determine if arrangements can be made to simplify our ability to social distance.
e) Set visual or physical barriers to keep the public away (caution tape and cones).
f) Consider if "split shifts" can be used to limit contact, or if work can be scheduled during hours of low to no facility operations.
g) If social distancing or other controls are not feasible discuss this with your supervisor and PM, discuss "Is the work necessary?" or "Can the work be rescheduled for a later date?"

3) If you are an embedded employee at a client facility:
a) Inquire whether working remotely is an option.
b) If not, and we must work at the client facility:
i) Ask if arrangements can be made to practice social distancing (e.g. split shift, separate workstation, etc.)
ii) Practice good hygiene, and if you do not feel the situation is safe, you can execute your stop work authority by having discussions with your Supervisor and Project Manager.
4) If you are working in contact with the public (mall areas, parks, outdoor residential settings, Set visual or physical barriers (caution tape and cones) to keep the public away and maintain social distancing.
5) If you are working at indoor residential settings, please consider whether the work can be rescheduled for a later date, and if not, then consider the following guidelines:
a) Call ahead to ask if the resident(s) is experiencing flu-like symptoms or if anyone in the house is in mandatory or precautionary self-quarantine, Also share your Arcadis work procedures and indicate that you will be practicing social distancing during the work.
b) Upon arrival, assess the residents for signs of flu-like symptoms. If observed, use Stop Work, exercise social distancing and contact your Project Manager.
c) Where feasible, wear gloves, wipe down surfaces prior to touching them and thoroughly wash hands after completing the work (do not touch your face).
d) Ask if arrangements can be made to practice social distancing (meaning stay 6 feet away).
e) Schedule your work when resident is not home, if your work area allows for access (e.g. a basement crawl space the doesn't require entry to the main living area of the home).
6) If you are working on projects involving drinking water systems, recreational water and/or wastewater:
a) The COVID-19 virus has not been detected in drinking water.
b) Conventional water treatment methods that use filtration and disinfection, such as those in most municipal drinking water systems, should remove or inactivate the virus that causes COVID-19.

c) At this time, the risk of transmission of the virus that causes COVID-19 through sewage systems is thought to be low.
d) Review the project Health & Safety Plan and task-specific Job Safety Analysis for required personal protective equipment and other controls.

Water Treatment Methods Link
Sewage Systems Link

Field Vehicles and Transportation

When using shared vehicles (fleet, rental, ride sharing services) follow the cleaning guidance above for frequently touched surfaces. Check with your rental agency before vehicle pick-up to understand their cleaning procedures, and supplement with your own as necessary. Note: if using wipes, make sure the wipe is compatible with the surface being cleaned.

If travelling with other employees, or other approved individuals in the same vehicle:
1) No more than 4 employees in a vehicle.
2) Maintain as much space between occupants, as practical, in the vehicle. If only two occupants, consider having one occupant in the back seat if vehicle is equipped with a back sets.
3) Do not share a vehicle with other employees or approved individuals if, after reviewing prevention and risk information described above, you are at risk of spreading COVID-19.

Lodging Considerations

Most hotel chains have implemented additional cleaning and disinfection procedures. Check with your hotel before check-in to understand their cleaning procedures. If there's still a concern, bring a surface cleaner and wipe down frequently touched surfaces such as doorknobs, tv remote, etc.

Rental Equipment and Sample Cooler Handling

Clean the exterior of rental equipment and sample coolers upon arrival at the job site using a cleaning product that will not impact data quality. Wear gloves and safety glasses when handling sample coolers to prevent contact with acid preservation of the bottles in coolers.

Client COVIS-19 Health Screening Forms

Some clients are requiring our employees to complete individual COVID-19 health screening forms.
These forms may include questions pertaining to your travel to certain countries, your contact with people diagnosed with COVID-19, and whether you have experienced flu-like symptoms in the last 14 days.
1) You are not required to share personal medical information with clients; therefore, Arcadis is not requiring you to complete any form requesting medical information. Your disclosure of personal medical information to clients is completely voluntary.
2) Please understand, if you do not complete the form, you will not be allowed on the client's sites and facilities, per the client's directive.
3) Also, if you complete the form, you have an ongoing duty to provide prompt notice of any changes to any of your responses. (Some clients may require periodically signing updated forms).

4) If you are restricted from a client site as a result of your answers to the COVID-19 health screening form, or because you have chosen not to complete the form, Arcadis will attempt to find you alternative work that does not involve access to the client's site or facility; although, Arcadis cannot guarantee that other work will be available.
If your Project Manager is not already aware of the client COVID-19 health screening form, please alert them when you receive one from a client.

Reporting a COVID-19 Exposure

If you learn you have been in close contact with a worker, client or member of the public who is COVID-19 positive:
1) Stop work.
2) Notify your Supervisor and Project Manager.
3) Self-isolate and contact your personal physician for additional direction.

COVID-19 Continuity Planning for Field Projects

If the project requires a COVID-19 continuity plan for the project or field portion of the project, any requirements in the Arcadis COVID-19 Continuity Plan template (or client approved equivalent) beyond the requirements of this guidance document must be followed.

Note: Close contact is defined as a) being within approximately 6 feet (2 meters) of a COVID-19 case for a prolonged period of time; close contact can occur while caring for, living with, visiting, or sharing a healthcare waiting area or room with a COVID-19 case

– or –
b) having direct contact with infectious secretions of a COVID-19 case (e.g., being coughed on).

Arcadis Culture of Caring

Arcadis is committed to a Culture of Caring that ensures each Arcadis employee and contractor goes home at the end of the day free from injury or illness. I certify that the following has been performed with all Arcadis field staff on this project either in person or by Skype:

☐ Reviewed the HASP including a discussion of hazard identification and controls.

- ☐ If conducting activities deemed by Arcadis to be "High Risk", frontline management has reviewed applicable H&S standards (Job Safety Analysis [JSA] when authorized by H&S) for these activities with field staff.
- ☐ If permit to work is required, frontline management has reviewed the permit(s) with field staff.

☐ Reviewed proactive H&S engagement expectations/injury prevention actions.
☐ Reviewed Stop Work Authority.
☐ Reviewed the incident reporting process and expectations including when WorkCare should be contacted by staff (WorkCare incident intervention for all minor, non-emergency injuries) and that the WorkCare phone number is programmed into field team cell phone.

For short service employees (SSE) (0-1 years with Arcadis):

☐ Provided coaching and mentoring on Arcadis H&S expectations during project work. Reviewed in detail specific hazards and controls and provided a resource who can be contacted if SSE has questions regarding planned or unplanned work tasks.

Mentor/Resource # ______________________ ______________________
Name Phone Number

Signed:

______________________ Select

Emergency Information

Site Address:

Former Gulf Terminal
1 Industrial Place
Oceanside, NY 11572

Emergency Phone Numbers:

Emergency (fire, police, ambulance)		911
Emergency (facility specific, if applicable):		
	South Nassau Community Hospital	516-632-3000
Emergency Other (specify)		
Client Contact	Robert Speer	
WorkCare (non-life-threatening injury/illness)		1-888-449-7787
Project Manager/H&S	Alex Newbrough	724-448-6218
Task Manager	Renee Parisi	(908) 616-4848
Corporate H&S Specialist	Aaron Svitana	(925) 360-2313
Corporate H&S Director	Denis Balcer	614-778-9171

Hospital Name and Address:

Mount Sinai South Nassau
1 Healthy Way, Oceanside, NY 11572

Hospital Phone Number: 516-632-3000

Incident Notification Process

1	Dial 911/Facility Emergency Number/WorkCare as applicable	
2	Contact PM/Supervisor	Alex Newbrough
3	Contact Corporate H&S	Denis Balcer
4	Contact Client	Robert Speer

Complete below, as applicable, or clear cell contents:

Location of Assembly Area(s): End of Hampton Road at intersection with industrial Place

Nearest AED location:

Nearest Storm Shelter:

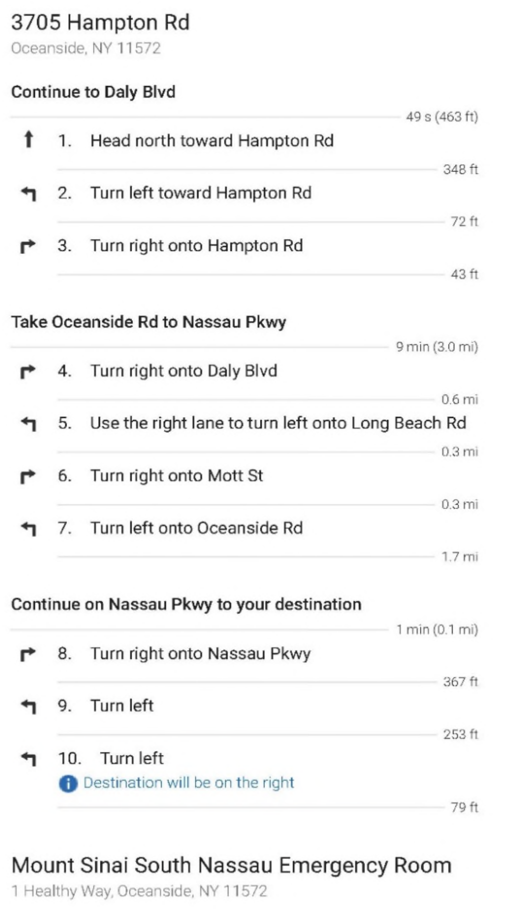
Route to the Hospital

Hospital: Mount Sinai South Nassau

Address: One Healthy Way, Oceanside, NY 11572

Emergency Room Number: (516) 632-3000

Hours of Operation: 24/7



3705 Hampton Rd
Oceanside, NY 11572

Continue to Daly Blvd

49 s (463 ft)

↑ 1. Head north toward Hampton Rd

348 ft

↰ 2. Turn left toward Hampton Rd

72 ft

↱ 3. Turn right onto Hampton Rd

43 ft

Take Oceanside Rd to Nassau Pkwy

9 min (3.0 mi)

↱ 4. Turn right onto Daly Blvd

0.6 mi

↰ 5. Use the right lane to turn left onto Long Beach Rd

0.3 mi

↱ 6. Turn right onto Mott St

0.3 mi

↰ 7. Turn left onto Oceanside Rd

1.7 mi

Continue on Nassau Pkwy to your destination

1 min (0.1 mi)

↱ 8. Turn right onto Nassau Pkwy

367 ft

↰ 9. Turn left

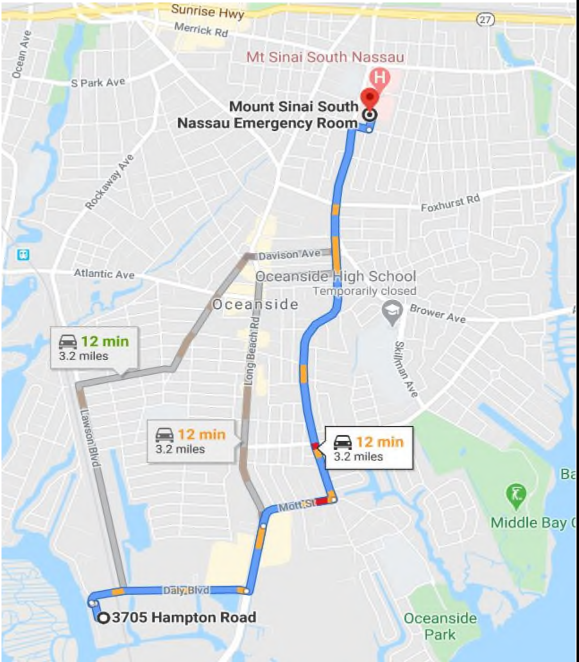
253 ft

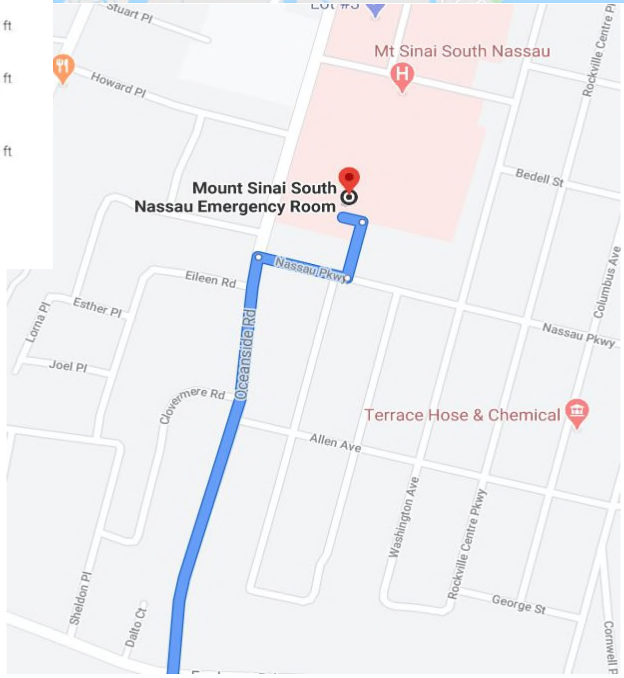
↰ 10. Turn left

ⓘ Destination will be on the right

79 ft

Mount Sinai South Nassau Emergency Room
1 Healthy Way, Oceanside, NY 11572





Site Type

The project site is an active facility with the following attributes:

Retail
Commercial

Surrounding Land Use and Topography

The Site is bound to the south by Barnum's Channel, to the east by the Long Island Railroad, to the north by the former Exxon Petroleum Terminal, and to the west by Hampton Road. A junk yard and office buildings are located west of Hampton Road fronting Hog Island Channel. Daly Boulevard is located north of the former Exxon Petroleum Terminal and another petroleum terminal (Sprague) is located north of Daly Boulevard. Long Island Topsoil Supplier is located immediately east of Long Island Railroad.

Simultaneous Operations (SimOps)

SimOps is expected or will be conducted in proximity to Arcadis work activities on the project site. SimOps creates unique hazards that could affect Arcadis employees and subcontractors and SimOps hazards identified on site will be addressed in the JSA or similar governing document (i.e. permit) for affected Arcadis work tasks. If the SimOps work activities create a high hazard to Arcadis staff or subcontractors, Arcadis will utilize stop work until the SimOps activity is complete or will coordinate work activities with SimOps workers and/or the client to ensure SimOps work hazards are mitigated.

Site Background

The former Chevron/Gulf Petroleum Terminal is located at 3705 Hampton Road, Oceanside, Town of Hempstead, Nassau County, New York hereafter referred to as “the site”. The site is listed under the New York State Department of Environmental Conservation (NYSDEC) State Superfund program No. C130165 and consists of a 7.223-acre property. The site has been developed as a Costco Retail Store and all former buildings have been demolished. The site is owned by CoreMark and under an assess agreement. The site is bound to the south by Barnum’s Channel, to the east by the Long Island Railroad, to the north by the former Exxon Petroleum Terminal, and to the west by Hampton Road. A junk yard and office buildings are located west of Hampton Road fronting Hog Island Channel. Daly Boulevard is located north of the former Exxon Petroleum Terminal and another petroleum terminal (Sprague) is located north of Daly Boulevard.

Project Tasks

The following tasks are identified for this project:

1	Monitor well - Well installation
2	Sampling - Well sampling using peristaltic pumps
3	Sampling - Sediment sampling using mechanical methods
4	Sampling - Well sampling using diffusive samplers
5	Utilities - Clearance
6	Survey - Land surveying
7	Select
8	Select
9	Select
10	Select
11	Select
12	Select
13	Select
14	Select
15	Select
16	Select
17	Select
18	Select
19	Select
20	Select

Supplemental documents associated with the above task(s):
Client H&S information is attached.

A Journey Management Plan is required and is attached.

The Arcadis Utility Clearance Checklist must be used for utility clearance activities.

☒ Required Checklists/Work Forms

Tailgate Safety Briefing Form
Vehicle Inspection Checklist
Utility and Structures Checklist

☐ Required Permits

Not Applicable

☐ Required H&S Standards

Not applicable

Short Service Employees (SSEs)

SSEs (employees who are employed with Arcadis for less than 1 year) have the potential to work on this project. If SSEs are utilized, the project team working in conjunction with the SSE's administrative supervisor will ensure requirements of ARC HSGE019 "Short Service Employees" are completed. SSE's will be identified on the project Tailgate Safety Meeting Form.

Roles and Responsibilities

	Name	Role	Short Service Employee
1	Ed Ptak	Project Manager (PM)	
2	Renee Parisi	Associate Project Manager (APM)	
3		Task Manager	
4		Field Technical Lead	
5		Site Safety Officer (SSO)	
6			
7			
8			
9			
10			

Training

All Arcadis employees are required to have the following training to be on site:

Hazwoper 40-Hour
Hazwoper 8-Hour Annual Refresher
Benzene - General Awareness
DOT HazMat #1
PPE (non-certificate)
None
None
None
None
None
None
None
None

Client specific:

Chevron 101

Other:

Selected Arcadis employees are required to have the following additional training:

	Names or Numbers from above
Hazwoper 8-Hour Supervisor	SHSO
First Aid/CPR	SHSO
BBP (Bloodborne Pathogens)	SHSO
Fire Extinguisher (non-certificate)	SHSO
None	
None	
None	
None	
None	
None	
None	
None	
None	
None	
None	
Other:	

The Arcadis Fundamental H&S Principles

Staff working on any of the task(s) listed above must utilize the six Arcadis Fundamental H&S Principles to ensure work is conducted safely. These principles include: 1) Use of TRACK, 2) H&S Planning, 3) Stop Work Authority, 4) "If Not Me Then Who", 5) Stewardship, and 6) Incident Reporting. Every project team member plays an important role in project health and safety. This is more than just having a HASP, training, or PPE. Proactive staff engagement with these principles is critical to a safe work environment.

General Task Hazard Assessment and Risk Control (HARC)

General: **Hazards Applicable to All Project Tasks**

The 12 hazard category HARC ratings are not available in this General THA. The mitigated and unmitigated ratings for the hazards presented are based on the Risk Assessment Matrix below. Modify hazards and ratings as necessary to meet project needs.

Risk Assessment Matrix		Likelihood Ratings			
Consequences Ratings		A	B	C	D
People	Property	0 Almost Impossible	1 Possible but Unlikely	2 Likely to Happen	3 Almost Certain to Happen
1-Slight or No Health Effect	Slight or No Damage	0-Low	1-Low	2-Low	3-Low
2-Minor Health Effect	Minor Damage	0-Low	2-Low	4-Medium	6-Medium
3-Major Health Effect	Local Damage	0-Low	3-Low	6-Medium	9-High
4-Fatalities	Major Damage	0-Low	4-Medium	8-High	12-High

Hazard #1

Driving - Driver - Injury, death or property damage due to driver distraction, fatigue, etc.

Suggested FHSHB Ref: III V, AO
Overall Unmitigated Risk: HIGH
Mitigated Risk: LOW

To mitigate this hazard, use TRACK and the following:
Smith System (on line)
JSAs

Comments: Use Smith System "5-Keys" when driving. See Driving JSA for details.

Hazard #2

Gravity - Falls - Injury due to slips and trips

Suggested FHSHB Ref: III F
Overall Unmitigated Risk: MEDIUM
Mitigated Risk: LOW

To mitigate this hazard, use TRACK and the following:
Job Briefing/Site Awareness
Housekeeping

Comments: Ensure footwear is appropriate for surface conditions. See HASP PPE section.

Hazard #3

Biological - skin/eye irritation or damage from poisonous plants

Suggested FHSHB Ref: III N, AE
Overall Unmitigated Risk: LOW
Mitigated Risk: LOW

To mitigate this hazard, use TRACK and the following:
Job Briefing/Site Awareness
PPE (see HASP "PPE" section)

Comments: Use skin pre-treatment lotions when available.

Hazard #4

Biological - bites or stings from exposure to insects or arachnids

Suggested FHSHB Ref: III N
Overall Unmitigated Risk: LOW
Mitigated Risk: LOW

To mitigate this hazard, use TRACK and the following:
Job Briefing/Site Awareness
PPE (see HASP "PPE" section)

Comments: Do body check daily.

Hazard #5

Biological - cuts, scrapes, skin/eye puncture from exposure to physically damaging plants

Suggested FHSHB Ref: III N, AE
Overall Unmitigated Risk: MEDIUM
Mitigated Risk: LOW

To mitigate this hazard, use TRACK and the following:
Job Briefing/Site Awareness
PPE (see HASP "PPE" section)

Comments:

General Task HARC (continued)

Hazard #6

Environmental - Thermal stress - Injury or illness from heat or cold

Suggested FHSHB Ref:	III M	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Field H&S Handbook (see ref. above)
Mitigated Risk:	LOW	JSAs

Comments: Use job rotation or rest breaks. Stay hydrated and eat regularly.

Hazard #7

Environmental - Inclement weather -Injury or equipment damage from inclement weather

Suggested FHSHB Ref:	III I	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Weather Monitoring
Mitigated Risk:	LOW	Cont./Emerg. Planning

Comments: Use 30/30 rule for lightning. See FHSHB for details.

Hazard #8

Motion - Musculoskeletal - Injury from lifting, twisting , stooping, or awkward body positions

Suggested FHSHB Ref:	III AF	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Engineering Controls (specify in comments)
Mitigated Risk:	LOW	Admin. Controls (specify in comments)

Comments: Use proper lifting techniques. Use job rotation when applicable. See FHSHB for details.

Hazard #9

Motion - Musculoskeletal - Injury from repeated work activity or body motion

Suggested FHSHB Ref:	III AF	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Engineering Controls (specify in comments)
Mitigated Risk:	LOW	Admin. Controls (specify in comments)

Comments: Use proper lifting techniques. Use job rotation when applicable. See FHSHB for details.

Hazard #10

Sound - Noise - Injury or illness due to noise exposure

Suggested FHSHB Ref:	III L	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Engineering Controls (specify in comments)
Mitigated Risk:	LOW	PPE (see HASP "PPE" section)

Comments: Increase distance from source if possible. Maintain equipment.

Hazard #11

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #12

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Task Specific HARC

Task 1:	**Monitor well - Well installation**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	L	Driving	-	Electrical	-
Environmental	M	Gravity	M	Mechanical	-	Motion	M
Personal Safety	L	Pressure	L	Radiation	-	Sound	M

Hazard #1

Environmental - Wind -Skin injury from sun or wind exposure

Suggested FHSHB Ref:	III M	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Job Briefing/Site Awareness
Mitigated Risk:	LOW	PPE (see HASP "PPE" section)
Comments:		

Hazard #2

Motion - Struck by - Bodily injury from impact with moving object

Suggested FHSHB Ref:	III S	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Site Awareness
Mitigated Risk:	LOW	JSAs
Comments:		

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:	Maintain ergonomics and safe lift practices	

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:	Avoid or minimize exposure to noise whenever possible	

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Task Specific HARC (continued)

Task 2:	**Sampling - Well sampling using peristaltic pumps**						
HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low):					FHSHB Ref:		III F
Biological	L	Chemical	M	Driving	-	Electrical	L
Environmental	L	Gravity	L	Mechanical	-	Motion	L
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

Chemical - liquids - injury or illness from vapor inhalation

Suggested FHSHB Ref:	III C, F, G, K, S, AG	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	See HASP "Monitoring" section
Mitigated Risk:	LOW	JSAs

Comments: Preform air monitoring in the breathing zone and breathing directly over the well opening

Hazard #2

Chemical- liquids - injury or illness from skin absorption

Suggested FHSHB Ref:	III C, F, G, K, S, AG	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	JSAs
Mitigated Risk:	LOW	PPE (see HASP "PPE" section)

Comments:

Hazard #3

Chemical - liquids, skin or eye irritation/damage/allergy

Suggested FHSHB Ref:	III C, F, G, K, S, AG	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	JSAs
Mitigated Risk:	LOW	PPE (see HASP "PPE" section)

Comments:

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Task Specific HARC (continued)

Task 3:	**Sampling - Sediment sampling using mechanical methods**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	L	Driving	-	Electrical	M
Environmental	L	Gravity	M	Mechanical	M	Motion	M
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

Electrical - Electrocution or arc flash - Injury or death from electrocution or arc flash from electrical

Suggested FHSHB Ref:	III AA, AB	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Lockout/Tagout
Mitigated Risk:	MEDIUM	PPE (see HASP "PPE" section)
Comments:		

Hazard #2

Gravity - Struck by - Injury from falling object

Suggested FHSHB Ref:	III AC, IV A	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	H&S Standards
Mitigated Risk:	LOW	Job Briefing/Site Awareness
Comments:		

Hazard #3

Mechanical - Pinch point - Injury by pinching of body part in mechanical process

Suggested FHSHB Ref:	III S IV, E, F, G, O	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Site Awareness
Mitigated Risk:	LOW	PPE (see HASP "PPE" section)
Comments:		

Hazard #4

Motion - Struck by - Bodily injury from impact with moving object

Suggested FHSHB Ref:	III S	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	JSAs
Mitigated Risk:	LOW	Site Awareness
Comments:		

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Task Specific HARC (continued)

Task 4:	**Sampling - Well sampling using diffusive samplers**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	L	Driving	-	Electrical	-
Environmental	L	Gravity	L	Mechanical	-	Motion	L
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #2

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Task Specific HARC (continued)

Task 5:	**Utilities - Clearance**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III AN

Biological	L	Chemical	L	Driving	-	Electrical	L
Environmental	L	Gravity	L	Mechanical	L	Motion	M
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

Motion - Struck by - Bodily injury from impact with moving object

Suggested FHSHB Ref:	III S	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Site Awareness
Mitigated Risk:	LOW	JSAs
Comments:		

Hazard #2

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Task Specific HARC (continued)

Task 6:	**Survey - Land surveying**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	L	Driving	-	Electrical	-
Environmental	M	Gravity	L	Mechanical	-	Motion	M
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

Environmental - Wind -Skin injury from sun or wind exposure

Suggested FHSHB Ref:	III M	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	JSAs
Mitigated Risk:	LOW	PPE (see HASP "PPE" section)
Comments:		

Hazard #2

Motion - Struck by - Bodily injury from impact with moving object

Suggested FHSHB Ref:	III S	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	MEDIUM	Site Awareness
Mitigated Risk:	LOW	JSAs
Comments:		

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Task Specific HARC (continued)

Task 7:	**Select**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	M	Driving	-	Electrical	L
Environmental	L	Gravity	L	Mechanical	-	Motion	L
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

None

Suggested FHSHB Ref: None — To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk: Not Ranked — Select
Mitigated Risk: Not Ranked — Select
Comments:

Hazard #2

None

Suggested FHSHB Ref: None — To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk: Not Ranked — Select
Mitigated Risk: Not Ranked — Select
Comments:

Hazard #3

None

Suggested FHSHB Ref: None — To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk: Not Ranked — Select
Mitigated Risk: Not Ranked — Select
Comments:

Hazard #4

None

Suggested FHSHB Ref: None — To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk: Not Ranked — Select
Mitigated Risk: Not Ranked — Select
Comments:

Hazard #5

None

Suggested FHSHB Ref: None — To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk: Not Ranked — Select
Mitigated Risk: Not Ranked — Select
Comments:

Hazard #6

None

Suggested FHSHB Ref: None — To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk: Not Ranked — Select
Mitigated Risk: Not Ranked — Select
Comments:

Task Specific HARC (continued)

Task 8:	**Select**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	L	Driving	-	Electrical	M
Environmental	L	Gravity	M	Mechanical	M	Motion	M
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #2

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select

Comments:

Task Specific HARC (continued)

Task 9:	Select

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III F

Biological	L	Chemical	L	Driving	-	Electrical	-
Environmental	L	Gravity	L	Mechanical	-	Motion	L
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #2

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Task Specific HARC (continued)

Task 10:	**Select**

HARC Unmitigated Hazard Types (H-High, M-Medium, L-Low): FHSHB Ref: III AN

Biological	L	Chemical	L	Driving	-	Electrical	M
Environmental	L	Gravity	L	Mechanical	M	Motion	M
Personal Safety	L	Pressure	L	Radiation	-	Sound	L

Hazard #1

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #2

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #3

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #4

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #5

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard #6

None

Suggested FHSHB Ref:	None	To mitigate this hazard, use TRACK and the following:
Overall Unmitigated Risk:	Not Ranked	Select
Mitigated Risk:	Not Ranked	Select
Comments:		

Hazard Communication (HAZCOM)/Global Harmonization System (GHS)

☐ HAZCOM/GHS for this project is managed by the client or general contractor

List the chemicals anticipated to be used by Arcadis on this project per HAZCOM/GHS requirements.
(Modify quantities as needed)

	Preservatives	Qty
☐	Not applicable	
☒	Hydrochloric acid	<500 ml
☐	Nitric acid	<500 ml
☐	Sulfuric acid	<500 ml
☐	Sodium hydroxide	<500 ml
☐	Zinc acetate	<500 ml
☐	Ascorbic acid	<500 ml
☐	Acetic acid	<500 ml
☐	Isopropyl alcohol	< 4 gal.
☐	Formalin (<10%)	< 4 gal.
☐	Methanol	<500 ml
☐	Sodium bisulfate	<500 ml

	Decontamination	Qty
☐	Not applicable	
☒	Alconox	≤ 5 lbs
☐	Liquinox	≤ 1 gal
☐	Acetone	≤ 1 gal
☐	Methanol	≤ 1 gal
☐	Hexane	≤ 1 gal
☐	Isopropyl alcohol	≤ 4 gal
☐	Nitric acid	≤ 1 L
☐	Other:	
	____________	
	____________	
	____________	

	Calibration	Qty.
☒	Not applicable	
☒	Isobutylene/air	1 cyl
☐	Methane/air	1 cyl
☐	Pentane/air	1 cyl
☐	Hydrogen/air	1 cyl
☐	Propane/air	1 cyl
☐	Hydrogen sulfide/air	1 cyl
☐	Carbon monoxide/air	1 cyl
☒	pH standards (4,7,10)	≤ 1 gal
☒	Conductivity standards	≤ 1 gal
☐	Other:	
	____________	

	Fuels	Qty.
☒	Not applicable	
☐	Gasoline	≤ 5 gal
☐	Diesel	≤ 5 gal
☐	Kerosene	≤ 5 gal
☐	Propane	1 cyl
☐	Other:	
	____________	

	Kits		Qty.
☒	Not applicable		
☐	Hach (specify):	____________	1 kit
☐	DTECH (specify):	____________	1 kit
☐	Other:	____________	1 kit
	____________		
	____________	____________	
	____________	____________	

	Remediation	Qty.
☒	Not applicable	
☐	____________	
☐	____________	
☐	____________	
☐	____________	
☐	____________	

	Other:	Qty.
☒	Not applicable	
☒	Spray paint	≤ 6 cans
☐	WD-40	≤ 1 can
☐	Pipe cement	≤ 1 can
☐	Pipe primer	≤ 1 can
☐	Mineral spirits	≤ 1 gal
	____________	

	DOT(1):	Qty.
☒	MOT eligible soils	
☒	MOT eligible water	
☐	MOT eligible solids	
☐	MOT eligible liquids	
☐	____________	
☐	____________	
☐	____________	

(1) Attach applicable Materials of Trade (MOT) generic shipping determination. SDS not generally applicable to this category.

SDSs for this project will be available electronically on a designated project field computer. All project workers will be notified of the SDS location in their initial safety briefing.

Contractor SDSs will be submitted to Arcadis in advance of work and will be filed with Arcadis SDSs as indicated above.

This project will store materials subject to the HAZCOM Standard in bulk storage. Storage requirements and limitations for this this material is addressed in a supplement attached to the this HASP.

Air Monitoring

☐ There are no atmospheric chemical, radiological, or particulate hazards on this project requiring air monitoring.
☐ Air monitoring is the responsibility of the client or subcontractor.

Constituents of Interest:

Time Weighted Averages (TWAs) are ACGIH 8-Hr Threshold Limit Values (TLVs) unless noted.

Methane			
TWA	NA See Notes, LAMP NOTICE See Notes	LEL/UEL (%):	5.0/15
STEL	NA	VD (Air = 1):	0.6
IDLH	NA	VP (mmHg):	NA

Hydrogen sulfide			
TWA	1 ppm	LEL/UEL (%):	4.0/44.0
STEL	5 ppm	VD (Air = 1):	1.19
IDLH	100 ppm, NIOSH	VP (mmHg):	13376

Carbon dioxide			
TWA	5000 ppm, LAMP NOTICE See Notes	LEL/UEL (%):	NA/NA
STEL	30000 ppm	VD (Air = 1):	1.53
IDLH	40000 ppm, NIOSH	VP (mmHg):	42940

Carbon monoxide			
TWA	25 ppm, LAMP NOTICE See Notes	LEL/UEL (%):	12.5/74
STEL	200 ppm, ceiling, NIOSH	VD (Air = 1):	0.97
IDLH	1200 ppm, NIOSH	VP (mmHg):	26600

None			
TWA	NA	LEL/UEL (%):	NA
STEL	NA	VD (Air = 1):	NA
IDLH	NA	VP (mmHg):	NA

None			
TWA	NA	LEL/UEL (%):	NA
STEL	NA	RGD (Air = 1):	NA
IDLH	NA	VP (mmHg):	NA

TWA - Time Weighted Average (ACGIH TLV unless noted)
STEL - Short Term Exposure Limit
IDLH - Immediately Dangerous to Life and Health

LEL/UEL - Lower /Upper Explosive Limit
RGD - Relative Gas Density
VP - Vapor Pressure

Notes:

The lamp you selected does not have a correction factor for one or more constituents listed above. Action levels may require manual adjustment or, if required, select PID with different eV rating.

For methane, if O2 readings in the methane atmosphere are or anticipated to be below 19.5% and/or the LEL is a concern, contact a CIH or CSP for assistance.

Required Monitoring Instruments, Action Levels and Monitoring Frequency

Air monitoring for volatile organics is not required.   11.7   ^See Notes^

<	NA	Continue working
	NA - NA	Levels sustained > 5 minutes, monitor continuously and review engineering controls and PPE. Proceed with caution.
>	NA	Stop work and contact SSO

Particulate monitoring is not required. Re-evaluate need for monitoring if visible dusts cannot be controlled.

Action levels are in mg/m3		
<	NA	Continue working
	NA	Levels sustained > 5 minutes, monitor continuously and review engineering controls and PPE. Proceed with caution.
>	NA	Stop work and contact SSO

LEL/O2 monitoring is not required. Reevaluate need for monitoring if high PID/FID readings are encountered.

LEL/O2 Meter NA	0-5% LEL	Continue work
	>5-10% LEL	Continually monitor, review engineering controls, proceed with caution
	>10% LEL	Stop work, evacuate, contact SSO
	19.5%-23.5% O2	Normal, continue work
	<19.5% O2	O2 deficient, stop work, evacuate, contact SSO
	>23.5% O2	O2 enriched, stop work, evacuate, contact SSO

All air-monitoring instruments must be calibration checked daily, if used, per manufacturer's instructions. Calibration checks, including calibration gases used, must be documented.

Breathing zone air monitoring using the above instruments will be performed at the following frequency:

Select

Compound specific monitoring is not required.

Indicator:	≤TWA	Continue work
☐ Tube ☐ Chip	>TWA	Stop work, review engineering controls and PPE, contact SSO
Compound(s):		

Indicator tube/chip monitoring frequency: Not applicable

Personal Protective Equipment (PPE)

See JSA or Permit for the task being performed for required PPE. If work is not conducted under a JSA or Permit, refer to the governing document for PPE requirements. At a minimum, the following checked PPE is required for all tasks during field work (outside of field office trailers and vehicles) not covered by a JSA or Permit on this project:

Minimum PPE required to be worn by all staff on project:

- ☒ Hard hat
- ☒ Safety glasses
- ☐ Safety goggles
- ☐ Face shield
- ☐ Hearing protection
- ☐ Rain suit
- ☐ Other:

- ☐ Snake chaps/guards
- ☐ Briar chaps
- ☐ Chainsaw chaps
- ☐ Sturdy boot
- ☒ Steel or comp. toe boot
- ☐ Metatarsal boot

		Specify Type:
☐	Coveralls:	
☐	Apron:	
☐	Chem. resistant gloves:	
☐	Gloves other:	
☐	Chemical boot:	
☐	Boot other:	
☒	Traffic vest, shirt or coat:	Class II
☐	Life vest:	

Task specific PPE: Hearing protection. Work gloves. Nitrile gloves.

Comments:

Medical Surveillance

All Arcadis employees and subcontractors performing field work will be required to be current in HAZWOPER medical surveillance.

Client drug and/or alcohol testing will be required for all workers on this project. The project or task manager will instruct project participants on testing protocols.

Hazardous Materials Shipping and Transportation

A shipping determination package has been prepared, reviewed and provided to Arcadis field staff for this project.

Traffic Safety and Traffic Safety Plans (TSPs)

All or portions of the project work will be conducted in a parking lot and/or private roadway. A Non-ROW TSP addressing this work is attached to this HASP.

Arcadis Commercial Motor Vehicles (CMVs)

CMVs operated by Arcadis employees on public roadways will not be utilized on this project. Arcadis defines a CMV as any single vehicle with a gross vehicle weight rating (GVWR) ≥10,001 pounds or a truck and trailer combination with a combined GVWR ≥10,001 pounds (GVWR of truck + GVWR of trailer = ≥10,001 pounds).

Site Control

Site control requirements are integrated into the TSP for this project.

Decontamination

Decontamination protocols are addressed in the applicable task JSA(s) for this project. The applicable JSAs are attached to this HASP.

Sanitation

The project scope is a mobile work operation. The project field team will have reasonable access to restroom facilities within 10 minutes of the work area where the mobile work activity is actively taking place. Potable water will be carried by the field team in the vehicle used for the project. Unless alternate requirements are stipulated in a plan supplement (i.e. Heat Injury and Illness Prevention Plan), permit or JSA, bottled or water coolers with potable water will be provided to project workers at 1 gallon/worker/day.

Safety Briefings

Arcadis will lead all safety briefings on this project and will document the safety briefing on a Tailgate Safety Briefing form or logbook. Safety briefings will be conducted once at the beginning of each work day unless the Site Safety Officer deems more frequent safety briefings will be required based on work being conducted. All project workers, including Arcadis subcontractors, will be required to attend the safety briefing. Site visitors and project workers not on duty during the morning safety briefing will receive the safety briefing upon their arrival onto the project site for the day.

Behavior Based Safety (BBS) Program

The CPM or APM is responsible for reviewing and establishing BBS goals for the project. These goals are summarized below.

TIP required at the following frequency on this project:

TIPs should be performed ata frequency of 1/400 hours for low risk work and 1/200 hours for high risk work.

Near Miss reporting goals for this project:

In the event of a near miss, it should be reported to project/field teams and Arcadis PMs immediately.

Other (specify):

Safety Equipment and Supplies

Safety equipment/supply requirements are addressed in the JSA or Permit for the task being performed. If work is not performed under a JSA or Permit, the following safety equipment is required to be present on site in good condition (Check all that apply):

- ☒ First aid kit
- ☐ Bloodborne pathogens kit
- ☒ Long shirts and pants
- ☒ Fire extinguisher
- ☐ Eyewash (ANSI compliant)
- ☒ Eyewash (bottle)
- ☒ Drinking water
- ☒ Other:
  Nitrile Gloves

- ☒ Insect repellent:
- ☒ High Visibility Vest
- ☒ Hard hat
- ☒ Hearing Protection
- ☒ Traffic cones
- ☒ Safety boots
- ☐ Heat stress monitor
- ☐ Poisonous plant pre/post exposure lotion/soap

Control of Ticks and Poisonous Plants

Work on this project has a low tick exposure hazard. Use of inspect repellent (DEET and/or permethrin) is recommended. Wear light colored clothing to help identify presence of ticks on staff. Keep shirt tails inside pants.

Work on this project has a low poisonous plant exposure hazard. First aid kits should be equipped with post exposure soap as a precaution. Inspect work area for presence of hazard prior to initiating work at the location. Wear disposable gloves during work and while removing outer footwear.

International Travel

International travel is not required for this project.

Signatures

I have read, understand and agree to abide by the requirements presented in this health and safety plan. I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

Printed Name	Signature	Date

Add additional sheets if necessary

You have an absolute right to STOP WORK if unsafe conditions exist!

Job Safety Analysis

General

JSA ID	HASP 1	**Status**	Complete
Job Name	General Industry-Driving - passenger vehicles	**Created Date**	7/27/2020
Task Description	Driving a car, van, or truck on public roadways.	**Completed Date**	07/27/2020

Client / Project

Client	Chevron
Project Number	30044997
Project Name	Chevron - Oceanside No. 6518040, 3705 Hampton Road
Project Manager	#REF!

User Roles

Role	Employee	Due Date	Completed Date
Developer	Kyle Barber	7/27/2020	7/27/2020
HASP Reviewer	Select Reviewer	7/27/2020	7/27/2020
Quality Reviewer			

Job Steps

Job Step No.	Job Step Description		Potential Hazard	Critical Action	H&S Reference
1	Pre-Trip Inspection	1	Failing to perform pre-trip inspections may cause mechanical failure, accident or injury.	Perform walk around of vehicle with particular attention to tire inflation and condition. Check lights, wipers, seatbelts for proper operating condition. Properly adjust seat and mirrors prior to vehicle operation. Use or review vehicle inspection checklist as required under the MVSP.	ARC HSGE024 Motor Vehicle Safety Standard (MVSP)
		2	Scrapes, cuts, burns to hand if inspecting engine fluids and/or tires. Eye splash hazard if inspecting engine fluids. Pinch or crush hazards when opening or closing hood, trunk, or tailgate.	Wear protective gloves and safety glasses as described below when checking under hood or tires. Use TRACK and keep hands clear when opening/closing hood, trunk, or tailgate to avoid crush or pinch hazard.	
		3	Struck by other vehicles while walking around vehicle performing inspections.	Wear high visibility vest, shirt, or coat while performing inspections in parking lots or other areas with a traffic hazard. Remain vigilant of moving vehicles or equipment in area, face oncoming vehicles to extent practical.	
		4	Improperly secured cargo may dislodge creating injury, property damage, or road hazard.	Ensure all cargo is properly secured to prevent movement while the vehicle is in operation. This includes cargo in the cab of the vehicle.	
2	Driving a motor vehicle on public streets	1	Failing to observe traffic flow ahead increases risk of hard braking resulting in potential impact of vehicle ahead, being struck by another vehicle from behind, and decreases decision making time.	Use Smith System Key #1, "Aim High in Steering". **Look ahead (15 seconds if possible) to observe traffic flow and traffic signals.** Adjust speed accordingly to keep vehicle moving and avoid frequent braking. Select lane of least traffic and adjust speed based on observed signal timing when possible. Avoid following directly behind large vehicles that obscure view ahead.	Smith System "5-Keys" is a registered trademark of Smith System Driver Improvement Institute, Inc.

		2	Failing to observe vehicles, pedestrians, bicyclists, and other relevant objects in vicinity of your vehicle increases risk of side swipes, rear ending, and third party injury.	Use Smith System Key #2, "Get the Big Picture". **Maintain 360 degrees of awareness around vehicle.** Check a mirror every 6-8 seconds, maintain space around the vehicle, choose a lane that avoids being boxed in. Look for pedestrian activity ahead in crosswalks or sidewalks. Watch for construction zone approach signs and act early by executing lane changes and reducing speed.	
		3	Failing to keep your eyes moving increases risk of not seeing relevant vehicles, pedestrians, and objects in your vicinity that may impair your ability to make timely and appropriate driving decisions and also increases risk of accident.	Use Smith System Key #3, "Keep Your Eyes Moving". **Move your eyes every 2 seconds and avoid staring while evaluating relevant objects.** Scan major and minor intersections prior to entering them. Check mirrors.	
		4	Failing to maintain space around and in front of your vehicle increases risk of striking another vehicle or being struck by another vehicle. Insufficient space shortens time for effective driving decision making resulting in increased accident risk.	Use Smith System #4, "Leave Yourself an Out". **Use 4 second rule when following a vehicle.** Avoid driving in vehicle clusters by adjusting speed and using lanes that permit maximum space and visibility. When stopped, keep one car length space in front of vehicle ahead or white line.	
		5	Failing to communicate with other drivers and pedestrians increases risk of striking vehicles, pedestrians, or being struck by other vehicles, especially from the rear.	Use Smith System Key #5, "Make Sure They See You". **Brake early and gradually when stopping to reduce potential of being rear ended.** Keep foot on brake while stopped. Use turn signals and horn effectively. Establish eye contact with other drivers and pedestrians to extent practical. Use vehicle positioning that promotes being seen.	
		6	Distractions within the vehicle takes focus off driving, increases risk of accident decreases time for making effective driving decisions.	**Cell phone use (any type or configuration) is prohibited while the vehicle is in motion.** Familiarize yourself with vehicle layout and controls (radio, temperature controls, etc.) prior to operating unfamiliar vehicles. Set controls prior to operating vehicle. Use GPS in unfamiliar areas to avoid use of paper maps/directions while driving. Set GPS prior to vehicle operation. Pull over and stop to modify GPS functions. Avoid consuming food or drink while driving.	
3	Parking	1	Parking vehicle in areas of clustered parked vehicles or near facility entrance may impair visibility to oncoming traffic in lot and increase exposure to pedestrian traffic.	**Use pull through parking or back into parking space when permitted or practical.** When practical and safe to do so, park away from other vehicles and avoid parking near the facility entrance or loading docks. If available, use a spotter to aid in backing activity. Back no further than necessary and back slowly. Get out and look (GOAL) if uncertain of immediate surroundings. Tap horn prior to backing.	

PPE Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses	While checking engine or tires	Required
Hand Protection	work gloves (specify type)	Leather or equivalent checking engine or	Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
	other	Vehicle kit (applies to company trucks)	Required
Miscellaneous	fire extinguisher	Applies to company trucks	Required
	first aid kit	Applies to company trucks	Required

Task Improvement Process

General

Observed Company:

Observation Type:

TIP Form: H&S Field Multi-Task (General)

Task Observed:

Observee Name:

Observer Name:

Observation Date:

Project Number: 30044997

Project Name: Chevron - Oceanside No. 6518040, 3705 Hampton RoadOceanside, NY 11572

Supervisor:

Equipment On Site:

Pertinent Information:

Observation

Task	Correct	Questionable	Comments
General			
PPE worn according to HASP/JLA specifications and inspected before use?			
STOP work authority used where appropriate?			
Body Use/Positioning			
Proper lifting/pushing/pulling techniques used (no awkward positions/posture; no twisting or excessive reaching; no straining; no excessive weight; load under control/stable; etc.)?			
Body parts away from pinch points (clear or protected from being caught between objects/equipment or from contacting sharp objects/edges, etc.)?			
Body parts not in the Line of Fire (protected from being struck by traffic, equipment, falling/flying objects, etc.)?			
Work Procedures/Environment			
Correct type and number of barricades/warning devices/cones?			

Communication with others when necessary (hand signals, flags, etc.)?			
Right tools and equipment selected for the job and inspected before use?			
Tools and equipment used properly?			
Housekeeping performed (work areas and pathways clear of hazards, uneven surfaces addressed, etc.)?			
Slip/trip/fall hazards addressed (path selected and cleared, eyes on path, speed footing, etc.)?			
Proper energy control (electrical systems grounded, lock out/tag out performed, isolated, cords/fixtures in good condition, GFCI inspected and utilized when appropriate and used properly, etc.)?			
Protected from overhead/underground utilities (proper clearance, properly marked, spotters as necessary, etc.)?			
Safe work on/near water (appropriate flotation device, appropriate boat for body of water and operation of boat, etc.)?			
Chemical/Radiation protection (decontamination zones set up properly, air monitoring, completed, and logged, etc.)?			
Fall from elevated height prevention (maintains 3-points of contact, appropriate ladder, mounting/dismounting vehicle/equipment, fall arrest system, etc.)?			
Any additional safety issues identified:			

Tip Summary **Enter details of the TIP and follow up discussion provide details on how any questionable items were resolved.**

Discussion following the TIP led by: ______________________________

Date of follow-up discussion: ______________________________

Positive Comments:

Discussion Summary Completed:

☐ Supervisor Led
☐ Peer to Peer
☐ Arcadis Employee to Subcontractor

Summary of Questionable Items

Action Items (Optional)

Assign appropriate action items based on the observations made. You can add more than one action item if needed.

Item #	Action Item	Responsible Person	Due Date	Comp. Date
1				
2				
3				

Standard Review

Reviews to be performed after entry of this TIP into 4-Sight.

Quality Review

Quality Reviews to be performed after entry of this TIP into 4-Sight.

Field Validation and Verification

Use the 4-Sight generated copy of this TIP to perform field V&V activities.

Air Monitoring Documentation Form

PID Model:

LEL/O_2 Model:

CIT Model:

Dust Mon. Model:

Monitor Frequency:

Air Monitoring Results

Date	Time	PID (units)	O_2 (%)	LEL (% LEL)	CIT (ppm)	Dusts (mg/m^3)	Location

CIT = Colorimetric Indicator Tube
LEL = Lower Explosive Limit
mg/m3 = Milligram per cubic meter
O2 = Oxygen

ppm = Part per million
% = Percent
PID = Photoionization Detector

PID Calibration Log

Zero Gas Source: ____________________ Instrument Type: ____________________ PAGE ____ of ____

Lot Number/Expiration Date: ____________________ Serial Number: ____________________

Calibration Gas Source: ____________________ Instrument Type: ____________________

Lot Number/Expiration Date: ____________________ Serial Number: ____________________

Concentration: ____________________ ____________________

Instrument Number	Date	Time	Zero Cal. OK (Y/N)	Calibration Gas Reading	Comments	Calibration w/in 2% (Y/N)?	Alarms Set (Yes/No)?	User Initials

Traffic Safety Plan (TSP)

Notes: ROW - Right of Way (Public) formerly known as "TCP"
Non-ROW - Not in the ROW (parking lots, etc.) formerly known as "STAR"

1.0 General

Plan type	Non-Right of Way (Non-ROW)
Project Name:	Chevron Oceanside (Former Gulf Terminal)
Project Number:	30010967 FN: 6518040
Developer Name:	Melissa Weaver
Duration of Project (in hours or days):	8-10 Hours per day
Time Restrictions (Y/N, if Y describe below):	None
Not Applicable	MW-29-VD, MW-29-D1, MW-29-D2
Not Applicable	MW-29-VD, MW-29-D1, MW-29-D2
Not Applicable	15
Not Applicable	1
Not Applicable	Urban (≤40 mph)

☐ Working on multiple roads?

Comments:

2.0 Work Description

Provide a brief description of scope of work:

Groundwater sampling from existing monitoring wells. Well inspections and Repairs as needed.

3.0 Type and Duration

Work locations on this project will be: Intermediate work (1-8 hours per location)

Non-ROW work will be performed in: Intersection and sidewalk

Special traffic conditions may include (select most prevalent): Large vehicles backing

4.0 Traffic Control Layout, Number of Devices Required, and Phasing

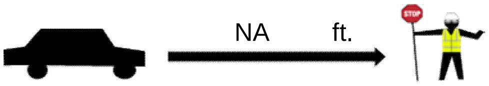
The following Non-ROW requirements in the Traffic Safety Handbook applies:

The menu below will be blank and is not applicable.

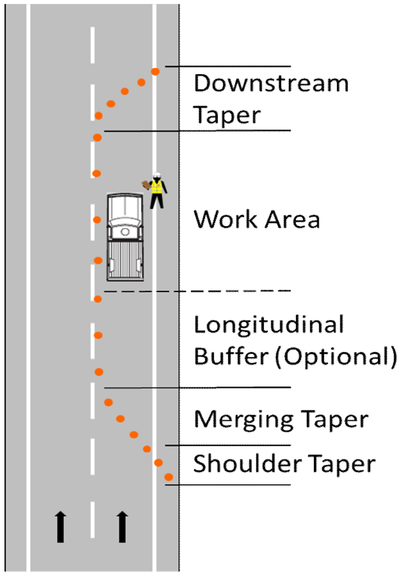
The menu below will be blank and is not applicable.

Non-ROW configuration:

An example non-ROW traffic control configuration for this project is illustrated below. The actual type and number of devices required are specified below. Don't leave vehicle doors open. Don't establish controls within 25 ft of the front or rear of parked large vehicles/rolling equipment without coordinating with the vehicle/equipment operator.

ROW minimum sign spacing distances for "A", "B" and "C" (as applicable) in referenced DOT Facts. A 100 ft. B 100 ft. C 100 ft.	ROW oncoming traffic minimum site distance required to see Flagger and properly decelerate and stop.  NA ft.

ROW Cone Calculation (Values are default. Light grey fields may be modified based on actual road conditions)



Active work area length (feet) 200
☒ Apply Optional Longitudinal Buffer (ft)? 60
Lane width of offset (feet) 12
Shoulder width of offset (feet) 8
Posted speed limit 15

☒ **Shoulder Taper**

Taper Length (feet)	10
Cones Required	1
Cones Spacing (max., ft)	15

☒ **Merging Taper**

Taper Length (feet)	45
Cones Required	3
Cones Spacing (max., ft)	15

☒ **Work Area/Longitudinal Buffer**

Cone Spacing (max., ft)	30
Cones Required	9

☒ **Downstream Taper**

Taper Length (feet)	100
Cones Required	5
Cone Spacing (max., ft)	20

Cones Required (minimum) 17

Note: Review taper configuration and cone spacing after ROW implementation to ensure traffic is moving efficiently without motorist confusion in the RWZ.

Select the traffic control devices to be used and enter number each required:

Check all that apply:		*Wording or Pictogram*	*Number:*
☒	Warning signs	Caution	2
☒	Warning signs	Work Zone	2
☐	Warning signs		
☐	Stop/Slow paddle		
☐	Red flag		
☐	Drums		
☒	Channelizer cone (42 inch height, 10 lb base)		
☐	Channelizer cone (42 inch height, 30 lb base)		
☐	Traffic cones (≥ 18 inches tall)		17
☐	Barricade:		
☒	Flags for cones		17
☐	Lights (for night work)		
☐	Plastic fencing (rolls)		
☒	Caution tape (rolls)		
☐	Other (specify):		

Non-ROW Phasing:

1) Position truck as shield, if practical

2) Deploy traffic control devices

3) Affix flags, caution tape or fencing

4) Unload project equipment

5) Commence work

6) SSO to maintain controls

7) Remove controls in reverse order

Reviewed By:

HASP Reviewer: ______________________

____

THIS FORM MUST BE COMPLETED IN ENTIRETY PRIOR TO BEGINNING ANY INTRUSIVE WORK

Project: Chevron - Oceanside No. 6518040, 3705 Hampton RoadOc
Project Number: 30044997
Form Completion Date: ____________ Form Expiration Date: ____________
(15 business days post form completion date)

Pre-Field Work

Required: One Call or "811" notified 48-72 hours in advance of work? #: ____________
Ticket Expiration Date ____________ (Review State Requirements)
Utility companies notified during the One Call process ☐ See attached ticket

____________ ____________ ____________ ____________
____________ ____________ ____________ ____________

List any other utilities requiring notification:
☐ None ____________ ____________ ____________

Private Locator Contacted ☐ Yes ☐ No
Plan private utility clearance subcontractor assignments, areas, required clearance equipment, depth of clearance needed, types of utilities. When possible re-clear 811 markings to confirm utility locations.

Client provided utility maps or "as built" drawings showing utilities? ☐ Yes ☐ No

Field Work - This must be completed on site, by staff who have a minimum of one year of field experience in identifying utilities. Review check list with PM or designee prior to beginning intrusive work.

List Soil Boring / Well IDs or Excavation Locations applicable to this clearance checklist:

3 Reliable Lines of Evidence Required Prior to Starting any Subsurface Intrusive Work
☐ One Call/"811" (Reliable as a line of evidence when working in public right of way or easement)
Utility Markings Present: ☐ Paint ☐ Pin flags/stakes ☐ Other ☐ None

☐ Client Provided Maps/Drawings **OR** ☐ Maps/Drawings requested but not provided
☐ Client Clearance Name(s)/Affiliation(s) ____________
☐ Interview(s): Name(s)/Affiliation(s) ____________
____

Did person(s) interviewed indicate depths of any utilities in the subsurface?
☐ Yes, depths provided: ☐ Did not know or refused to answer
Additional Comments:

☐ Site Inspection (**Complete Page 2 & Photo Document Marked Utilities & Utility Structures**)
☐ Public Records / Maps / Asbuilts
☐ Private Locator: (Name and Company) ____________
☐ Ground Penetrating Radar (GPR)
☐ Radiofrequency (RFLoc)
☐ Electromagnetic (EM)
☐ Metal Detector

Soft Dig Methods
☐ Termination Depth ______ft. bgs
☐ Potholing / Vacuum Extraction
☐ Air-Knife or Hydro-Knife
☐ Probing
☐ Hand Auguring

☐ Other: ____________
☐ Marine Locator: (Name and Company) ____________

Tips for Successful Utility Location:
1. Don't forget to look up
2. Be on site with Private Utility Locators
3. Ask Private Locators to "confirm" other's markings
4. Select alternate/backup locations during clearance process
5. Mark out all known utilities. Leave nothing to question
6. No hammering - no pickaxes - no digging bars - no shortcutting
7. No excessive turning or downward force of hand augers/shovels
8. Utilities may run in or directly under asphalt/concrete

During the site inspection look for the following: **("YES" requires additional investigation and the utility must be marked properly prior to beginning subsurface intrusive work)**:

Site Inspection		**Utility Color Codes**	**Present**	
a)	Natural gas line present (evidence of a gas meter)?	Yellow	☐ Yes	☐ No
	i) Feeder Lines to buildings or homes?		☐ Yes	☐ No
b)	Evidence of electric lines:	Red		
	i) Conduits to ground from electric meter or along wall?		☐ Yes	☐ No
	iii) Conduits from power poles running into ground?		☐ Yes	☐ No
	ii) Light poles, electric devices with no overhead lines?		☐ Yes	☐ No
	iii) Overhead electric lines present? (See Section l)		☐ Yes	☐ No
c)	Evidence of sewer drains:	Green		
	i) Restrooms or kitchen on site?		☐ Yes	☐ No
	ii) Sewer cleanouts present?		☐ Yes	☐ No
	iii) Combined sewer/storm lines or multiple sewer lines?		☐ Yes	☐ No
d)	Evidence of water lines:	Blue		
	i) Water meter on site or multiple water lines?		☐ Yes	☐ No
	ii) Fire hydrants in vicinity of work?		☐ Yes	☐ No
	iii) Irrigation systems? (Sprinkler heads, valve boxes, controls in building)		☐ Yes	☐ No
e)	Evidence of storm drains:	Green		
	i) Open curbside or slotted grate storm drains		☐ Yes	☐ No
	ii) Gutter down spouts going into ground		☐ Yes	☐ No
f)	Evidence of telecommunication lines:	Orange		
	i) Fiber optic warning signs in areas?		☐ Yes	☐ No
	iv) Aboveground cable boxes or housings or wires in work area?		☐ Yes	☐ No
g)	Underground storage tanks:			
	i) Tank pit present, tank vent present?		☐ Yes	☐ No
	ii) Product lines running to dispensers/buildings?		☐ Yes	☐ No
h)	Do utilities enter or exit existing structures/buildings?			
	If Yes, confirm the utility markings outside of structure/building match up.		☐ Yes	☐ No
i)	Proposed excavation marked in white?	White	☐ Yes	☐ No
j)	Unclassed utilities / anomalies marked in pink?	Pink	☐ Yes	☐ No
k)	**Overhead** Utilities/Communication Lines - **Look Up**:			
	i) Overhead electrical conduit, pipe chases, cable trays, product lines?		☐ Yes	☐ No
	ii) Overhead fire sprinkler system?		☐ Yes	☐ No
l)	**Overhead** Power lines in or near the work area:			
	i) < 50 kV within 10 ft. of work area?		☐ Yes	☐ No
	ii) >50 - 200 kV within 15 ft. of work area?		☐ Yes	☐ No
	iii) >200-350 kV within 20 ft. of work area?		☐ Yes	☐ No
	iv) >350-500 kV within 25 ft. of work area?		☐ Yes	☐ No
	v) >500-750 kV within 35 ft. or work area?		☐ Yes	☐ No
	vi) >750-1000 kV within 45 ft. of work area?		☐ Yes	☐ No
m)	Other:			
	i) Evidence of linear asphalt or concrete repair?		☐ Yes	☐ No
	ii) Evidence of linear ground subsidence or change in vegetation?		☐ Yes	☐ No
	iii) Unmarked manholes or valve covers in work area?		☐ Yes	☐ No
	iv) Warning signs ("Call Before you Dig", etc.) on or adjacent to site?		☐ Yes	☐ No
	v) Utility color markings not illustrated in this checklist?	Purple	☐ Yes	☐ No
n)	Has the Utilities & Structures Checklist been reviewed by the PM or Designee		☐ Yes	☐ No

PM or Designee Name: ______________________________

Name and Signature of person completing the checklist: ______________________________

Date: ____________________ ______________________________

Do not perform **mechanized** intrusive work within 30 inches of a utility marking without receiving pre-approval by Corporate H&S .

ARCADIS Design & Consultancy for natural and built assets

Arcadis Weekly Vehicle Inspection Form

Vehicle # / License Plate # ______ **Lease Plan # / Last 6 of Vin #** ______

	Inspection Date												
	Odometer reading												
	Driver / Inspector Name												
	Check the appropriate box and enter repair date for identified repairs:	OK	Needs Repair	Repair Date	OK	Needs Repair	Repair Date	OK	Needs Repair	Repair Date	OK	Needs Repair	Repair Date
Interior	Horn operational												
	Door Locks operational												
	Seat Belts in good repair												
	Seats and Seating Controls												
	Steering Wheel - No Excessive Play												
	Interior Lights and Light Controls												
	Instrument Panel/Gauges												
	Wiper Controls operational												
	Heat/Defrost/Air Conditioning working												
	Rear View Mirror present												
	Backup Camera/Sensors working												
	Jack and Lug Wrench present												
Exterior[1]	Lights and Signals operational												
	ires properly inflated/good tread depth												
	Spare Tire properly inflated												
	Doors operational												
	Windows Not Cracked/Damaged												
	Side View Mirrors												
	Body Panels and Bumpers												
Engine & Brakes	Engine Start & Running Smoothly												
	Fluid Levels, No Noticeable Leaks												
	Belts tight, no cracks												
	Brakes operational, no squeaking												
Emergency Equipment[2]	First Aid Kit, inspected weekly												
	Fire Extinguisher properly secured												
	Fire Extinguisher inspected weekly												
	range/Yellow emergency warning light												
	Roadside Assistance Information												
	Recommend spotter cones available												
Cargo	Cargo Secure and Properly Distributed												
	Securing Devices in Good Condition												
Registration	License Plate /Tags												
	Registration and Insurance												
	City/State Inspection Decal												
	Lease Plan information/Fuel Card												

[1] **Note all damages to the vehicle on the back of this page**

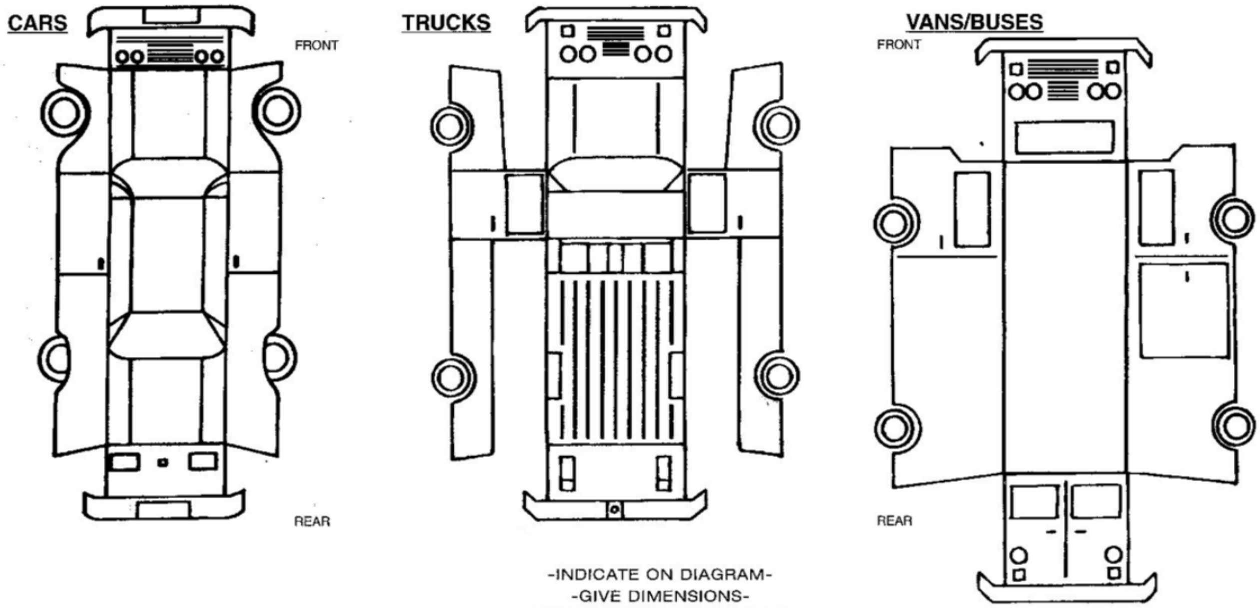
[2] **Emergency Equipment required per Motor Vehicle Standard ARC HSGE024**

Note All Vehicle Damage Below

All Vehicle Damage must be reported to Sue Berndt (Corporate Legal), Andrew McDonald (Corporate H&S), and Roger Elliot (Corporate Fleet Manger)

CODES:

B-BENT
BR-BROKEN
BU-BULGE
C-CHAFED
CH-CHIPPED
CPM-COVERED WITH PROTECTIVE MATERIAL-UNABLE TO DETERMINE DEFECTS IF ANY
CSA-CHAFED AND SCRATCHED ALL OVER
CR-CRACKED
D-DENTED
DMC-DUST AND MUD COVERED UNABLE TO DETERMINE OTHER DEFECTS IF ANY
G-GOUGED OR CUT
GC-GLASS CRACKED
HS-HAIRLINE SCRATCH
M-MISSING
P-PUNCTURED
R-RUSTY
S-SCRATCHED
SC-SCRAPED
SM-SMASHED
ST-STAINED AND/OR SOILED
T-TORN



-INDICATE ON DIAGRAM-
-GIVE DIMENSIONS-
-CIRCLE WHERE APPLICABLE-

Notes:

Tread guide: If a tread gauge is not available coins may be used to determine remaining tread. 2/32" is the minimum by law in most states (top of Lincoln's head on penny), 4/32" is minimum recommended for wet surfaces (top of Washington's head on quarter), 6/32" is minimum recommended for snowy surfaces (top of Lincoln Memorial on penny).Vehicle tires should be replaced if the tread depth is less than 6/32".

2/32" remaining 4/32" remaining 6/32" remaining

Reference JSA 10907 For Weekly Vehicle Inspection

ARCADIS | Design & Consultancy for natural and built assets

Arcadis Visitor Acknowledgement and Acceptance of HASP Signature Form

By signing below, I waive, release, and discharge the owner of the site and Arcadis and their employees from any future claims for bodily and personal injuries which may result from my presence at, entering, or leaving the site and in any way arising from or related to any and all known and unknown conditions on the site.

Printed Name	Signature	Company	Date/Time On Site	Date/Time Off Site

APPENDIX F

GENERIC COMMUNITY AIR MONITORYING PLAN

Appendix F
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-sire receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. As stated in the NYSDOH letter dated August 16, 2022, the "Special Requirements" CAMP would apply at this site if any ground-intrusive activities occur below the 8-foot demarcation layer within 20 feet of the Costco Service Station.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

> **Continuous monitoring** will be required for all ground intrusive activities and during the demolition of contaminates or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.
>
> **Periodic monitoring** for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity

of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public parking, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone on half the distance to the nearest potential receptor or residential/commercial structure, whichever is less- but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposed should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped, and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

Special Requirements

The “Special Requirements” CAMP will be followed if any ground-intrusive activities occur below the 8-foot demarcation layer within 20 feet of the Costco Service Station.

A. *Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures*:

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels. Background readings in the occupied spaces must be taken prior to commencement of the planned activities. Any unusual background readings should be discussed with NYSDOH prior to commencement of work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/kg or less at the monitoring point.

B. *Special Requirements for Indoor Work with Co-Located Residences or Facilities:*

Unless a self-contained, negative-pressure enclosure with proper emission controls encompasses the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under “Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures” except that in this instance “nearby/occupied structures” would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

APPENDIX G

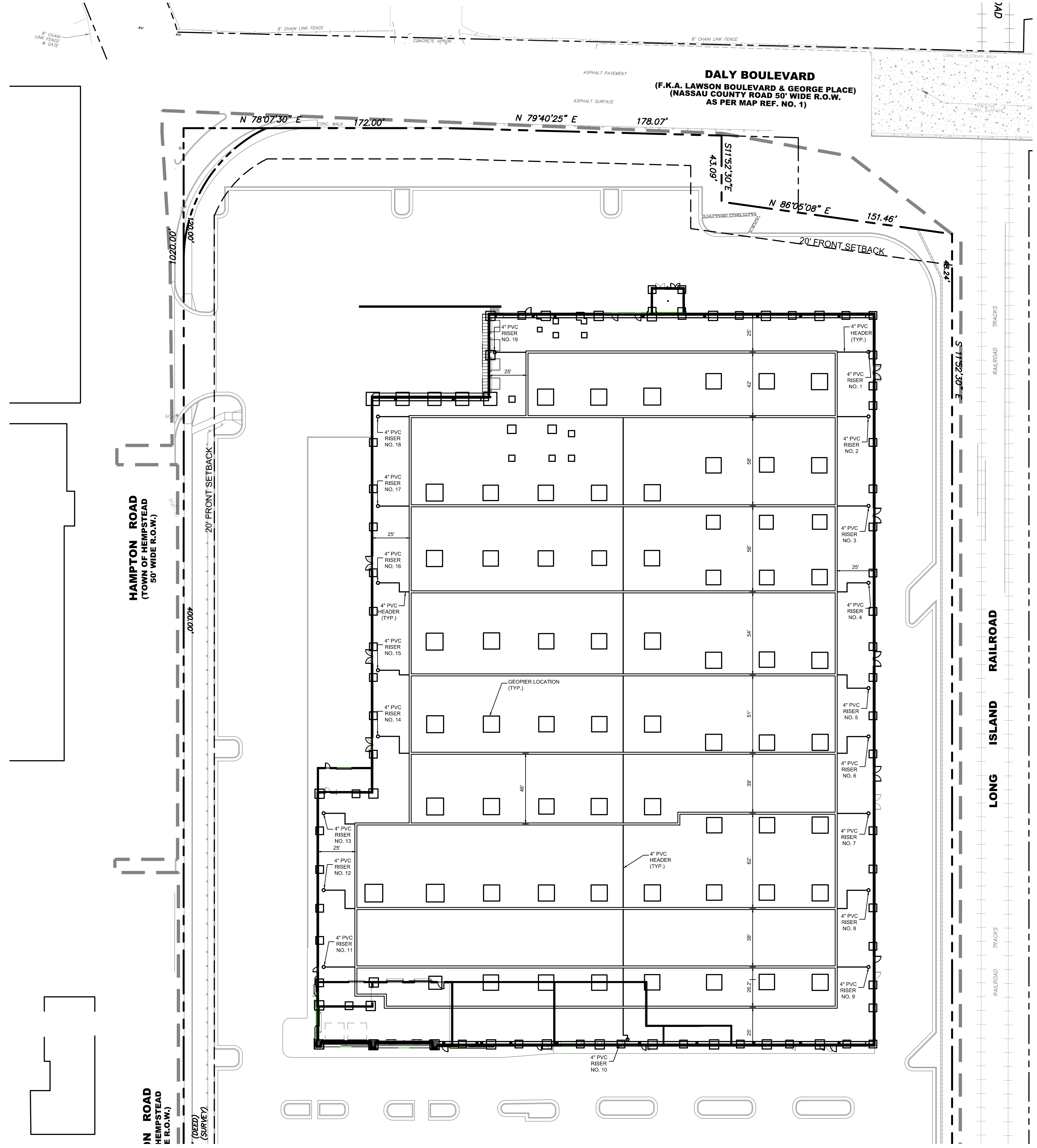
SSD O&M PLAN AND AS-BUILT

Sub-Slab Depressurization System Operation and Maintenance Plan

This Site Management Plan (SMP) describes the existing Passive Sub-Slab Depressurization (SSD) System and provides as-built design details and the system location. The SSD is a Engineering Control for the Site. The potential for soil vapor intrusion within the Costco warehouse building is mitigated through the use of a Liquid Boot® vapor intrusion barrier installed across the warehouse floor, and existing passive SSD venting system installed as part of the Site IRMs. The SSD system will be inspected, monitored, and its performance certified at specified frequency defined in this SMP.

The system will be inspected using existing sub-slab monitoring points beneath the occupied onsite Costco building. Additionally, the SSD piping and existing Costco building slab will be inspected annually as part of the SMP. Any damaged piping, pipe supports, or piping labels will be repaired or replaced. Each SSD piping discharge will be inspected to verify that no air intakes into the building have been located nearby. A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix J Monitoring and Sampling Protocol. The inspection of the SSD will be conducted by a qualified environmental professional, a PE who is licensed and registered in New York State, or a qualified person who directly reports to a PE who is licensed and registered in New York State.

Sub-slab vapor sampling will be conducted bi-annually, followed by an annual sampling the following year if required by the NYSDEC. Sub-slab samples will be analyzed for United States Environmental Protection Agency (USEPA) Method Toxic Organic (TO)-15. The purpose of the vapor sampling is to determine if the SSD system needs to remain in passive operation or be upgraded to an active system or removed as an engineering control. Indoor air monitoring will be performed only if needed and contingent on the results of sub-slab monitoring, as identified in Table 4-2 of this SMP. If results of the initial sub-slab monitoring and sampling indicates that there is no potential for vapor intrusion and that the passive SSD (and existing Liquid Boot® vapor intrusion barrier and concrete slab) is adequately mitigating vapor intrusion, a proposal will be submitted to the NYSDEC and NYDOH to remove the SSD as an engineering control and no additional monitoring or inspection of the SSD will be needed. Alternatively, based on sub-slab and indoor air sampling results, if site-related vapors are impacting the indoor air at the Costco facility, then the passive SSD will be modified to an active SSD. Modification to the frequency for sampling requirements will require approval from the NYSDEC project manager. Should the sub-slab vapor sample results determine the SSD must be operated as an active system, a revision to this SMP and O&M plan will be submitted to the NYSDEC.



RADON AND SUBSLAB VAPOR GAS COLLECTION SYSTEM

SCALE: 1"=40'

40 0 40 80
SCALE IN FEET
(1"=40')

NOTE:

GEOPIER LAYOUT TAKEN FROM A PLAN ENTITLED "GROUTED IMPACT PIER ELEMENT LAYOUT, COSTCO WHOLESALE, OCEANSIDE, NEW YORK", PREPARED BY GEOSTRUCTURES, DATED MAY 18, 2015.

LEGEND

○	6" PVC RISER LOCATIONS
═	CETCO GEOVENT LOCATIONS
—	SOLID 4" PVC PIPE LOCATIONS

NOTES:

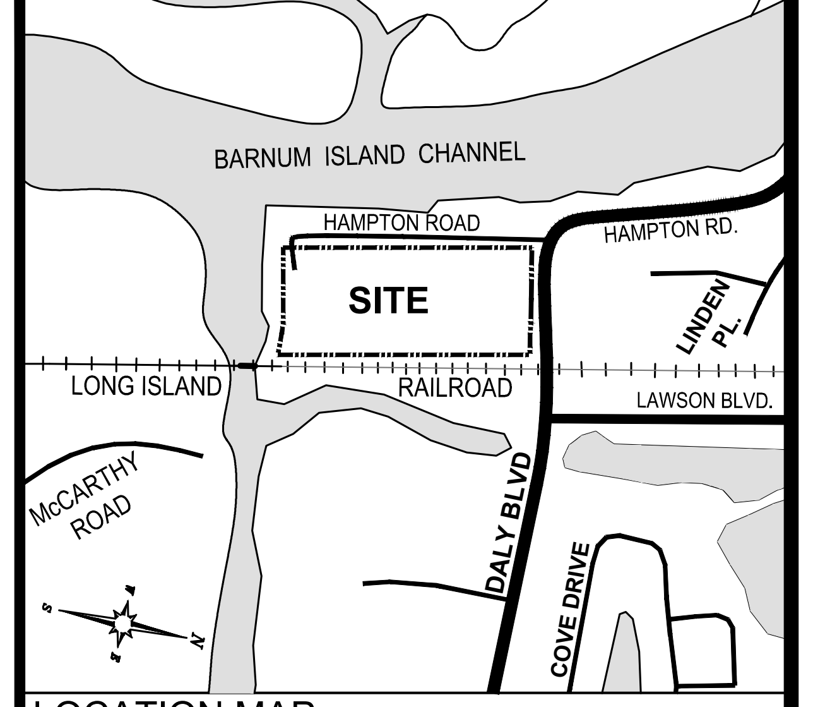
1. UTILIZE ONLY MANUFACTURER SPECIFIED PRODUCTS AND PARTS INDICATED OR BETTER THAN APPROVED EQUAL.
2. ULTIMATE OPERATION AND MAINTENANCE IS THE OWNER'S RESPONSIBILITY UNDER THE DIRECTION AND GUIDELINES OF THE ENGINEER
3. ALL PIPING-SUBGRADE SOILS SHALL BE A STRUCTURAL FILL WITH 95% RELATIVE COMPACTION AND FREE OF STANDING WATER.
4. ALL LATERAL PIPING IS TO BE INSTALLED LEVEL AND WITH NO SAGGING.
5. REFER TO THE PROJECT SPECIFICATIONS FOR ALL SYSTEM SPECIFICATIONS AND REQUIREMENTS DURING CONSTRUCTION.
6. REFER TO PROJECT SPECIFICATIONS FOR ALL STORAGE HANDLING, COLOR, SIZE, TYPE, JOINING AND CONSTRUCTION REQUIREMENTS OF ALL INDICATED PIPING.
7. THE CONTRACTOR IS RESPONSIBLE FOR THE PROTECTION OF ALL EXPOSED CABLES, CONDUITS, PIPING AND THE LIKE UNDERGROUND UTILITIES AND STRUCTURES WHICH MAY BE ENCOUNTERED EITHER ABOVE OR UNDERGROUND. ALL NECESSARY PRECAUTIONS MUST BE TAKEN BY THE CONTRACTOR TO PREVENT DAMAGE TO THEIR EXISTING/PROPOSED IMPROVEMENTS. IN THE EVENT THAT SUCH DAMAGE SHOULD OCCUR FROM THE CONTRACTOR'S OPERATIONS, THE CONTRACTOR SHALL REPAIR, REPLACE OR BRING THE ORIGINAL CONDITION TO THE DAMAGED UTILITIES OR IMPROVEMENTS AT THE CONTRACTOR'S EXPENSE.
8. ALL PIPE LENGTHS INDICATED ON THIS PLAN ARE APPROXIMATE AND WILL VARY DURING CONSTRUCTION. HENCE, THE CONTRACTOR IS RESPONSIBLE FOR DETERMINING AND VERIFYING ACTUAL LENGTHS AND SHALL NOT BID BASED ON THE VALUES PROVIDED ON THIS PLAN.
9. ALL MATERIALS SHALL BE NEW AND WITHOUT FLAWS OR DEFECTS OF ANY TYPE AND SHALL HAVE A MINIMUM GUARANTEE OF ONE YEAR AGAINST MATERIAL DEFECTS OR DEFECTIVE WORKMANSHIP.
10. ALL PVC PIPE SHALL BE CONTINUOUSLY AND PERMANENTLY MARKED WITH THE MANUFACTURER'S NAME OR TRADE MARK, SIZE SCHEDULE, TYPE, WORKING PRESSURE AT 73 DEGREES F., SDR NUMBER, PRODUCTS STANDARD NUMBER AND NATIONAL SANITATION FOUNDATION (NSF) APPROVAL.
11. ALL PVC PIPES SHALL BE SOLVENT WELDED. SOLVENT WELDED PIPE FITTINGS SHALL BE MOLDED FITTINGS, SCHEDULE 40, MANUFACTURED OF THE SAME MATERIAL AS THE PIPE, AND SHALL BE SUITABLE FOR SOLVENT WELD SLIP JOINT RING, TIGHT SEAL OR THREADED CONNECTION.
12. CEMENT SHALL BE CLEAR PLASTIC, NON-CRACKING PIPE CEMENT FOR USE ON ALL SIZES AND SCHEDULES OF PVC PIPE AND FITTINGS. CEMENT MUST BE NSF APPROVED AND MEET AST, D2564 SPECIFICATIONS. NO BLUE GLUE IS TO BE USED FOR ANY REASON.
13. CLEANER/PRIMER MUST BE ANY COLOR OTHER THAN CLEAR.
14. REFER TO ORIGINAL PROJECT SPECIFICATIONS AS WELL AS SPECIFICATIONS, DETAILS AND INSTALLATION GUIDE PROVIDED BY LIQUID BOOT AS REFERENCE.
15. THE CONTRACTOR IS TO INSTALL THE INDICATED LATERALS AS SHOWN, ANY RELOCATION OF PROPOSED LATERALS, HEADERS OR RISERS IS TO BE BROUGHT TO THE ENGINEER'S ATTENTION IMMEDIATELY.
16. ALL VERTICAL RISERS WILL BE LABELED "GAS COLLECTION SYSTEM DO NOT ALTER". CAST IRON PIPING MAY BE REQUIRED FOR VERTICAL RISERS PER FIRE CODE. (TO BE DETERMINED BY ARCHITECT)
17. LIQUID BOOT VAPOR BARRIER SYSTEM WILL BE INSTALLED UNDER THE COMPLETE BUILDING SLAB AND ALONG EXTERIOR WALLS IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS.
18. ANCHORS AND/OR ANY OTHER PENETRATIONS THROUGH LIQUID BOOT MUST BE RESEALED AS PER LIQUID BOOT SPECIFICATIONS.
19. SEALING AROUND PENETRATIONS PER LIQUID BOOT BROWNFIELD / MEMBRANE LINER SPECIFICATIONS:
    - A. CLEAN ALL PENETRATIONS. ALL METAL PENETRATIONS SHALL BE SANDED CLEAN WITH EMERY CLOTH.
    - B. FOR APPLICATIONS REQUIRING LIQUID BOOT ®BASEFABRIC GEOTEXTILE, ROLL OUT GEOTEXTILE ON SUB-GRADE WITH THE HEAT-ROLLED SIDE FACING UP, OVERLAPPING SEAMS A MINIMUM OF SIX INCHES (6"). CUT THE GEOTEXTILE AROUND PENETRATIONS SO THAT IT LAYS FLAT ON THE SUB-GRADE. LAY GEOTEXTILE TIGHT AT ALL INSIDE CORNERS. APPLY A THIN (10 MIL) TACK COAT OF LIQUID BOOT ®"A" SIDE WITHOUT CATALYST WITHIN THE SEAM OVERLAP.
    - C. AT THE BASE OF PENETRATION INSTALL A MINIMUM 3/4 INCH THICK MEMBRANE CANT OF LIQUID BOOT ®, OR OTHER SUITABLE MATERIAL AS APPROVED BY THE MANUFACTURER. EXTEND THE MEMBRANE AT A 60 MIL THICKNESS THREE INCHES (3") AROUND THE BASE OF PENETRATION AND UP THE PENETRATION A MINIMUM OF THREE INCHES (3"). **ALLOW TO CURE OVERNIGHT BEFORE THE APPLICATION OF LIQUID BOOT ®MEMBRANE. (SEE ATTACHED MANUFACTURER'S STANDARD DETAIL.)**
    - D. SPRAY APPLY LIQUID BOOT ®TO A 60 MILS MINIMUM DRY THICKNESS AROUND THE PENETRATION, COMPLETELY ENCAPSULATING THE COLLAR ASSEMBLY AND TO A HEIGHT OF ONE AND ONE HALF INCHES (1 1/2") MINIMUM ABOVE THE MEMBRANE IN THE LIQUID BOOT BROWNFIELD / MEMBRANE LINER SPECIFICATIONS. SPRAY LIQUID BOOT ®TO SURROUNDING AREAS AS SPECIFIED FOR THE PARTICULAR APPLICATION. **(SEE MANUFACTURER'S STANDARD DETAIL)**
    - E. ALLOW LIQUID BOOT ®TO CURE COMPLETELY BEFORE PROCEEDING TO STEP "F".
    - F. WRAP PENETRATION WITH POLYPROPYLENE CABLE TIE AT A POINT TWO INCHES (2") ABOVE THE BASE OF PENETRATION. TIGHTEN THE CABLE TIE FIRMLY SO AS TO SQUEEZE, BUT NOT CUT, THE CURED MEMBRANE COLLAR.

PASSIVE/ACTIVE SUB-SLAB DEPRESSURIZATION SYSTEM NOTES:

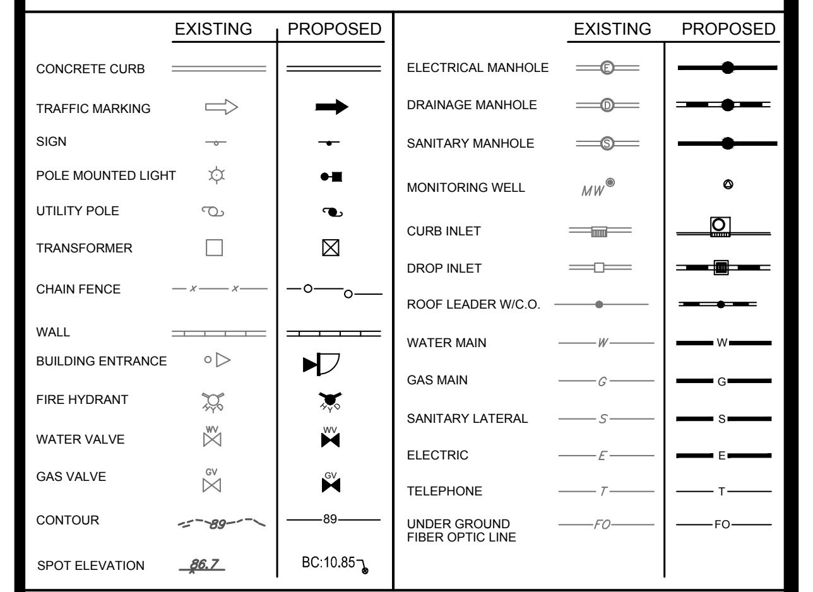
1. IF A FAN IS REQUIRED TO CHANGE THE SYSTEM FROM PASSIVE TO ACTIVE, A CERTIFIED RADON MITIGATOR MUST INSTALL THE FAN.
2. THE CONSTRUCTION TECHNIQUES UTILIZED IN THE CONSTRUCTION ARE IN COMPLIANCE WITH THE MINIMAL SYSTEM-SPECIFIC RECOMMENDATIONS REQUIRED BY THE "FINAL NYSDOH CEH BEEI SOIL VAPOR INTRUSION GUIDANCE", DATED OCTOBER 2006.
3. ALL PENETRATIONS OF CONDITIONED ENVELOPE SHALL BE SEALED TO PREVENT AIR PASSAGE.
4. VAPOR MITIGATION SYSTEM VENT PIPES SHALL BE IDENTIFIED AND CLEARLY LABELED AT INTERVALS OF NOT MORE THAN 25' IN CONCEALED LOCATIONS, NOT MORE THAN 50' IN EXPOSED LOCATIONS, AND NOT LESS THAN ONCE IN ANY ROOM OR SPACE.
5. ELECTRICAL JUNCTION SHALL BE INSTALLED NEAR WHERE FUTURE INLINE VENT PIPE FAN AND SYSTEM FAILURE ALARMS MAY BE INSTALLED.
6. TO AVOID ENTRY OF EXTRACTED SUBSURFACE VAPORS INTO THE BUILDING, THE VENT PIPE'S EXHAUST SHOULD BE
    - i. ABOVE THE EAVE OF THE ROOF (PREFERABLY, ABOVE THE HIGHEST EAVE OF THE BUILDING AT LEAST12 INCHES ABOVE THE SURFACE OF THE ROOF),
    - ii. AT LEAST 10 FEET ABOVE GROUND LEVEL.
    - iii. AT LEAST 10 FEET AWAY FROM ANY OPENING THAT IS LESS THAN 2 FEET BELOW THE EXHAUST POINT.
    - iv. 10 FEET FROM ANY ADJOINING OR ADJACENT BUILDINGS, OR HVAC INTAKES OR SUPPLY REGISTERS.
7. MONITORING PORTS TO BE INSTALLED AT ALL RISER LOCATIONS PER RISER DETAILS.

CONSTRUCTION SITE RUNOFF IS CONTRIBUTING TO THE BARNUM ISLAND CHANNEL.

N.Y.S. ONE CALL SYSTEM, INC.
1-800-272-4480
STOP-CALL BEFORE YOU DIG!



LOCATION MAP SCALE: 1"=800'



DRAWING LEGEND

N
W E
S

40 0 40 80
SCALE IN FEET
(1"=40')

REV.	DATE	DRAWN BY	DESCRIPTION
2	5/22/15	PCS	REVISED PER ARCHITECTURAL CHANGES
1	4/29/15	PCS	REVISED PER EXXON COMMENTS

RUSSELL T. McFALL II
NEW YORK LICENSED PROFESSIONAL
ENGINEER - LICENSE NUMBER: 90030

Russell T. McFall II
090030
5/22/15

MASER
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Consulting, Municipal & Environmental Engineers
Planners ▪ Surveyors ▪ Landscape Architects
State of N.J. Certificate of Authorization: 24GA27986500

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Red Bank, NJ 07701
Phone: 732.383.1950
Fax: 732.383.1984
email: solutions @ maserconsulting.com

SUBSLAB VAPOR MITIGATION
SYSTEM DESIGN
FOR
COSTCO WHOLESALE
OCEANSIDE, NEW YORK
TOWN OF HEMPSTEAD
NASSAU COUNTY

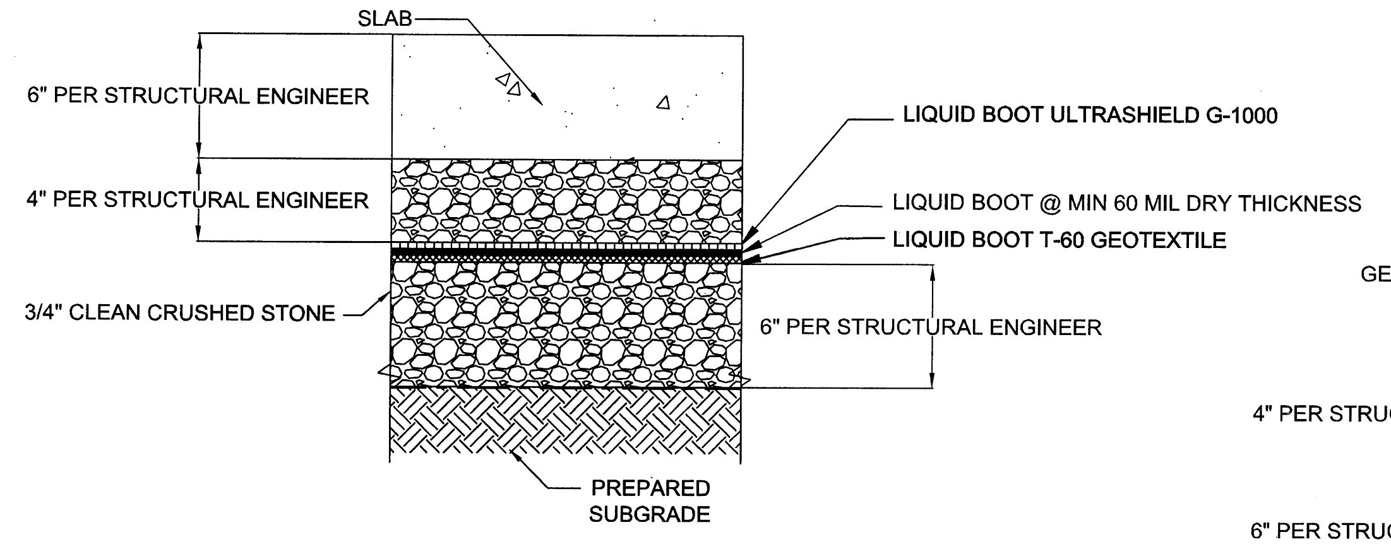
SCALE:	DATE:	DRAWN BY:	CHECKED BY:
1"=40'	9-30-2014	PCS	RS

PROJECT NUMBER: 12000271A

SHEET NUMBER: VBD-1

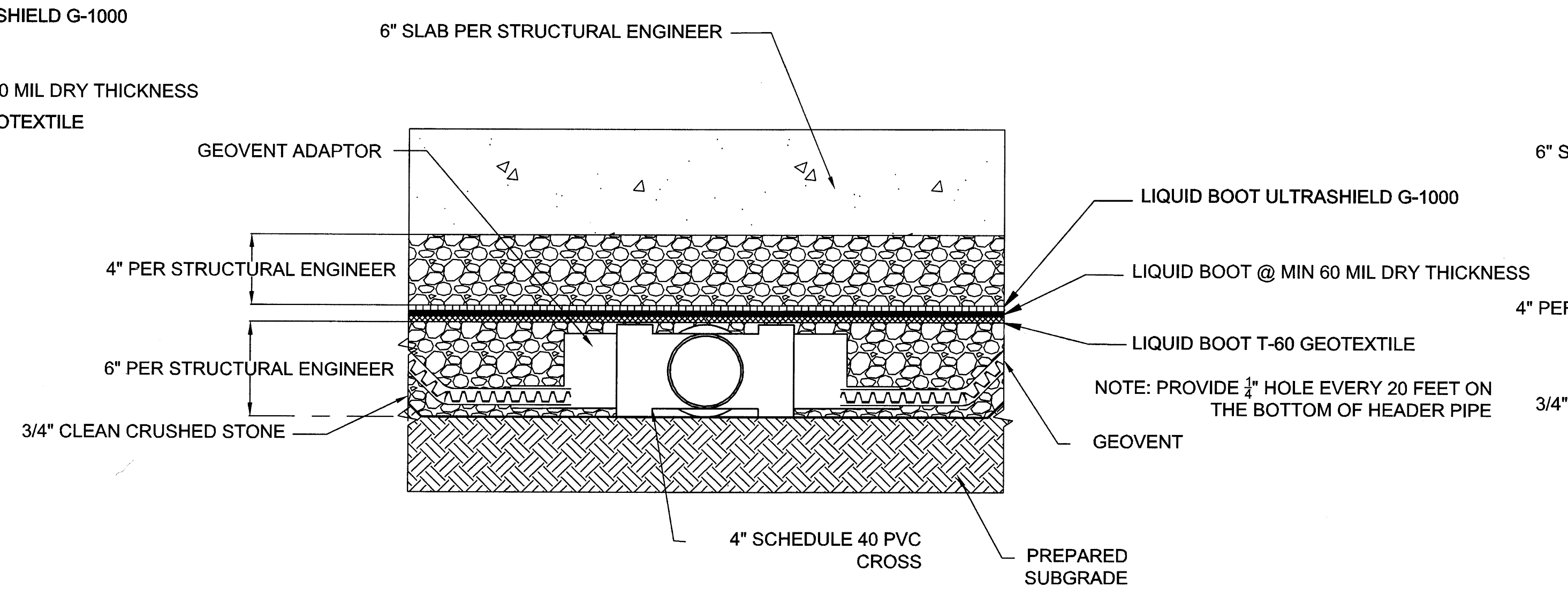
NOTE:

DETAILS MAY BE REVISED UPON RECEIPT OF FINAL ARCHITECTURAL AND STRUCTURAL PLANS.



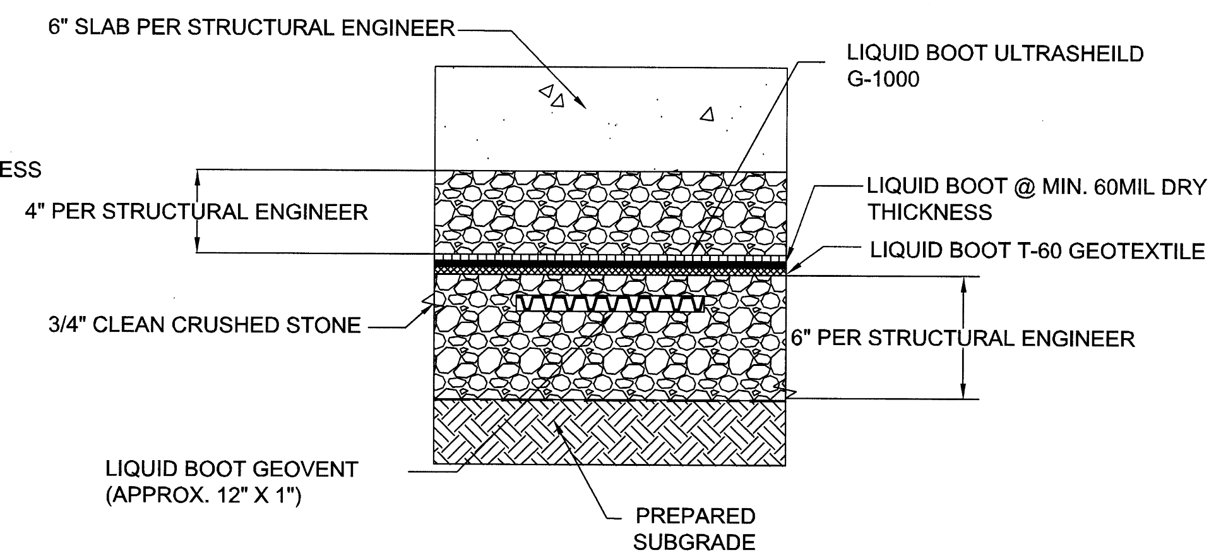
TYPICAL LIQUID BOOT DETAIL

NTS



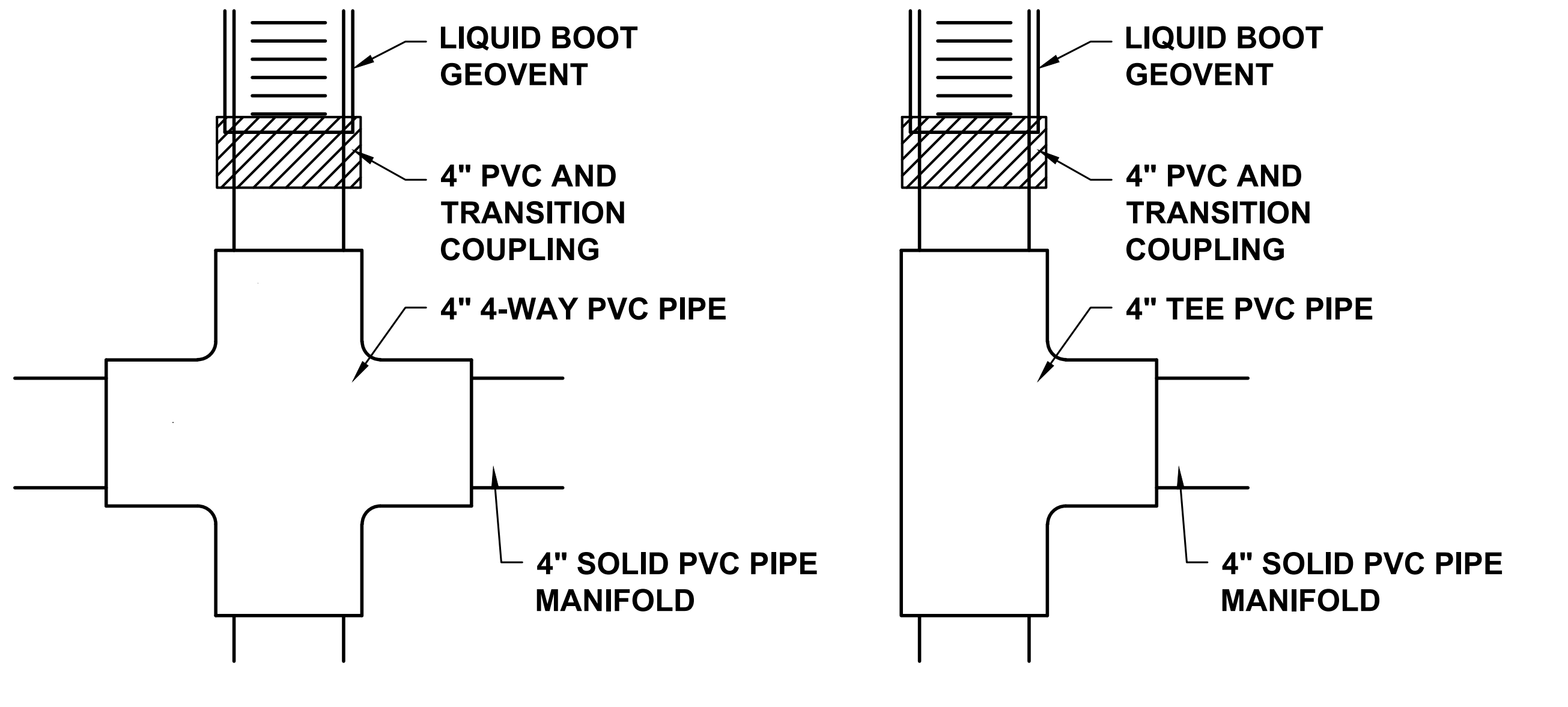
TYPICAL HEADER PIPE TO GEOVENT TRANSITION DETAIL

NTS



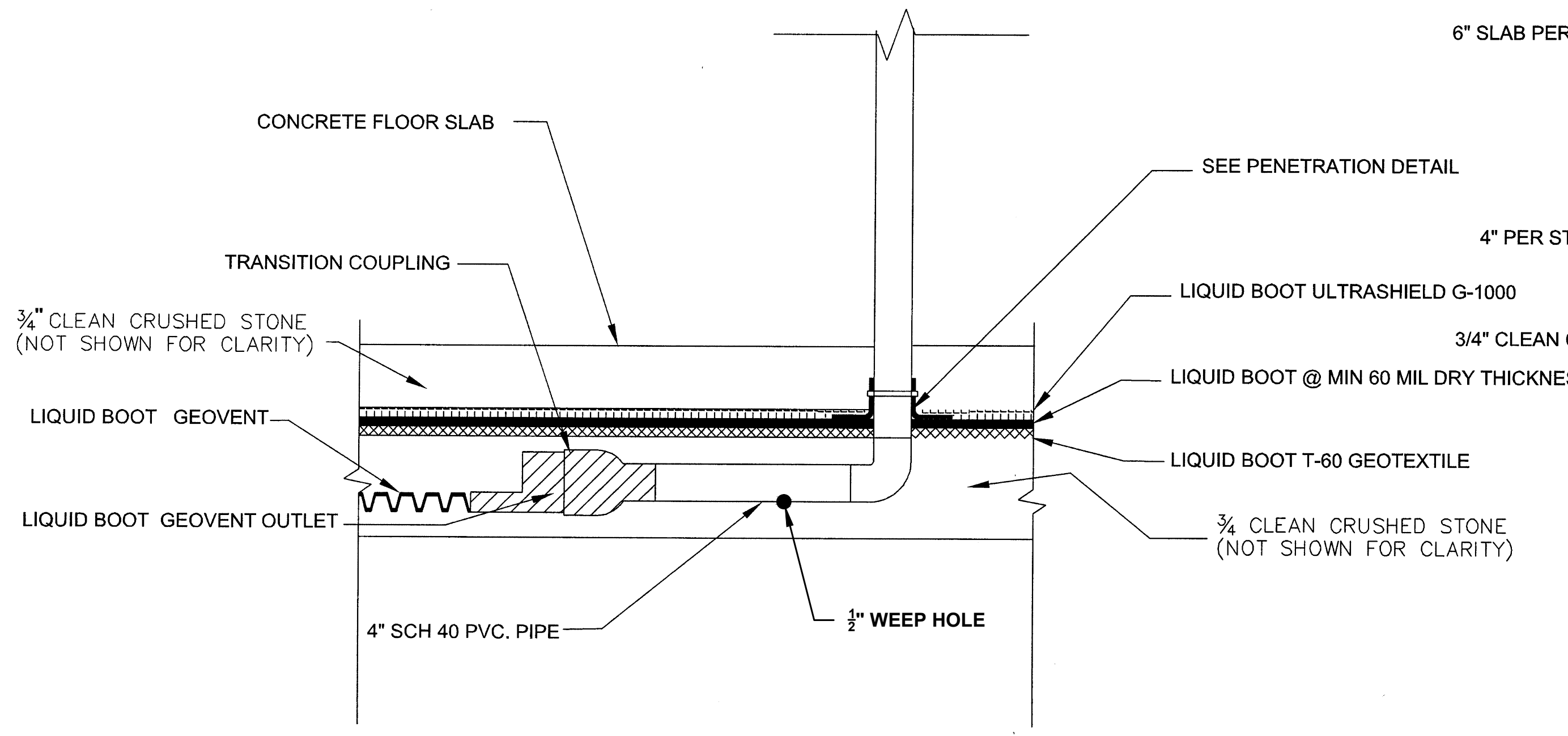
GEOVENT CROSS SECTION DETAIL(TYP.)

NTS



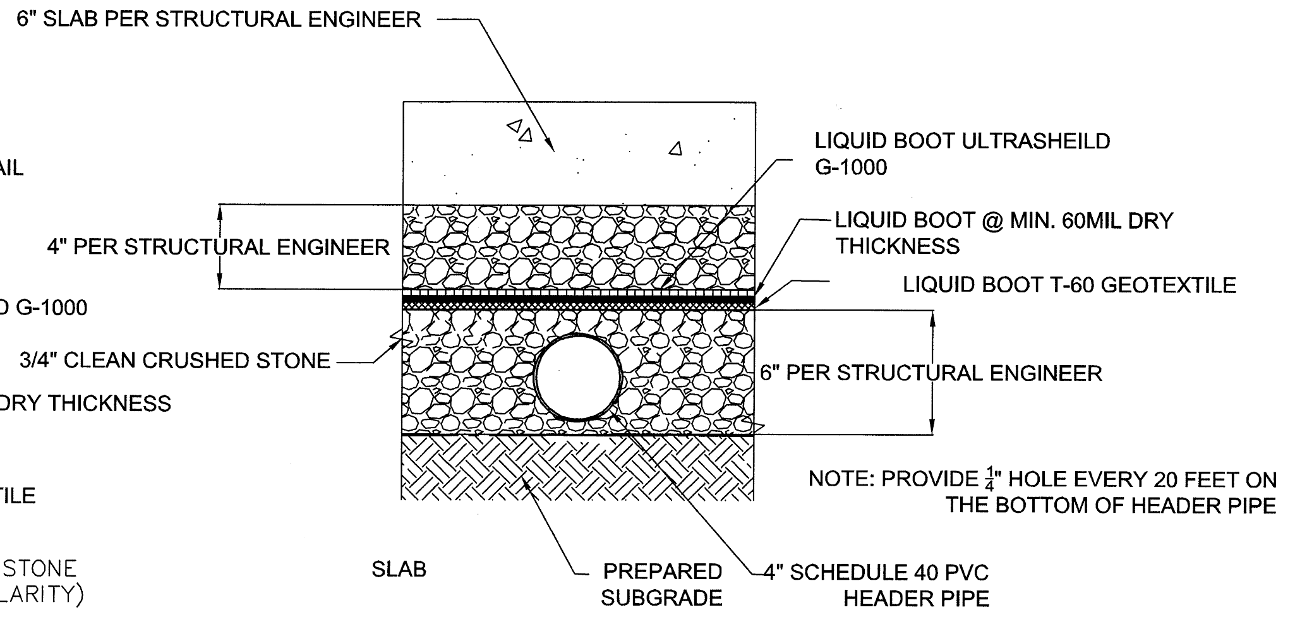
GEOVENT TO PVC MANIFOLD CONNECTION DETAIL (TYP.)

N.T.S.



GEOVENT TRANSITION TO RISER DETAIL (TYP)

NOTE: SUBGRADE NOT SHOWN



TYPICAL HEADER PIPE DETAIL

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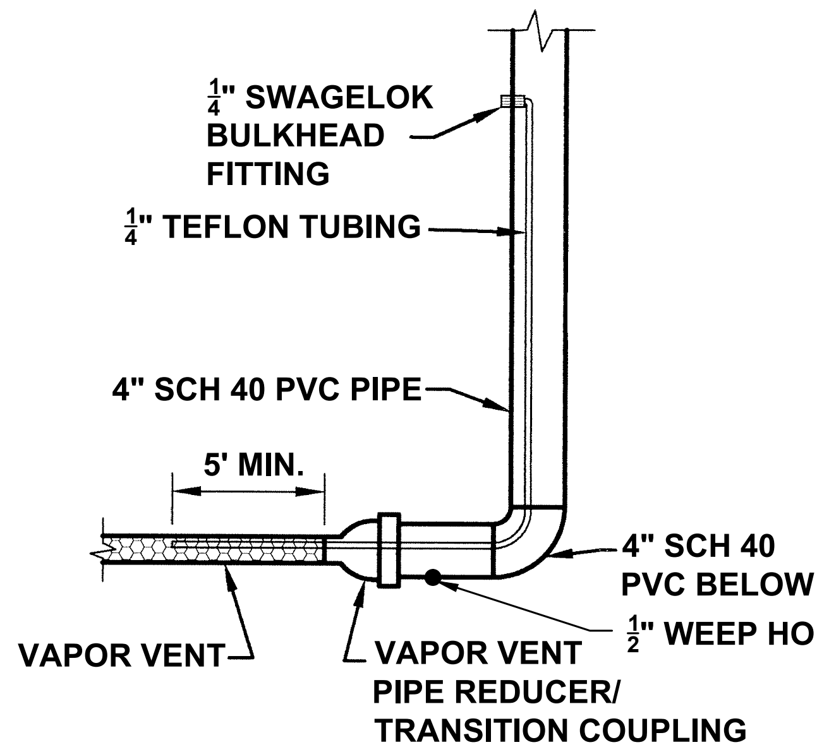
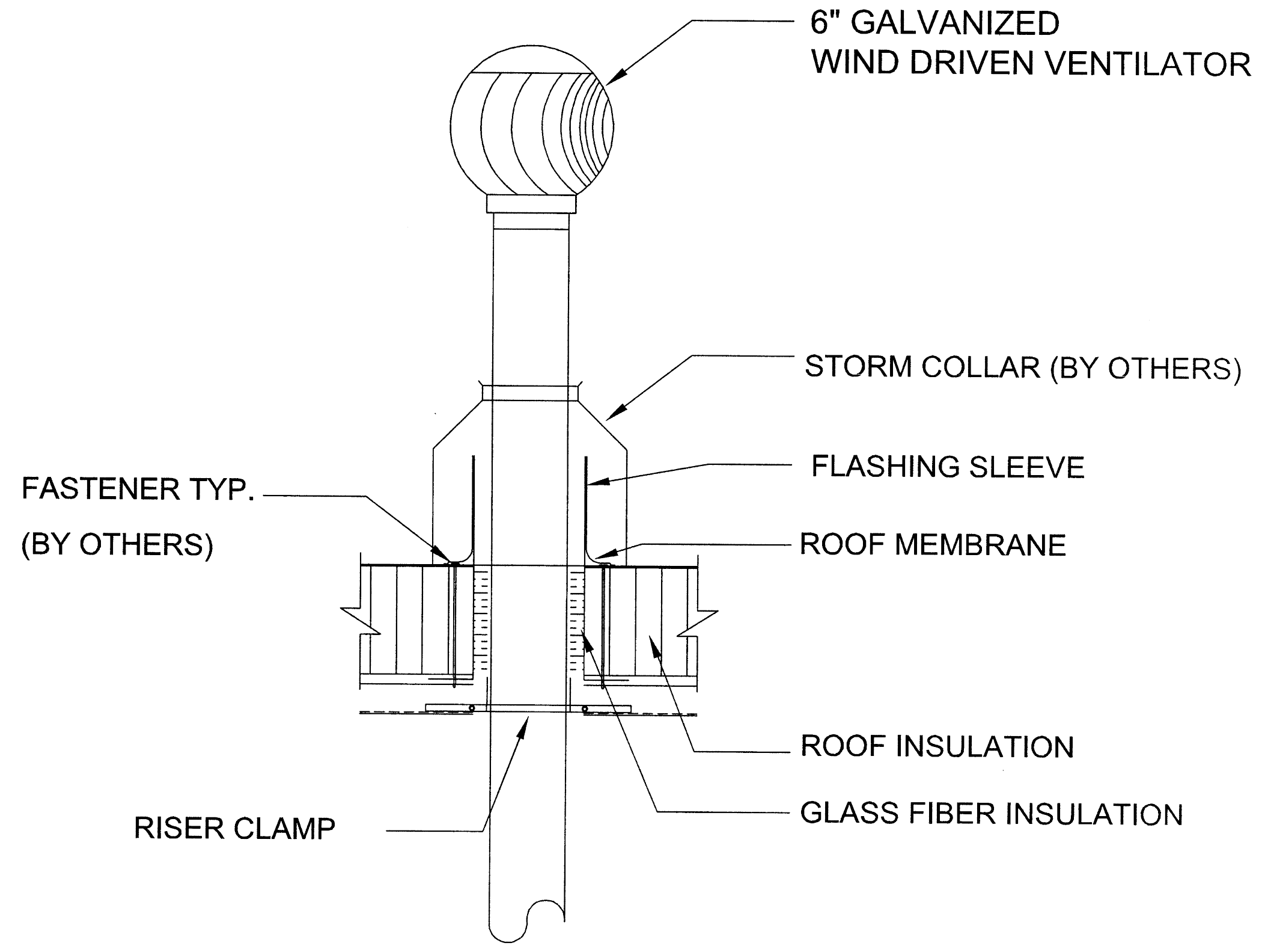


TYPICAL SOIL GAS SAMPLE PORT DETAIL

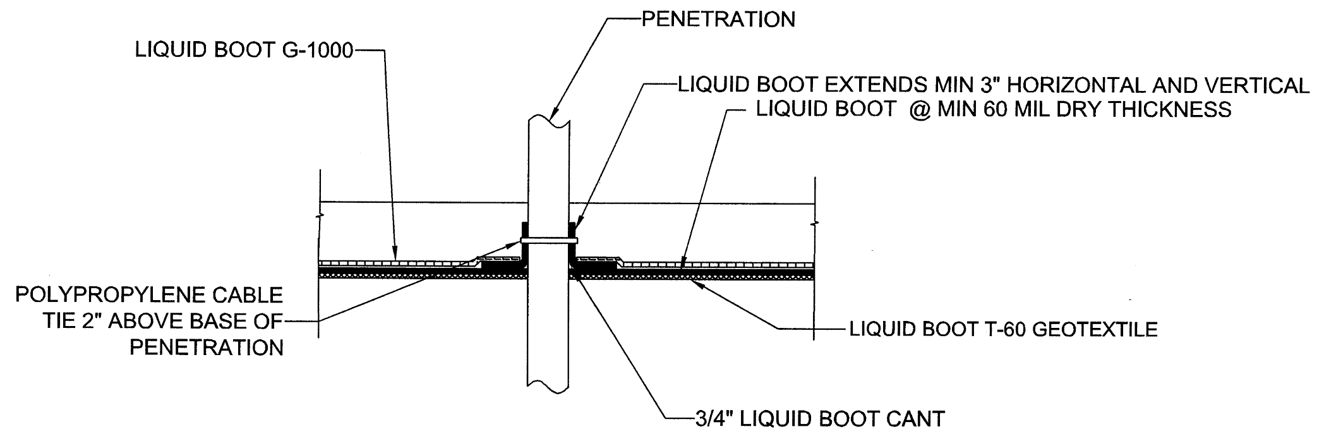
NOT TO SCALE



TYPICAL VENT RISER PENETRATING ROOF

NTS

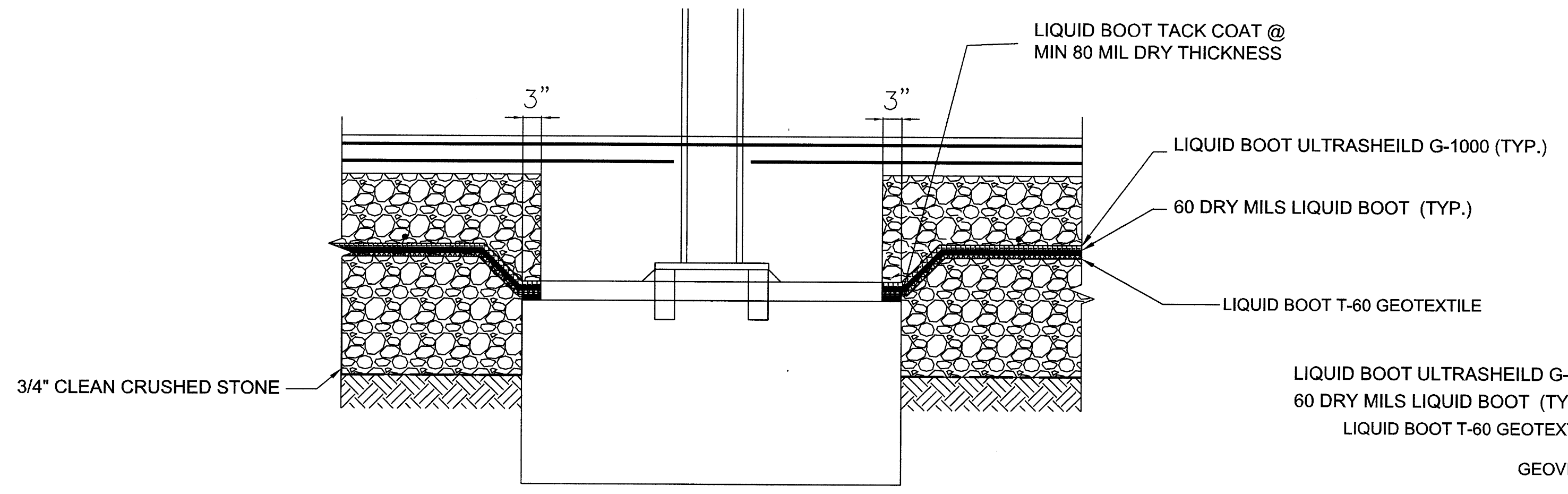
NOTE: 1. PROVIDE A 3/4" EMPTY CONDUCT TO ELECTRICAL PANEL FOR OPTIONAL BLOWER
2. RISER LOCATED TWO FEET AWAY FROM INSIDE PARAPET WALLS



VAPOR BARRIER MEMBRANE PENETRATION DETAIL (TYP.)

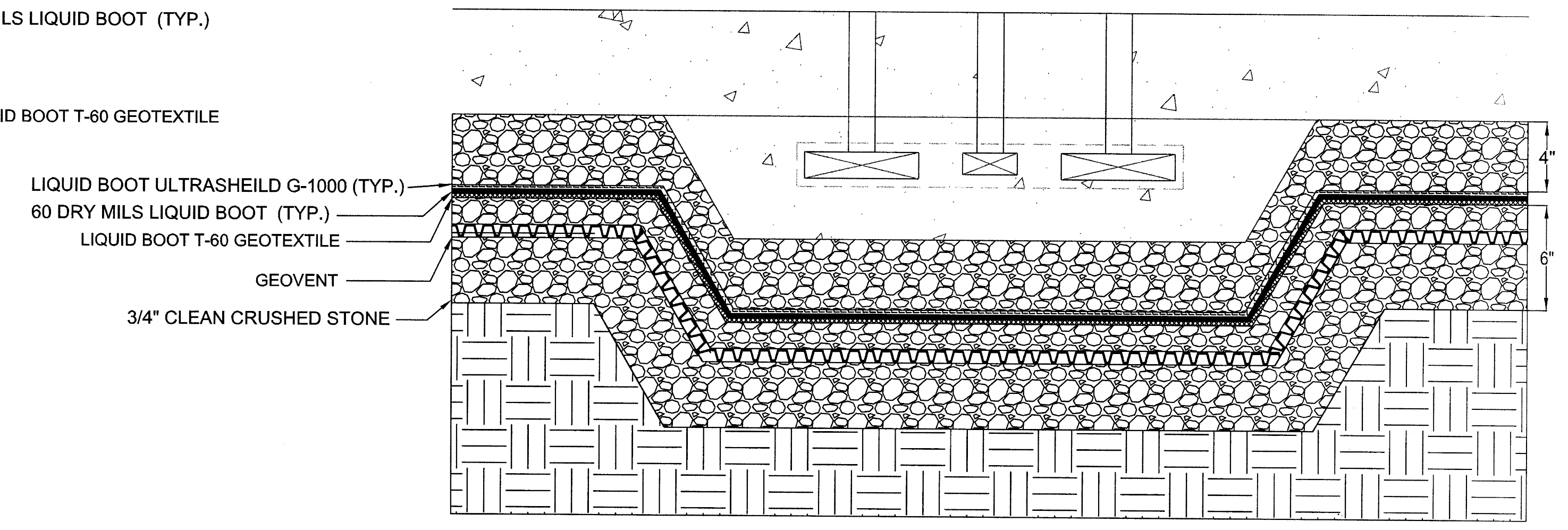
NOTE: SUBGRADE NOT SHOWN

NTS



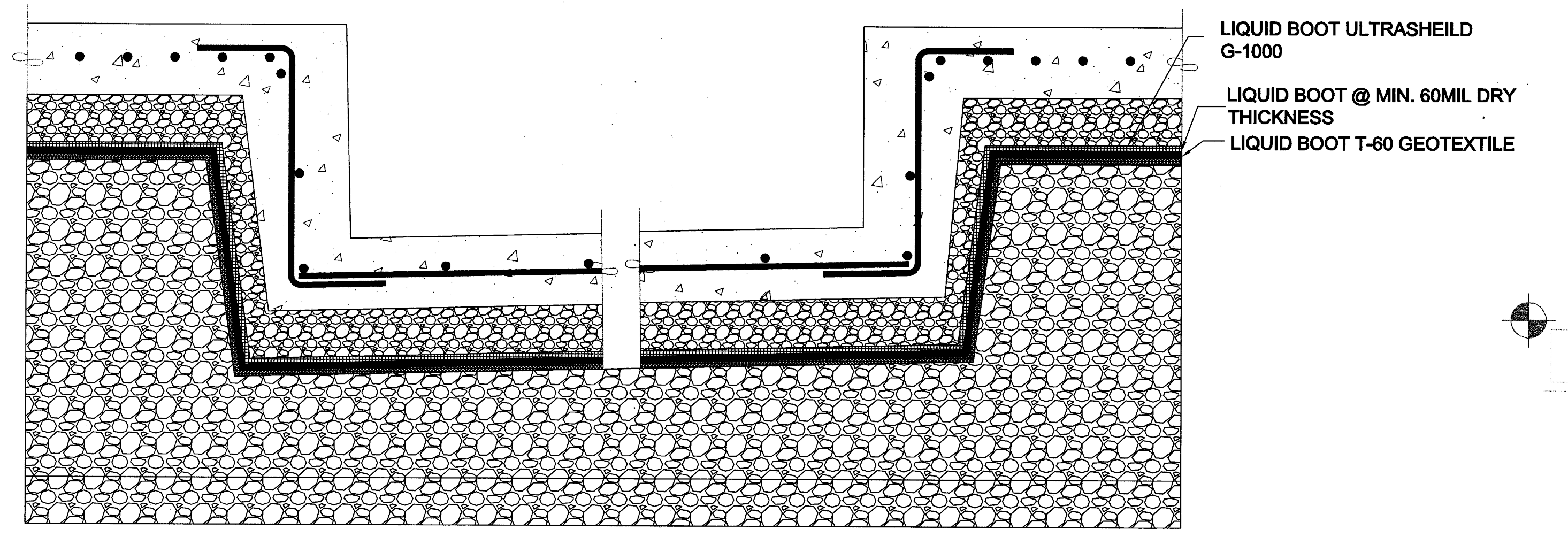
GAS VAPOR BARRIER ON TYPICAL PILE CAP DETAIL(TYP.)

NTS



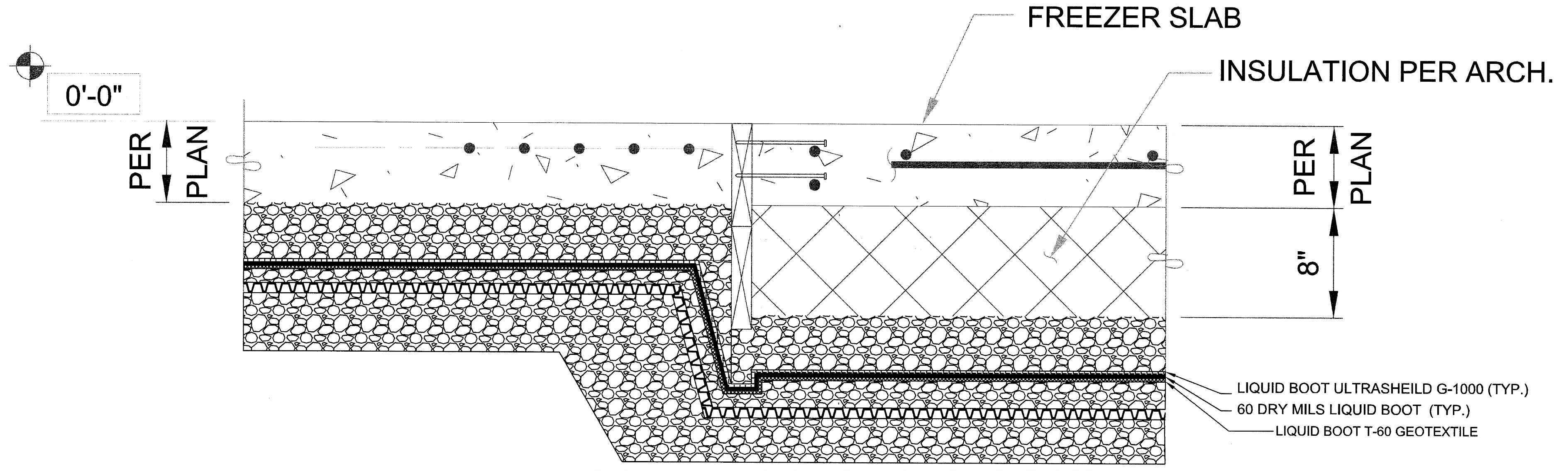
LIQUID BOOT AND GEOVENT DETAIL AT CHECKSTAND UNDER-FLOOR DUCT

NTS



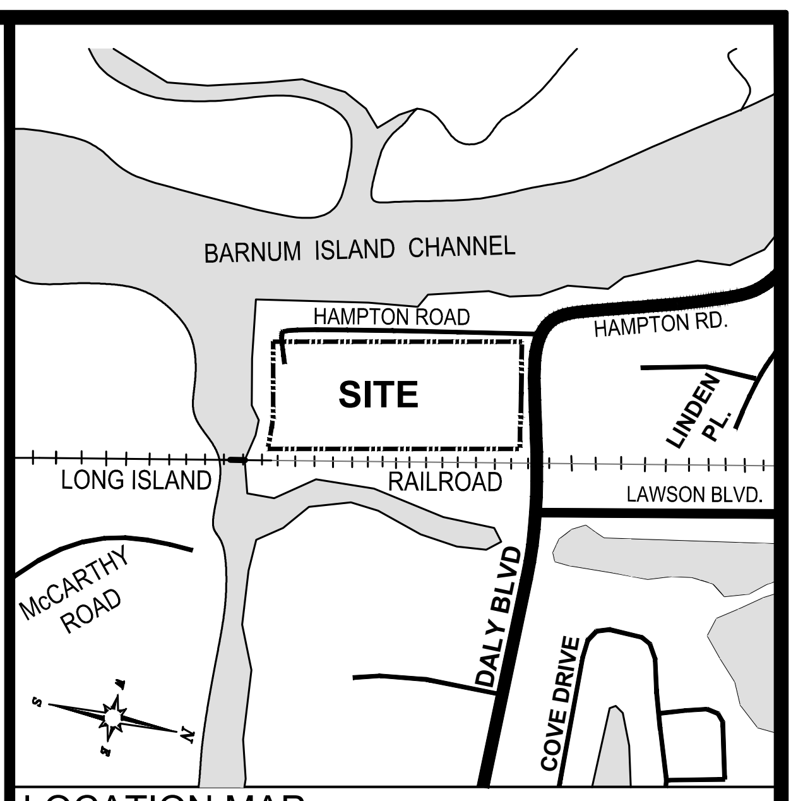
PAN WASHER PIT DETAIL

NOTE: LOCATE PIT PER ARCH. DWGS.



TYPICAL LIQUID BOOT AND GEOVENT DETAIL AT FREEZER PIT / REFRIGERATOR AREA

NTS



LOCATION MAP SCALE: 1"=800'

REV.	DATE	DRAWN BY	DESCRIPTION
2	5/22/15	PCS	REVISED PER UPDATED DETAILS
1	4/29/15	PCS	REVISED PER EXXON COMMENTS

RUSSELL T. McFALL II
NEW YORK LICENSED PROFESSIONAL
ENGINEER - LICENSE NUMBER: 90030

MASER CONSULTING P.A.
Consulting, Municipal & Environmental Engineers
Planners ■ Surveyors ■ Landscape Architects
State of N.J. Certificate of Authorization: 24GA27986500

New Jersey New York Pennsylvania Virginia
Customer Loyalty *through* Client Satisfaction

RED BANK OFFICE
331 Newman Springs Road
Suite 203
Red Bank, NJ 07701
Phone: 732.383.1950
Fax: 732.383.1984
email: solutions @ maserconsulting.com

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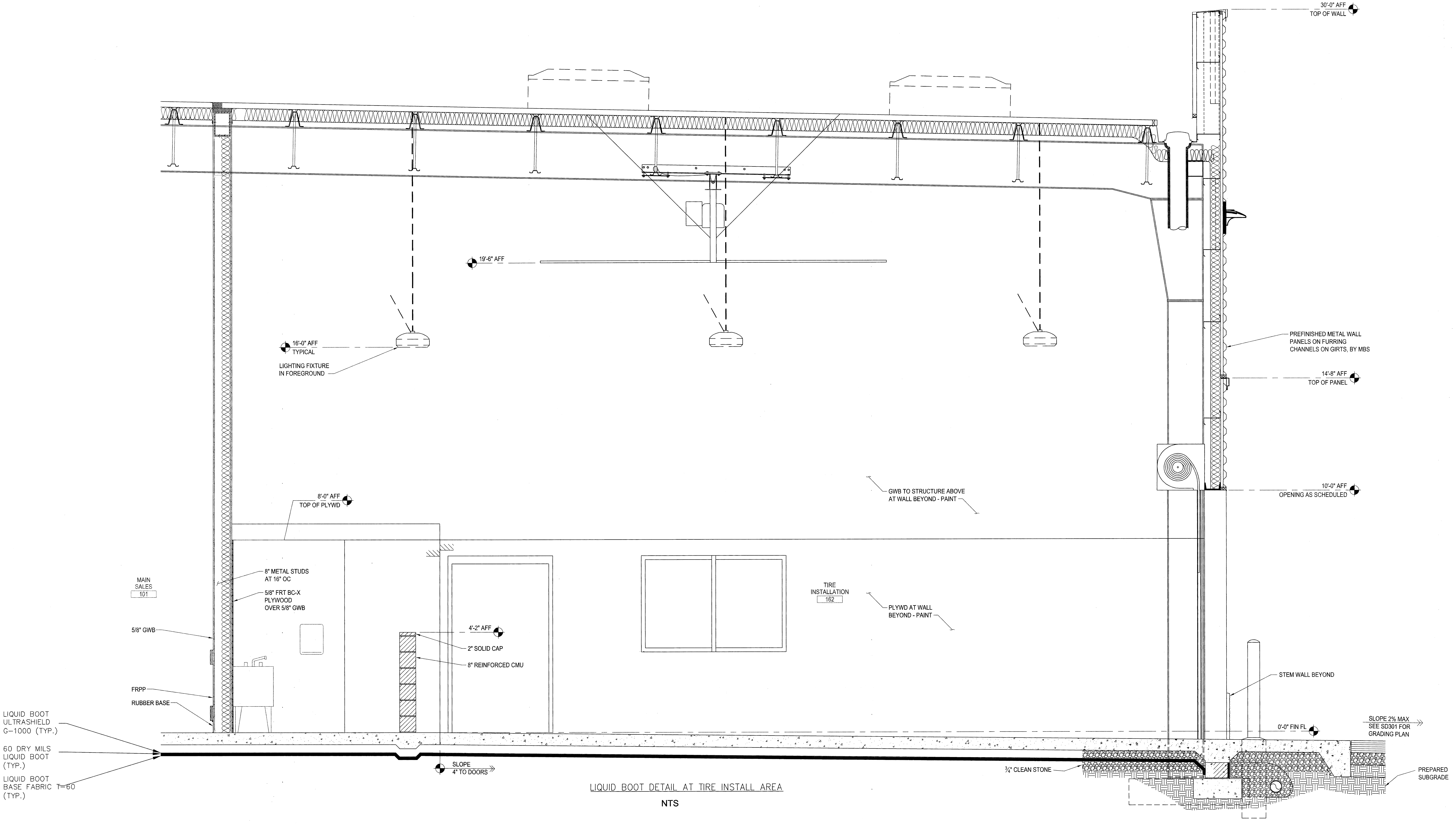
PROJECT NUMBER: 12000271A

SHEET NUMBER: VBD-2



LIQUID BOOT DETAIL AT TIRE INSTALL AREA

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NOTE:

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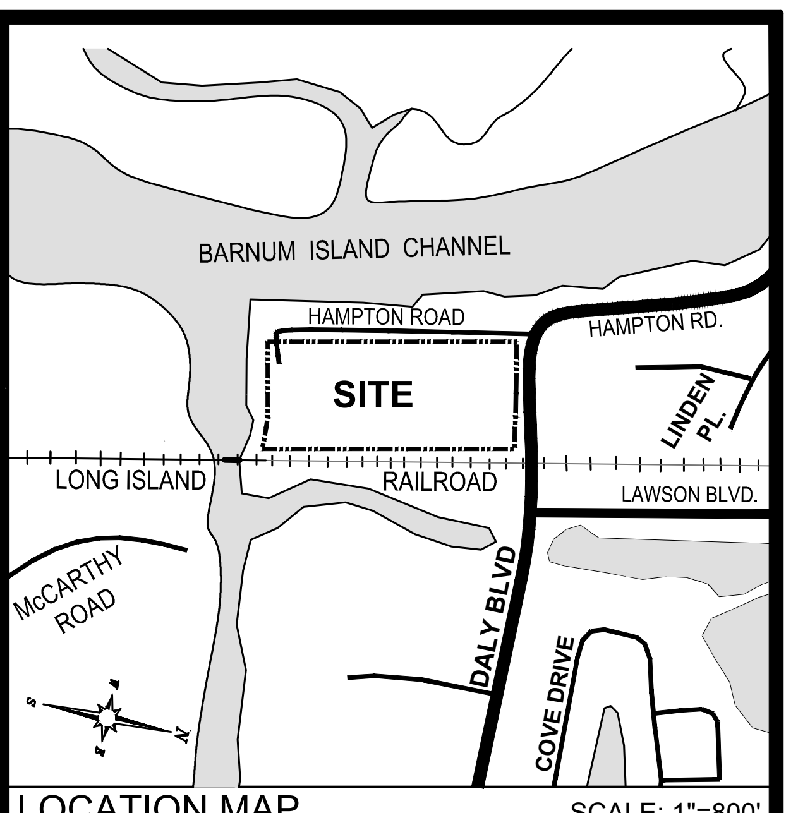

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NEW YORK LICENSED PROFESSIONAL
ENGINEER - LICENSE NUMBER: 90030

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PROJECT NUMBER: 12000271A

SHEET NUMBER: VBD-3

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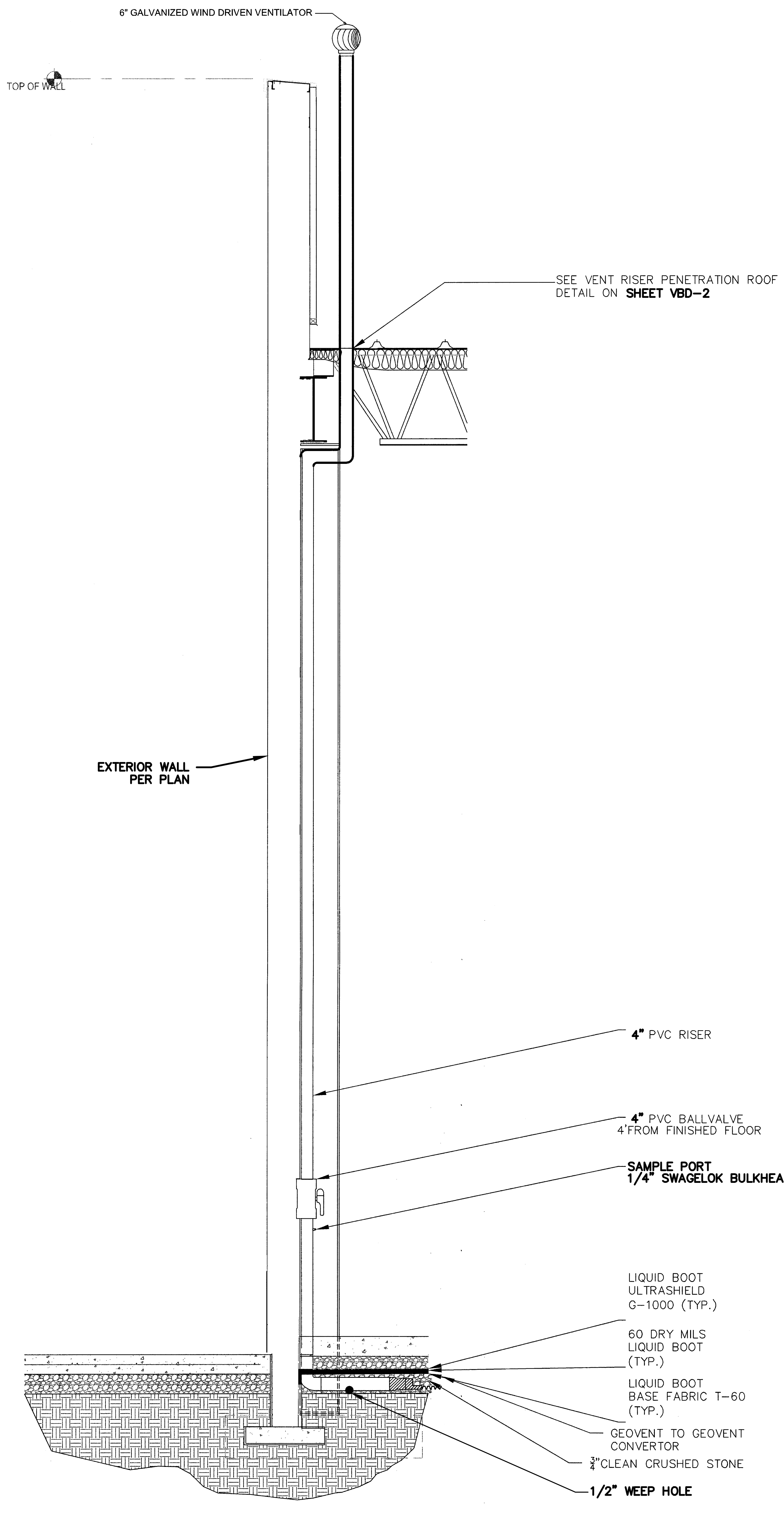

TYPICAL GEOVENT TO RISER DETAIL

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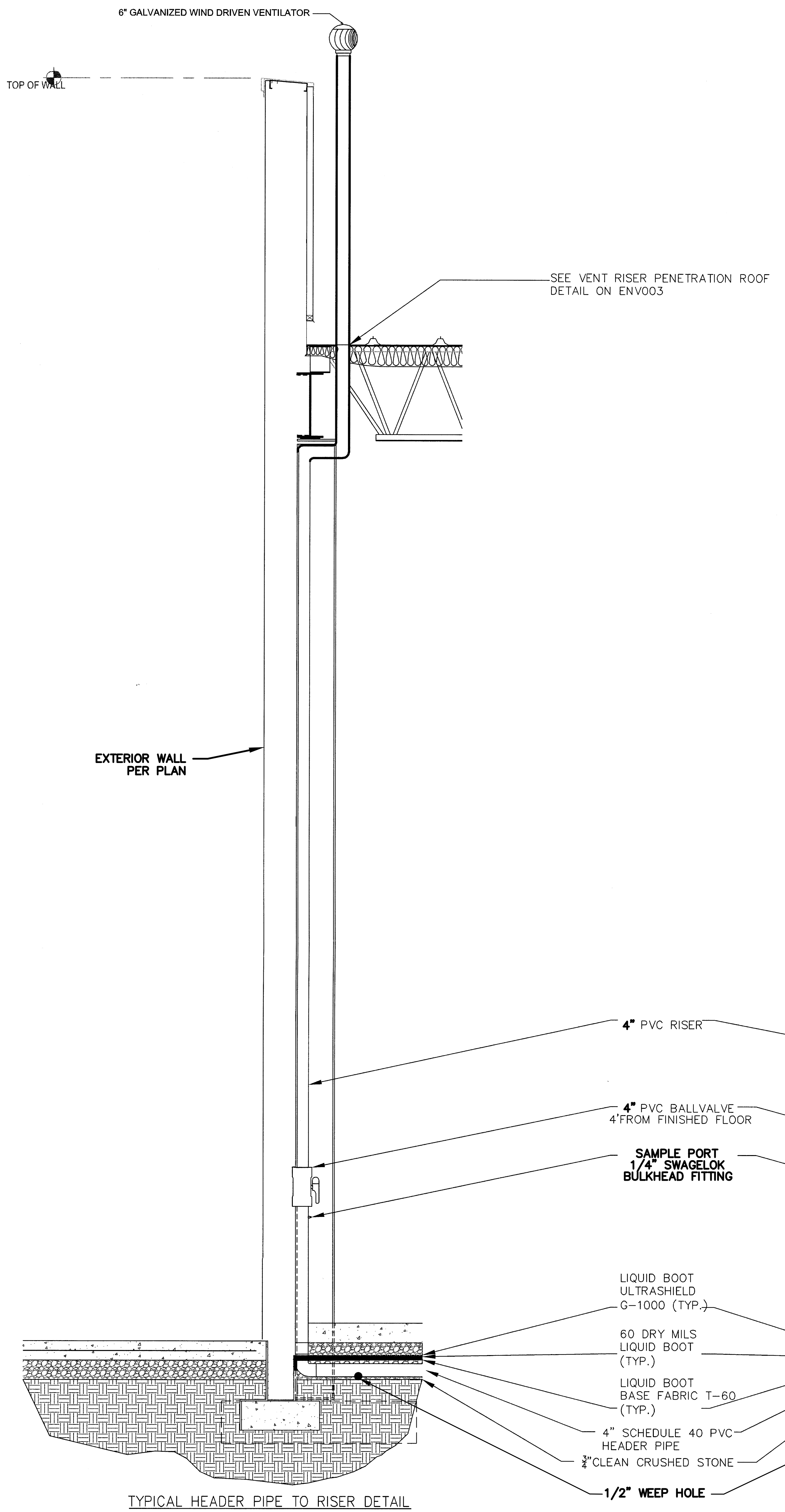

TYPICAL HEADER PIPE TO RISER DETAIL

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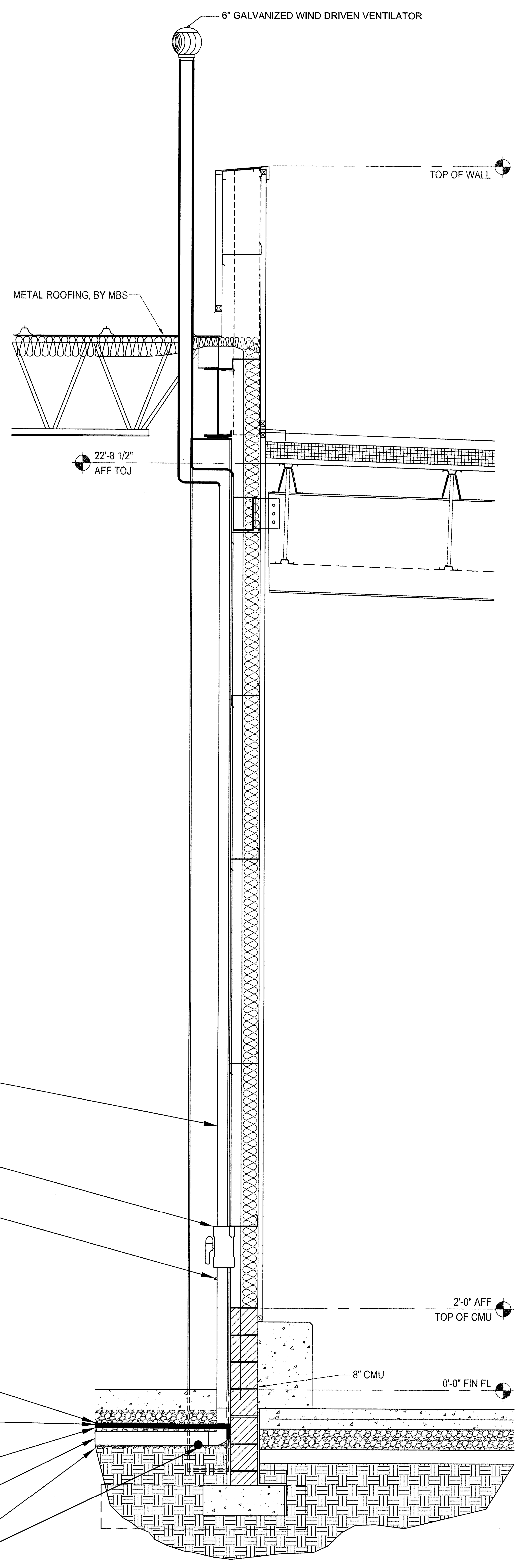

TYPICAL HEADER PIPE TO RISER DETAIL

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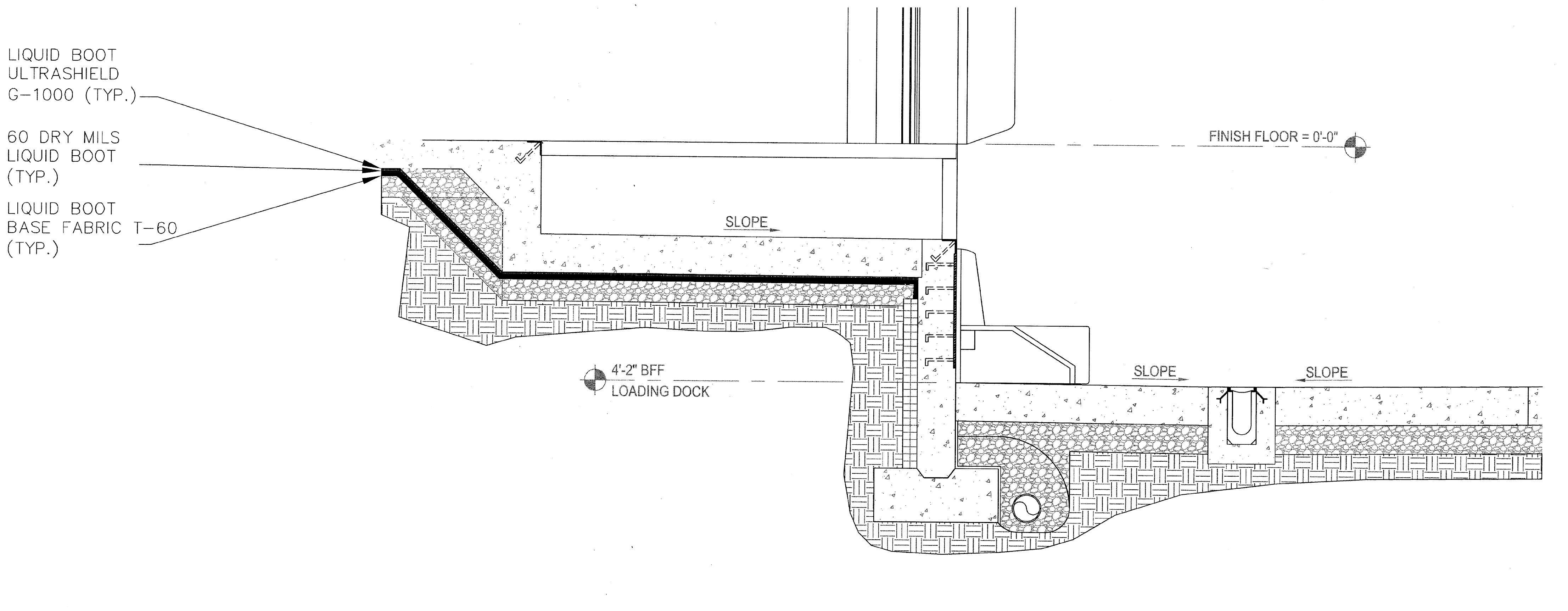

LIQUID BOOT DETAIL AT LOADING DOCK

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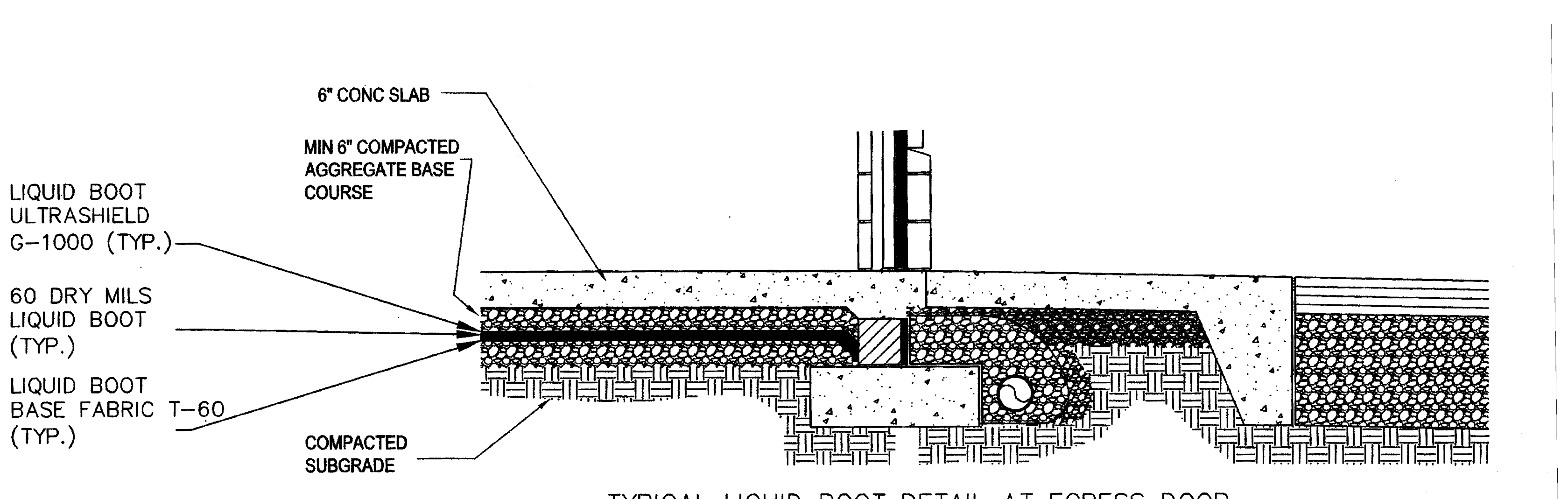

TYPICAL LIQUID BOOT DETAIL AT EGRESS DOOR

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NOTE:

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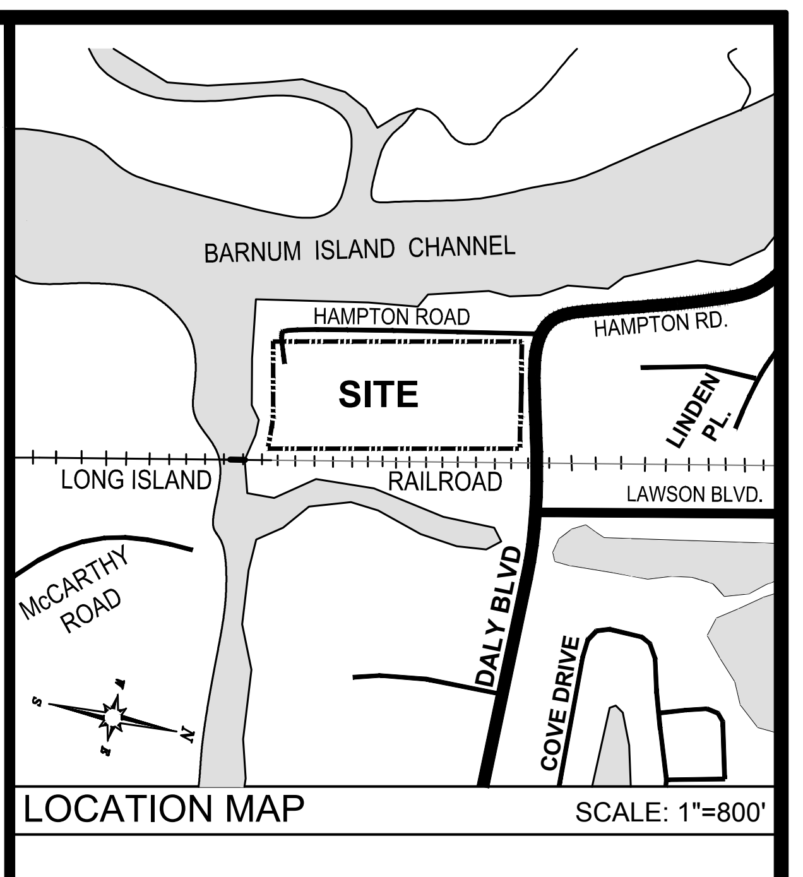

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PROJECT NUMBER:
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VBD-4

APPENDIX H

FIELD SAMPLING PLAN

TGI - GROUNDWATER SAMPLING WITH HYDRASLEEVESTM

Rev: 0

Rev Date: October 12, 2018

VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
0	October 12, 2018	All	Updated and re-written as TGI	Marc Killingstad

APPROVAL SIGNATURES

Prepared by:		10/12/2018
	Christian Seidel	Date:
Technical Expert Reviewed by:		10/12/2018
	Marc Killingstad (Technical Expert)	Date:

1 INTRODUCTION

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to any and all projects. It is the **CPM's** responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment de**cisions to meet the project's scope of work based upon site conditions,** staffing expertise, state-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

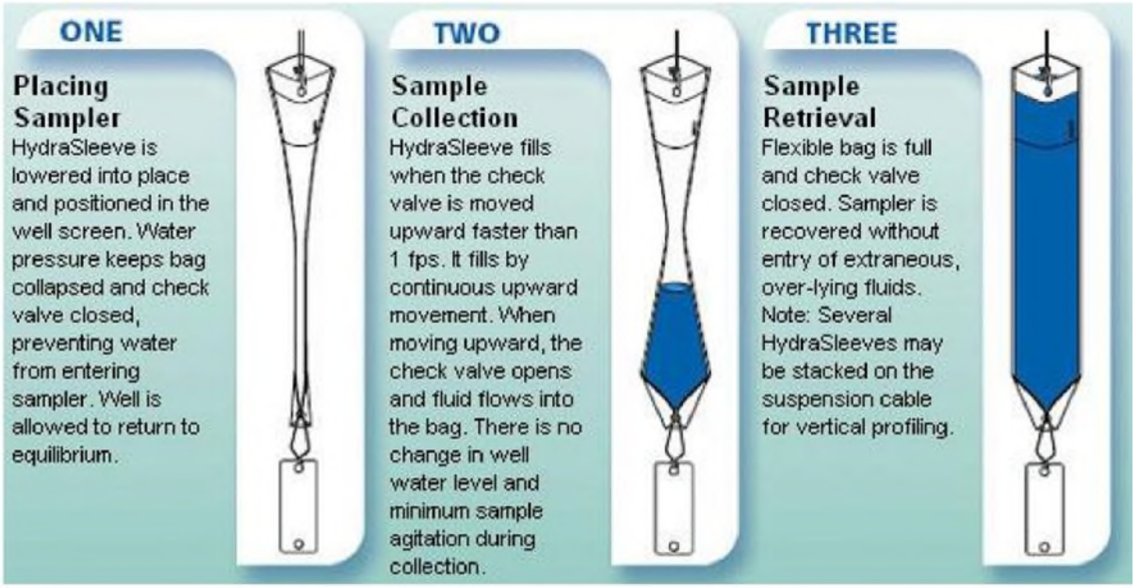
2 SCOPE AND APPLICATION

This Technical Guidance Instruction (TGI) establishes guidelines for use by field personnel in the deployment and subsequent retrieval **of HydraSleevesTM** for collection and documentation of groundwater samples for chemical analysis. Proper collection procedures are necessary to assure the quality and integrity of collected groundwater samples.

Details within this TGI are to be used in conjunction with/to assist in the development of site-specific work plans (e.g., Field Implementation Plans [FIP]).

HydraSleeve**TM** groundwater samplers can be used to collect a representative sample for most physical and chemical parameters without purging of a well. It collects a groundwater sample from a user-defined interval while limiting mixing fluid from other intervals. The HydraSleeve**TM** is deployed to a depth within the screened interval of the monitoring well and time is allowed for the well to re-equilibrate following deployment. The sealed HydraSleeve**TM** can be activated and removed for sample collection within several hours to several months. When activated, the HydraSleeve**TM** collects a sample with minimal drawdown and agitation of the water column. Once the sampler is full, a one-way reed valve at the top of the sleeve collapses, preventing mixing of extraneous, non-representative fluid during HydraSleeveTM recovery from the well.

HydraSleeveTM samplers can provide groundwater samples for site characterization, evaluation of remediation alternatives, long-term monitoring, Level III and Level IV analytical data for use in risk assessments, and a number of other applications.



Placing Sampler
HydraSleeve is lowered into place and positioned in the well screen. Water pressure keeps bag collapsed and check valve closed, preventing water from entering sampler. Well is allowed to return to equilibrium.

Sample Collection
HydraSleeve fills when the check valve is moved upward faster than 1 fps. It fills by continuous upward movement. When moving upward, the check valve opens and fluid flows into the bag. There is no change in well water level and minimum sample agitation during collection.

Sample Retrieval
Flexible bag is full and check valve closed. Sampler is recovered without entry of extraneous, over-lying fluids. Note: Several HydraSleeves may be stacked on the suspension cable for vertical profiling.

3 PERSONNEL QUALIFICATIONS

Arcadis field sampling personnel will have completed or are in the process of completing site-specific training as well as having current health and safety training as required by Arcadis, client, or regulations, such as 40-hour HAZWOPER training and/or OSHA HAZWOPER site supervisor training. Arcadis personnel will also have current training as specified in the Health and Safety Plan (HASP) which may include first aid, cardiopulmonary resuscitation (CPR), Blood Borne Pathogens (BBP) as needed. In addition, Arcadis field sampling personnel will be knowledgeable in the relevant processes, procedures, and TGIs and possess the demonstrated required skills and experience necessary to successfully complete the desired field work. The HASP and other documents will identify other training requirements or access control requirements.

The designated Field Manager is responsible for periodic observation of field activities and review of field generated documentation associated with this TGI. The Field Manager is also responsible for implementation of corrective action if problems occur (e.g., retraining personnel, additional review of work plans and TGIs, variances to QC sampling requirements, issuing non-conformances, etc.).

Field personnel assigned to collect groundwater samples are responsible for completing their tasks in accordance with the specifications outlined in this TGI and other appropriate and relevant guidelines. Field staff will have prior experience in groundwater sampling.

The determination of placement depth of the HydraSleeveTM in the monitoring well will be made by a qualified geoscientist/engineer prior to field mobilization and will be outlined in the work plan/field implementation plan (FIP). Any changes in field conditions (typically due to fluctuations in water table elevation) will require discussion between field personnel and the technical lead for the project. All staff are responsible for reporting deviations from procedures in the Field Activity Daily Log, and to the designated Field Manager and/or Project Manager.

4 EQUIPMENT LIST

There are three (3) main steps for collecting groundwater samples with the HydraSleeveTM: 1) assembly and deployment, 2) retrieval of the sleeve after the equilibration period, and 3) transferring collected groundwater sample into the appropriate sampling containers while minimizing disturbance to the sample. The equipment needed for HydraSleeveTM sampling is listed below.

Equipment needed throughout the scope for both deployment and retrieval of HydraSleeveTM:

- Approved site-specific Health and Safety Plan (HASP)
- Approved site-specific work plan/FIP and/or Field Sampling Plan (FSP) which will include:
  - Well location map
  - Planned Sample Table (PST) identifying
    - Type of HydraSleeveTM samplers (size and material)
    - Deployment locations/depths
    - Well construction details (including well screen intervals)
    - Sample analyses, sample volume required, and sample holding time
- Field notebook and/or smart device (phone or tablet)
- HydraSleeveTM specific field forms (**Attachment A**)
- Appropriate personal protective equipment (PPE) (e.g., latex or nitrile gloves, safety glasses, etc.) as specified in the HASP
- Well keys and other tools to remove manhole covers (manual torque wrench with 9/16” socket and flat head screwdriver typical)
- Photoionization detector (PID) or Flame ionization detector (FID) (as appropriate, depending on site-specific constituents of concern)
- Electronic water-level indicator or oil/water interface probe with 0.01-foot accuracy (oil/water as appropriate, note that sampling will not be performed when sheen or light non-aqueous phase liquid [LNAPL] is present)
- Down-hole multiparameter sonde (e.g., YSI)
- Plastic sheeting (e.g., Weatherall Visqueen) to protect all down-hole sampling equipment from contact with potential sources of contamination.
- Decontamination equipment

  - Non-phosphate laboratory soap (Alconox or equivalent), brushes, clean buckets or clean wash tubs—new buckets or tubs will be purchased if it cannot be determined if the present items are clean
  - Distilled or de-ionized water for equipment decontamination
- Indelible ink pen
- 150-foot measuring tape (or sufficient length for the maximum site depth

requirement) **Equipment needed for assembly and deployment of the HydraSleeveTM**:

- Appropriate HydraSleeveTM (size and material) for the wells being sampled (NOTE: Sampling protocols and materials for sites with Per- and Polyfluoroalkyl Substances [PFAS] concerns are not discussed in detail in this TGI, but if there is a concern that PFAS may be present at the site and/or if PFAS is being analyzed, there are specific HydraSleeveTM samplers that will be used.
- Some examples of sleeves are provided below—check with the manufacturer for additional options
  - 2-L 2” HydraSleeveTM SuperSleeve (SS) (1.9” OD, 60” long; volume of 2 liters; requires special 2-piece top weight) for 2” diameter Schedule 40 wells
  - 1-L 2” HydraSleeveTM (1.75” OD, 36” long; volume of 1 liter) for 2” diameter wells
  - 1.5” HydraSleeveTM (1.5” OD, 30” long; volume of 625 milliliters [mL]) for 2” diameter wells
  - 1” HydraSleeveTM (1” OD, 48” long; volume of 325 mL) for wells less than 1.5” diameter
- J-plug style cap to hold sleeve tether either supplied by HydraSleeveTM manufacturer or modified by Arcadis
- 1/8-inch diameter braided polypropylene rope (for tethers)
- Weights (stainless steel or other inert material) to anchor the HydraSleeveTM in the well (NOTE: special weights are required for the SuperSleeve-style HydraSleeveTM)
- Cable ties to anchor HydraSleeveTM to tether
- 150-foot measuring tape (or sufficient length for the maximum site depth requirement)
- Safety cutting tool (e.g., self-retracting safety knife)

Equipment needed for retrieval of HydraSleeveTM and collection of groundwater samples:

- Sample labels and Chain-of-Custody forms (COC).
- Appropriate sampling containers (sample bottles, coolers, and ice).
- 5-gallon bucket or other container to hold extra groundwater.
- If field filtering of samples is required: Hand pump for transfer vessel (Pine part ID 71631), individually wrapped transfer vessels (Pine part 71628), and appropriately sized filters. Only one

hand pump is needed to apply pressure, but each sample will require its own transfer vessel and filter.

- Additional HydraSleeveTM samplers and zip ties to deploy for the next sampling event, as required.

Unless otherwise specified in the site-specific work plan/FIP, it is advisable to establish a sampling order starting with the least contaminated well and progressing to the most contaminated well last.

5 CAUTIONS

Selection of the appropriate size HydraSleeveTM depends on sample volume requirements, well diameter, and the length of the saturated screened interval, which dictates the maximum distance allowed over which to pull and fill the HydraSleeve. The largest HydraSleeveTM available (60-inch) holds 2 liters (L) of groundwater while the smallest holds 325 mL of groundwater. Sample volume requirements must be outlined in the FIP and verified with the laboratory before ordering and deploying the HydraSleeveTM samplers.

The HydraSleeveTM sampler is designed for single use (deployment and sample collection) only; tethers and weights can only be reused after proper decontamination.

According to the manufacturer, HydraSleeveTM has been used successfully with no equilibration period at some sites for some analytical parameters. HydraSleeveTM does not require dissolved compounds to diffuse across a membrane as in the case of polyethylene diffusion bag (PDB) samplers (ITRC, 2004). Because the HydraSleeveTM mechanically obtains a “core” of the water column, rather than relying on diffusion through a membrane, the sampler can be retrieved shortly after deployment in many cases.

One way to conservatively estimate the maximum required equilibration period is to estimate the time to ‘flush’ the well based on the Darcy velocity within the formation (hydraulic conductivity times gradient) (see **Attachment B**). Some project teams have adopted a minimum 24-hour undisturbed deployment time or other rules of thumb to use prior to sleeve retrieval.

Note that representative groundwater sampling may occur with a shorter flushing period, or no flushing period at all, if the well contains minimal accumulated silt and care is taken to minimize disturbance in the well during HydraSleeveTM deployment.

If sampling for turbidity-sensitive analytes (e.g., metals), waiting some time prior to retrieval is recommended.

Site-specific testing versus another accepted groundwater sampling method (i.e., side-by-side testing) can be performed at a subset of wells—preferably spanning a range of hydraulic conductivity, geologic materials, and chemical concentrations—to verify that the HydraSleeveTM device produces samples similar to those obtained from the other accepted method.

A study conducted by (McHugh et al, 2016) indicated that analytical results for samples collected with HydraSleeveTM were biased low when sampling volatile organic compounds (VOCs) relative to samples collected from the same wells using purge sampling methods and when monitoring wells had more than 10 feet of water above the well screen. The difference was attributed to filling errors that resulted in samples collected from a contaminant depleted water column above the well screen. This type of error could occur if the HydraSleeveTM was pulled too slowly through the screened interval and did not close properly or when other factors interfered with the opening or closing of the check valve of the sampler.

6 HEALTH AND SAFETY CONSIDERATIONS

The HASP will be followed, as appropriate, to ensure the safety of field personnel.

Appropriate personal protective equipment (PPE) will be worn at all times in line with the task and the site-specific HASP.

Access to wells may expose field personnel to hazardous materials such as contaminated groundwater or non-aqueous phase liquid (NAPL) (e.g., oil). Other potential hazards include pressurized wells, stinging insects that may inhabit well heads, other biologic hazards (e.g. ticks in long grass/weeds around well head), and potentially the use of sharp cutting tools (scissors, knife)—open well caps slowly and keep face and body away to allow to vent any built-up pressure; only use non-toxic peppermint oil spray for stinging insect nests; review client-specific health and safety requirements, which may preclude the use of fixed/folding-blade knives, and use appropriate hand protection.

Deploying and retrieving HydraSleeveTM samplers requires staff to lower and raise materials into and out of the monitoring well. Be sure to use proper bending and lifting techniques to avoid muscle strain and other potential injuries.

7 PROCEDURE

Field personnel will set up, deploy, and retrieve HydraSleeveTM samplers in accordance with the following procedures.

Preliminary Tasks

1. Prior to any round of sampling, the consultant will confirm all analytical methods, methodology, current detection limits, and protocols are the most up to date version in the sampling protocol.
2. Visually inspect the well to ensure that it is undamaged, properly labeled and secured
    a. Damage or other conditions that may affect the integrity of the well will be recorded in the Field Activity Daily Log and brought to the attention of the designated Field Manager and/or Project Manager
    b. Note well construction and conditions on the HydraSleeveTM Field Form (**Attachment A**)
3. All equipment will either be new or decontaminated in accordance with appropriate guidance document (*TGI – Groundwater and Soil Sampling Equipment Decontamination)* prior to use
4. Calibrate all field equipment (e.g., water-level meter and down-hole sonde [pH, temperature, conductivity, ORP, turbidity, and DO]) according to the instrument manufacturer's specifications
    a. Daily calibration results will be recorded on the appropriate form(s) as specified by the FIP/PST
    b. Instruments that cannot be calibrated according to the manufacturer's specifications will be removed from service and tagged.
5. Don appropriate PPE

6. Lay out plastic sheeting to create a clean work area and set up monitoring and sampling equipment
7. Observe if any air is flowing into or out of the casing (e.g., bubbles, hissing sounds); if so, note accordingly on the HydraSleeveTM Field Form (**Attachment A**).
8. Safely (slowly) remove the well cap
9. If specified in the site-specific workplan/FIP, measure VOCs at the rim of the well with a PID and FID instrument record the reading in the field logbook
    a. Also measure the breathing space adjacent to the well and check any measurements against the HASP guidelines to be sure conditions are safe to work
10. If the well casing does not have a reference point to measure from, usually a V-cut or indelible mark in the well casing, create one and perform/record all measurements from this mark
11. If specified in the site-specific workplan/FIP, determine if non-aqueous phase liquid (NAPL) is present in the well using an oil/water interface probe in accordance with appropriate TGI
    a. If NAPL is present, record the depth to NAPL and static water level on the HydraSleeveTM Field Form
    b. Sleeves will not be deployed, and samples will not be collected from wells where NAPL is present
12. Measure and record the depth to water and the total depth of the groundwater monitoring well (to 0.01 ft) on the HydraSleeveTM Field Form—care will be taken to minimize disturbance of the water column and to any particulates attached to the sides or at the bottom of the well
13. Compare the measurement of the total depth of the well with the previous measurement and check against the well screen details provided in the FIP and/or PST to determine the percent of screen occluded by sediment (if any)
    a. If more than 20 percent of a well screen is occluded by sediment, the well will not be sampled until it is re-developed
14. Collect and record field parameters using a multiparameter down-hole sonde (e.g., YSI)

Assembly and Deployment of Standard HydraSleeveTM

Assemble the HydraSleeveTM sampler

1. Remove the HydraSleeveTM from the package and grasp top to “pop” open (Figure 1)
2. Squeeze side fins together at top to bend reinforcing strips outward (Figure 2)
3. Attach either a tethered spring clip to both holes (preferred) or attached rope to the hole on one side at the top of the HydraSleeveTM (using cable ties) (Figure 3)
4. Fold to align the two holes at bottom of HydraSleeveTM together and attach the weight using a zip tie or weight clip (Figure 4)
5. The sampler is ready to insert into the well at the pre-determined depth specified in the FIP/PST (Figure 5)

Figure 1

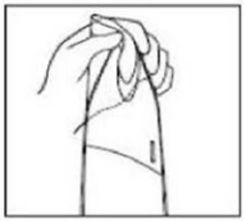


Figure 2

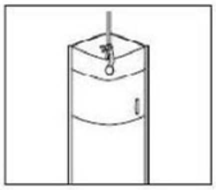


Figure 3

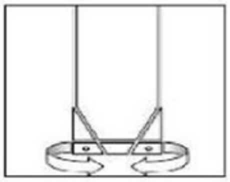


Figure 4

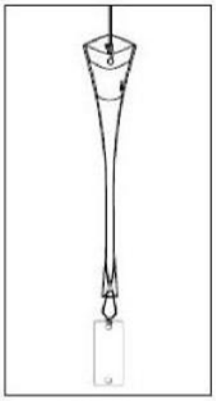
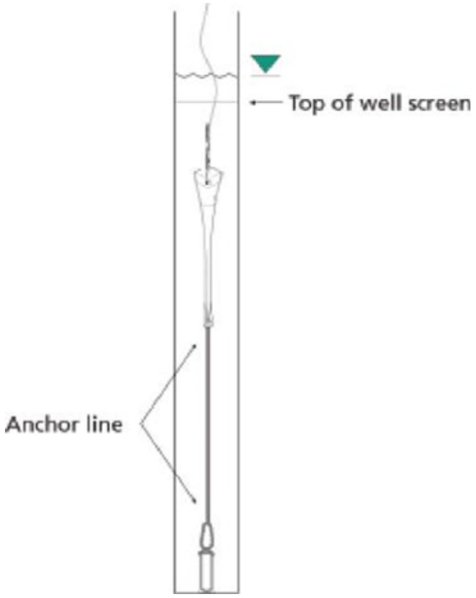


Figure 5

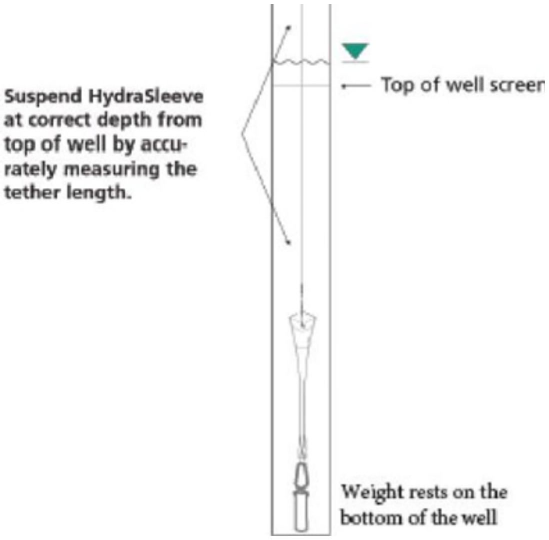
Deploy HydraSleeveTM sampler

- Once assembled, two (2) methods of deployment can be used—note that both options require the top of the HydraSleeveTM to be positioned below the midpoint of the saturated screened interval by a distance approximately equal to 0.75 times the full length of the sleeve (e.g., a 36-inch HydraSleeveTM will be lowered so that the top of the sleeve is approximately 27 inches below the midpoint of the saturated screened interval which is the appropriate position to collect the groundwater sample from approximately the middle of the saturated screened interval when the sleeve is pulled upward)

    1. *Bottom Anchor Deployment* (preferred). Bottom down deployment is preferred because there is less of a potential margin for error in measuring and correcting for the distance between the bottom of the well and the bottom of the HydraSleeveTM, versus measuring and correcting for the distance between the top of well casing and the top of the HydraSleeveTM. Using the determined well depth, calculate the distance from the bottom of the well to the desired sampling depth (specified in the FIP/PST and HydraSleeveTM Field Form). Attach an appropriate length anchor line between the weight and the bottom of the sampler and *slowly* lower the assembly until the weight rests on the bottom of the well, allowing the top of the sampler to float at the correct sampling depth. Attach the suspension line to the well cap to suspend the HydraSleeveTM at the correct depth until activated for sampling.



2. *Top-Down Deployment*. Measure and assemble the correct amount of suspension line needed to "hang" the top of the HydraSleeveTM at the desired sampling depth (specified in the FIP and on the HydraSleeveTM Field Form). Once constructed, *slowly* lower the assembly in the well and attach the suspension line to the well cap to suspend the HydraSleeveTM at the correct depth until activated for sampling.



- For wells in which more than one sampling device will be used, please refer to the configurations shown on pages 5 and 6 of **Attachment C** (Eon Products Inc. *Interim Field Manual*)

- If more samplers are needed due to sample volume requirements, it is recommended to increase HydraSleeveTM size rather than to use multiple samplers.
- Top weights on samplers may be required to ensure the targeted sample interval will be sampled by the HydraSleeveTM
- For wells with screen lengths less than 10 feet (as indicated in the FIP and on the HydraSleeveTM Field Form) or where the saturated screen length is less than 10 feet (determined during initial water-level gauging), top-down deployment will be used as described above with the exception of the placement of a top weight:
    1. The weight for these wells will be placed on the top of the HydraSleeveTM as shown in the figure below (**Photo 1**)
    2. The hanging clip is inserted locking the top of the HydraSleeveTM and the weight together, and the tether will be attached to the apex of the clip, as shown below (**Photo 2**)
    3. Addition of a top weight is necessary to compress the sampler so it will fill at a lower depth than it would if it were merely suspended in the well


Photo 1

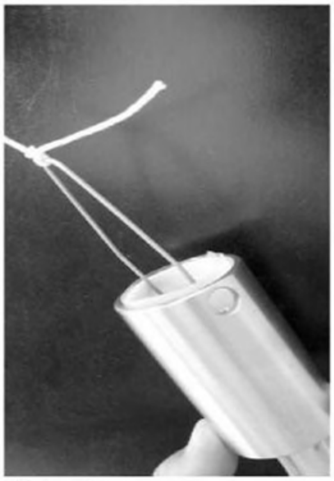


Photo 2

- At this point deployment is complete; allow time for stabilization following any disturbance caused by the sampler deployment prior to collecting groundwater samples
    - The manufacturer's recommended deployment time is hours to months
    - The time prior to sampler retrieval will be considered in the context of both groundwater flow velocity at the site and the potential for turbidity to affect sample quality
    - The time will be specified in the FIP/PST
    - The maximum deployment time at the site will be one year.

- After the stabilization/equilibration period, groundwater samples can be collected for analysis

Assembly and Deployment of SuperSleeve-style HydraSleeveTM SS

Assemble the HydraSleeveTM SS

1. Remove sampler from the package and attach the bottom weight (Photos 3 and 4).
2. Fold the two holes at bottom of HydraSleeveTM SS together
3. Open prongs of bottom weight clip by squeezing
4. Insert reusable weight clip through holes and attach the bottom weight

Photo 3

Photo 4

5. Attach the top weight as follows: Insert the open (check valve) end of the HydraSleeveTM SS through the bottom of the stainless-steel portion of top weight until about 1/2 inch of the open sleeve protrudes above the female threads
6. Thread stainless steel weight (female thread) onto PVC top piece (male thread) locking the top of the HydraSleeveTM SS between the threads (Photo 5)

Photo 5

7. Attach rope to top weight (using cable ties).
8. The sampler is ready to insert into the well at the pre-determined depth specified in the FIP/PST

Deploy the HydraSleeveTM SS

1. Lower the HydraSleeveTM SS into the well slowly until the bottom weight touches the bottom
2. Provide enough slack in the tether to allow the top weight to fully compress the sampler into the bottom of the well
    a. For example: a 2-liter HydraSleeveTM SS [5-feet long] will compress to within 2 feet of bottom of a 2-inch well screen in about 4 hours; a 2-liter HydraSleeveTM SS requires about 5 feet of water on top of the sampler to completely fill, so it cannot be used in wells with shorter than a 10-ft saturated screen length

Collecting Groundwater Samples from HydraSleevesTM

1.

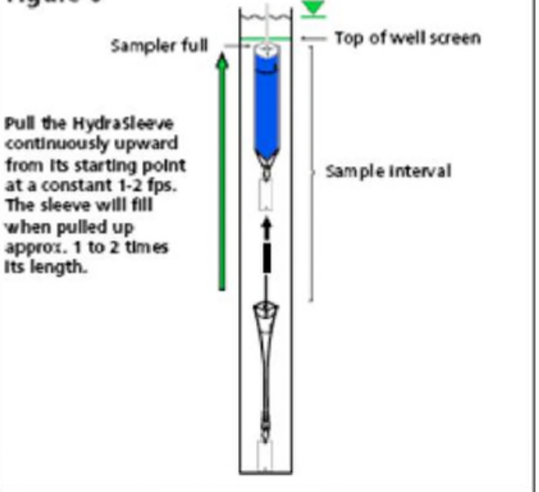
Perform *Preliminary Tasks* detailed above; *however, measure depth to groundwater prior to retrieval of the HydraSleeveTM while total well depth will be collected after the HydraSleeveTM has been retrieved from the well*

2. All groundwater samples, including QA/QC samples for a given well will be collected with one HydraSleeveTM
    a. If the volume requirement for sample analysis exceeds the capacity of the sleeve, it is not acceptable to redeploy the same or a second HydraSleeveTM to fill additional bottles.
    b. Instead, the sampling process will be repeated using a larger size HydraSleeveTM or another approved sampling method (e.g., low-flow) will be performed
3. Fill out sample documentation on the HydraSleeveTM Field Form (**Attachment A**).
4. Inspect the sample bottles (obtained from the analytical laboratory prior to the sampling event) to ensure that they are appropriate for the samples being collected, are undamaged, and have had the appropriate types and volumes of preservatives added
    a. The types of sample containers to be used and sample preservation requirements will be provided in the FIP/PST.
5. The HydraSleeveTM Field Form will specify the sample collection method for each well—the *Continuous Pull Method* is preferred and will be used for the majority of the wells; however, if the well to be sampled has saturated screen length less than 10 feet in length, or if the HydraSleeveTM diameter is undersized when compared to the well diameter, the *Short Strokes Method* may be used
    a. *Continuous Pull Method* – Move the sampler upward at an approximate rate of 1 to 2 feet per second (ft/sec) (about the speed a bailer is usually pulled upward) for water to pass through the check valve into the sample sleeve until full
        i. The total upward distance the check valve must travel to fill the sample sleeve is about 1 to 2 times the length of the sampler

ii. For example, a 36-inch HydraSleeveTM needs a total upward movement of 36 inches to no more than 72 inches to fill

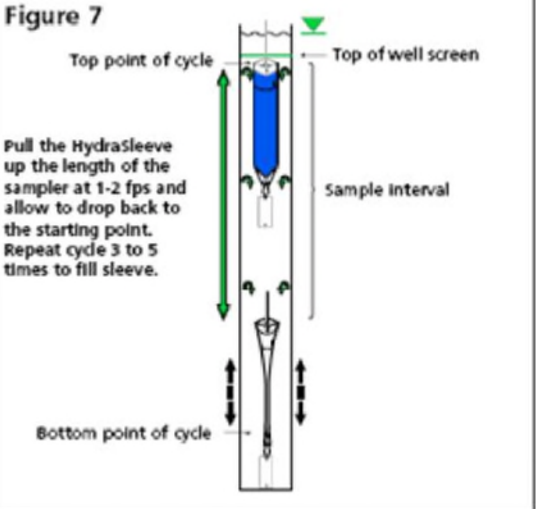
iii. This method usually provides the least turbid samples and is analogous to coring the water column from the bottom up (Figure 6).

Figure 6



b. *Short Strokes Method* – Pull the sampler upward at about 1 to 2 ft/sec for the length of the sampler (e.g., 36 inches), let it drop back to the starting point, and repeat the cycle 3 to 5 times (Figure 7)

Figure 7



6. Once retrieved, if the sleeve is not completely full, a sample will not be collected and a new HydraSleeveTM will be deployed and the process repeated

7. To remove a sample from the HydraSleeveTM with the least amount of aeration and agitation use the short plastic discharge tube included with the sampler

a. First, squeeze the full sampler just below the top to expel water resting above the flexible check valve (Photo 8)

Photo 8

b. Then push the pointed discharge tube through the outer polyethylene sleeve about 3-4 inches below the white reinforcing strips (Photo 9)

Photo 9

c. Discharge the sample into the desired container (Photo 10) in the order described below

d. Raising and lowering the bottom of the sampler or pinching the sample sleeve just below the discharge tube will control the flow of the sample

e. The sample sleeve can also be squeezed, forcing fluid up through the discharge tube, similar to squeezing a tube of toothpaste

Photo 10

8. Collect sample parameters in the following order: VOCs (care will be taken to avoid agitation and volatilization of sample during the decanting process), explosives, metals, and other parameters
    a. Samples will be collected and labeled in accordance with relevant TGIs
    b. Types of sample bottles and volume requirements for each analysis are provided in the Quality Assurance Project Plan (QAPP) and FIP
    c. Metals samples will not be field filtered unless specified
    d. If field filtering is required for any analyte, groundwater to be filtered will be placed into a dedicated transfer vessel and filtered using a small hand pump as shown below in Photo 7 (these items are available through environmental equipment vendors)

Photo 7

9. To obtain a duplicate/blind duplicate sample, collect a duplicate from the same bag as an original sample and send for analysis with the appropriate labeling

10. To obtain an equipment blank, pour deionized water into a **new, unused** HydraSleeveTM and collect the blank using the same method as the samples; send for analysis with the appropriate labeling

11. If turbidity of the collected sample is to be measured, use the collected sample water to fill the LaMotte turbidimeter vial, and measure and record turbidity on the HydraSleeveTM Field Form (**Attachment A**)

12. Place collected samples immediately in a sample cooler that is already full of ice or ice packs such that the samples are immediately chilled and stored at a temperature of 4° Celsius, in accordance with relevant TGIs

13. Field parameter measurements (temperature, specific conductance, pH, DO, and ORP) can now be taken using a down-hole multi-meter (e.g., a YSI 600XL). Gently lower the probe of the meter down the well until it reaches the middle of the well screen noted on the PST and HydraSleeveTM Field Form. Follow the manufacturer's guidelines on how to determine stability of parameter readings. Once the meter readings have stabilized, record them on the HydraSleeveTM Field Form.

14. Measured and record total well depth on the HydraSleeveTM Field Form.

15. NOTE: After the groundwater samples and field measurements have been collected, it may be necessary to deploy another HydraSleeveTM in the well for future sampling events (e.g., quarterly, semi-annually, etc.)
    a. This reduces the effort required to perform future events
    b. The FIP and/or PST will state if another HydraSleeveTM is to be deployed
    c. The same suspension line or well-specific tether will be reused for additional deployment to ensure consistency in the deployment depth
    d. Follow the steps outlined previously in this TGI for assembly and deployment instructions

16. Secure the well.

17. Properly dispose of PPE and disposable equipment.

18. Decontaminate any cutting devices, reusable weights, suspension lines, or sampler attachment mechanisms after each usage as described in the *TGI – Groundwater and Soil Sampling Equipment Decontamination*

8 WASTE MANAGEMENT

Materials generated during groundwater sampling activities, including disposable equipment and excess water in the HydrasleevesTM, will be stored on site in appropriate labeled containers and disposed of properly. Waste will be managed in accordance with the *TGI – Investigation-Derived Waste Handling and*

TECHNICAL GUIDANCE INSTRUCTION – PURGE SAMPLING AT PASSIVE BARRIER MITIGATION SYSTEMS

Rev: 0

VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by

APPROVAL SIGNATURES

Prepared by:		1/25/2019
	Everett Rubin	Date:
		1/25/2019
	Eric Epple	Date:
Technical Expert Reviewed by:		1/25/2019
	Rachel Saari	Date:

1 INTRODUCTION

This Technical Guidance Instruction – Purge Sampling at Passive Barrier Mitigation Systems (document) was prepared to help guide appropriate sampling of passive barrier mitigation systems.

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

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In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, regulation-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

2 SCOPE AND APPLICATION

This document describes Arcadis' procedures for collecting samples representative of sub-slab conditions from passive vapor mitigation system (VMS) riser pipes in lieu of penetrating an existing vapor intrusion (VI) barrier by installing a sub-slab probe for sample collection. The objective of using these sampling procedures is to collect representative data from beneath the building slab as influenced by the mitigation system at riser pipe locations. The radius of influence for the mitigation system will be calculated and an appropriate purge volume will be extracted prior to sample collection based on screening results to ensure representative samples are collected. The following sections provide instructions for calculating the purge time, purging, screening, and sampling.

Site-specific requirements and/or field conditions may require modifications to some of the procedures described in this document. This document may be altered per approval of the Project Manager.

3 PERSONNEL QUALIFICATIONS

Arcadis field personnel will have current health and safety training, including 40-hour Hazardous Waste Operations and Emergency Response training and site-specific training, as needed. Arcadis field personnel will be familiar with the information presented in this document and possess the required skills and experience necessary to successfully complete the desired field work. An Arcadis engineer will be responsible for reviewing purge volume calculations and selecting the purge fan. Arcadis personnel leading the sampling activities will have previous VI sampling experience.

The Health and Safety Plan (HASP) provides additional required training specific to each job site.

4 EQUIPMENT LIST

The equipment recommended for purging and sampling activities is identified below:

- Appropriate personal protective equipment (PPE; as required by the HASP)
- In-line fan with cord installed (Class I, Division 2 rated for potentially flammable soil vapor [e.g., Marc Climatic Controls, Inc. ISFX])
- Anemometer (TSI Velocicalc® or similar)
- Stopwatch
- Laptop or tablet with purge volume calculating table
- Photo ionization detector (PID) that reads in parts per million and calibration kit
- PID that reads in parts per billion and calibration kit
- Landfill gas meter with carbon filters and calibration kit
- Extension cords
- Ground fault circuit interrupter (GFCI)
- Hand saw for cutting polyvinyl chloride (PVC) riser pipes, as needed
- Fernco® caps or PVC caps
- Fernco® couplings or reducing Fernco® couplings sized to connect fan to riser piping
- Hazmat Pac© overpack materials
- Heavy duty PVC glue and primer containing low or no volatile organic compounds (VOCs)
- One-liter evacuated canisters with filters that regulate flow to approximately 1 liter per minute
- Compression fittings (Swagelok or similar) with Ferrules (front and back)
- Compression (Swagelok or similar) caps for sample ports
- Two-way valves
- Custom built 3-inch-diameter stainless steel piping with associated sample ports
- TeflonTM or TeflonTM-lined polyethylene tubing ($^1/_4$-inch outer diameter)
- Silicone tubing (Masterflex [$^1/_4$-inch inner diameter])

- Lay-flat ducting (10-inch)
- Zip ties
- Duplicate sample tees.

5 HEALTH AND SAFETY CONSIDERATIONS

Arcadis will comply with Occupational Safety and Health Administration, state, and local standards or regulations relating to elevated work. The necessary PPE will be worn while on site.

Arcadis personnel will review the HASP and Job Safety Analysis (JSA) forms associated with each task prior to beginning work to be aware of potential hazards associated with the site. Additional considerations for potential roof access need to be considered and necessary revisions made to the site-specific HASP.

6 SAMPLING PROCEDURES

6.1 Minimum Purge Volume and Duration Determination

At a minimum, the approximate volume of air that is representative of one pore volume of the target area beneath the building footprint associated with each riser pipe plus pipe volume exchange (100 percent) is recommended to be removed during the purge. Purge volumes are to be calculated following the procedure outlined below:

1. Prior to any round of sampling, the consultant will confirm all analytical methods, methodology, current detection limits, and protocols are the most up to date version in the sampling protocol.
2. Obtain VMS construction report and as-built drawings.
3. Use as-built drawings to assist in identifying the portions of the building footprint serviced by each riser pipe and estimating the approximate area of the building footprint to be represented by each riser pipe sample.
4. Estimate the thickness and the void ratio of the gravel layer surrounding each riser pipe.
5. For each riser pipe, calculate the associated pore volume in cubic feet by multiplying the area by the thickness and the void ratio.
6. For each riser pipe, calculate the pipe volume (in cubic feet) by adding the length of the sub-slab collection piping to the above-grade riser piping and multiplying by the cross-sectional area of the piping. The pipe volume is the minimum volume that should be purged prior to collection of any sample.
7. For each riser pipe, add the pore volume and the pipe volume together to obtain one total purge volume.
8. Divide by the in-line fan’s rated flow rate to calculate the estimated total purge time from model (in minutes) or divide by the actual flow rate as measured by a field anemometer to calculate the estimated total purge time from spreadsheet (in minutes). The estimated total purge time is the time to purge the minimum volume that should be purged at each riser pipe location.

8. Multiply the estimated purge time from spreadsheet by 100 to determine the estimated total purge time (for 100 percent purge of one pore volume plus one pipe volume exchange). Per professional judgement, additional purge time can be added as needed to ensure that the pore volume and pipe volume have been fully exchanged (e.g., H = 125 for 125 percent of one pore volume plus 125 percent of one pipe volume; a 25 percent addition purge volume / duration added for conservativeness).

The formula for purge duration (for both the estimated total purge time from model and the estimated total purge time from spreadsheet) is presented below (in minutes):

$$-- F[(A \mathit{X} B) \mathit{X} (C \mathit{X} D)] + [(it \mathit{X} E^{2}) \mathit{X} F]$$

$$'j \mathit{X} H G$$

Where:

A = Total building area (square feet)

B = Proportion of the total building area under influence by vent riser, as estimated from building drawings (unitless)

C = Gravel thickness (feet)

D = Gravel void percent (percent)

E = Riser pipe radius (feet)

F = Riser pipe length (feet)

G = Purge flow rate, from in-line fan rating (for the estimated purge time from model) or as measured by a field anemometer (for the estimated purge time from spreadsheet; cubic feet per minute)

H = 100 for estimated total purge volume (one pore volume plus one pipe volume). This number can be increased for additional buffer (e.g., H = 125 for 125 percent of one pore volume plus 125 percent of one pipe volume; a 25 percent addition purge volume / duration added for conservativeness).

6.2 Purging and Sampling Procedure

VMS sample ports will be sampled during induced steady flow conditions. The VMS sampling schematic is exemplified in Figure 1. The following procedure will be used to obtain a steady flow condition and collect a sample(s):

1. PVC piping sections will be removed from all of the VMS influent and effluent pipes servicing the building SSV system.
2. Caps will be placed on all inlet and discharge pipes, except the one being tested.
3. Use a 4- by 3-inch Fernco® coupling to install a 1.5-foot-long, 3-inch-wide, cylindrical stainless steel pipe (sample piping) to the existing cast iron vent riser piping. The sample piping will be prefabricated

to contain four threaded sampling ports aligned vertically along the pipe, with a fifth additional anemometer port above the other four sample ports. Each of the four sampling ports will be fitted with a compression fitting (Swagelok® or similar) connection.

4. Use a 3- by 4-inch Fernco® coupling to connect to a 6-inch piece of 4-inch PVC piping to the connected stainless steel piping.
5. Use a 4- by 6-inch Fernco ® coupling to install an intrinsically safe (Class I, Division 2), high-flow, in-line fan on the riser piping (e.g., Marc Climatic Controls, Inc. ISFX fan or equivalent) attached to the 4-inch piping. Attach lay-flat ducting to the fan such that discharge is upward and away from the work area and a minimum of 10 feet from heating, ventilation, and/or air conditioning intakes or other openings into the building. Locate the nearest outlet. Use extension cords and a GFCI as necessary to provide temporary power to the fan location.
6. Start the fan and start a stopwatch.
7. Begin continuous monitoring of the vapor concentration using the part per million PID connected to the third lowest sample port on the sample piping using Swagelok® or similar fittings and $^{1}/_{4}$-inch outer-diameter Teflon™ lined tubing. A part per billion PID will also be used (if needed) to measure lower concentrations, connected to the second lowermost port on the sample piping using Swagelok® or similar fittings and $^{1}/_{4}$-inch outer-diameter Teflon™ lined tubing. To prevent overloading of the part per billion PID, initial startup of each purge will begin with the part per million PID alone. If concentrations remain less than 5 parts per million (ppm) [as measured by the part per million PID]), the part per billion PID will be engaged. Similarly, if concentrations rise to exceed 5 ppm, the part per billion PID will be disengaged. When disengaged, part per billion PID piping will be capped.
8. A landfill gas meter with an attached carbon filter will be connected to the fourth lowermost sampling port on the sample piping using Swagelok® or similar fittings and $^{1}/_{4}$-inch outer-diameter Teflon™ lined tubing during both purging and sampling to screen for sample flammability. Arcadis' procedures for shipment of flammable samples will be used as necessary and all samples where methane was detected equal to or in excess of 5 percent by volume will be packed in Hazmat Pac© overpack materials. Refer to the shipping determination and associated shipping guide included in the HASP for instructions on how to properly handle and ship samples.
9. Use an anemometer inserted into the anemometer port (above the four sample ports) to measure the discharge flowrate (units of cubic feet per minute). Make sure the anemometer is set to the appropriate piping size (3-inch) and shape (round). The anemometer probe will be centered within the pipe and oriented perpendicularly to ensure accuracy.
10. Use the formula for purge duration (presented above) to determine the approximate number of minutes of fan operation necessary to remove the estimated purge volume.
11. Began the purging process. Record the PID and landfill gas meter readings at 1-minute intervals or as frequently as practicable to capture fluctuations and observe trends in readings.
12. Multiple samples (and up to one duplicate) may be collected from each riser pipe during purging. Samples will be collected when PID readings indicate that a relatively elevated (peak) concentration is being extracted and/or upon reaching the estimated purge volume, as specified. If no peak concentration is measured, collect a sample following the removal of the estimated purge volume, as

specified. If PID screening indicates that concentrations continue to rise following removal of the specified estimated purge volume, continue purging and (to the extent possible) collect the sample when PID readings are at their peak. A cap on purge volume should be set to avoid purging beyond the target area for the riser pipe (e.g., 125 percent of the estimated purge volume)..

13. Samples will be collected from the lowermost port on the sample piping. The grab sample will be collected with a 1-liter passivated canister, which will be connected to the sample piping via compression fittings, Teflon™ tubing, and an inherent two-way valve. A flow-regulating filter calibrated by the analytical laboratory may be used.
14. No passivated canisters with initial vacuums of less than -25 inches of mercury will be used for sampling.
15. To sample, the inherent two-way valve attached to the passivated canister will be opened. Volume will continue to be collected until the passivated canister's vacuum reaches approximately -5 inches of mercury. At this point, the valve will be closed and the samples will be packaged for shipment.
16. Repeat these steps at each discharge pipe on the building servicing a desired sub-slab sampling area. Cap the discharge pipes and repeat the processes described above while extracting from the inlet pipes.
17. Reinstall wind turbines, piping extension, and 90-degree fittings on riser pipes to match as-built conditions. Securely glue fittings (containing low or no VOCs) and adjust guy wires, as needed.
18. Prepare the laboratory-provided chain of custody form, specifying the proposed turnaround time and analyte list for United States Environmental Protection Agency Method TO-15 analysis. Samples will be picked up via a laboratory courier.

7 WASTE MANAGEMENT

The waste materials generated by these activities should be minimal. PPE (such as gloves) and other disposable equipment (e.g., tubing) will be collected by field personnel for proper disposal.

8 DATA RECORDING AND MANAGEMENT

Measurements will be recorded on the sampling log, with notations of project name, sampling date, vent riser name, calculated minimum purge time, calculated total purge time, calculated 125 percent purge time , anemometer readings, PID readings, landfill gas meter readings, sample start and finish times, canister identification numbers, flow controller identification numbers, and initial and final canister vacuum readings, as exemplified on Table 1. Field sampling logs and chain of custody forms will be transmitted to the Project Manager at the conclusion of the sampling event.

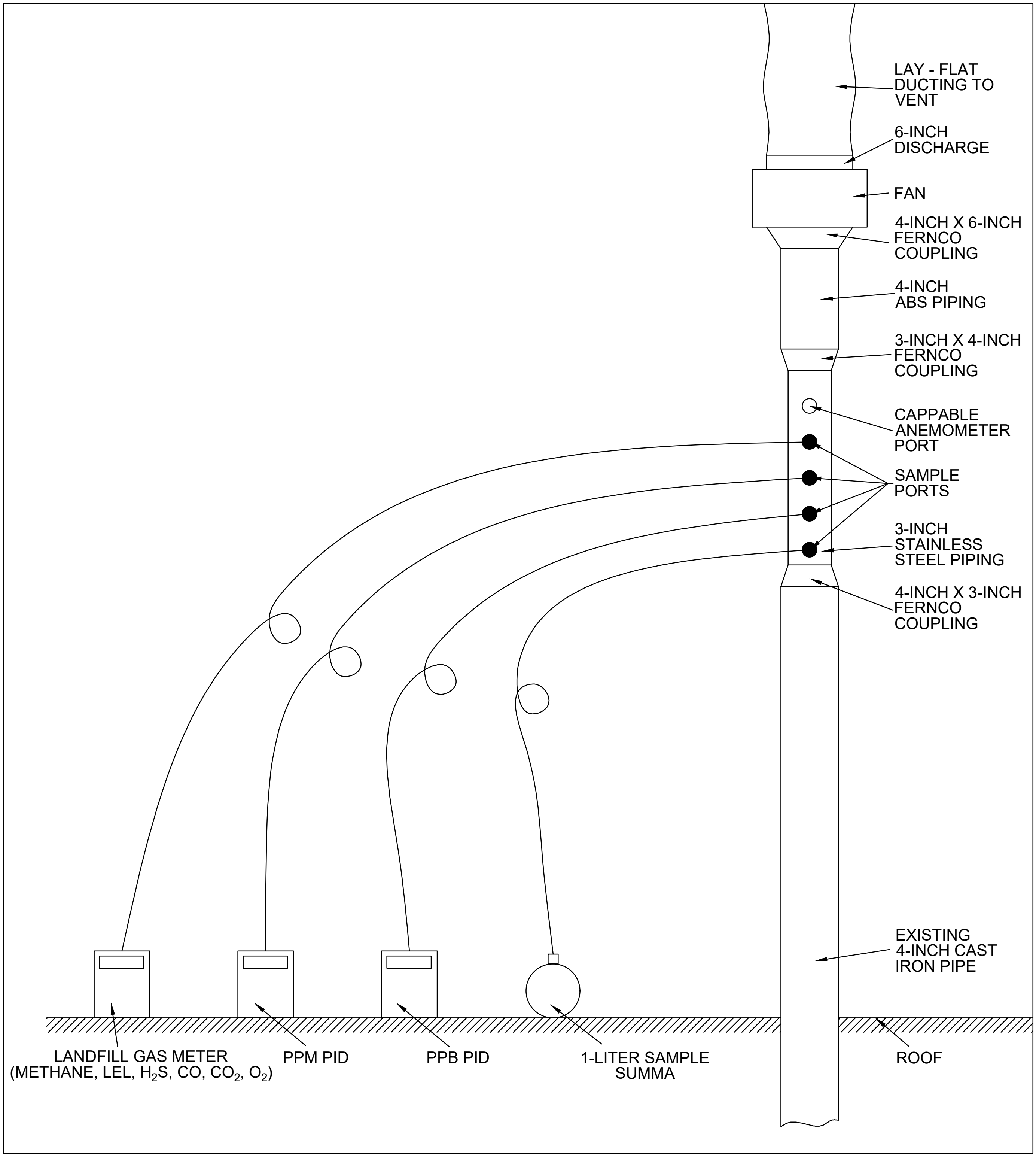
9 QUALITY ASSURANCE

Up to one duplicate sample will be collected from each riser to ensure laboratory quality assurance. The total number of duplicate samples collected will be equal to or greater than 10 percent of the total samples collected. Duplicate sample canisters will be attached in line with their parent sample via a tee fitting, and duplicate samples will be collected simultaneously with their parent sample.

ATTACHMENTS

Figure 1: Vapor Mitigation System Sampling Schematic

Table 1: Vent Riser Sampling Log



LEGEND:

ABS = ACRYLONITRILE BUTADIENE STYRENE

CO = CARBON MONOIDE

CO_2 = CARBON DIOXIDE

H_2S = HYDROGEN SULFIDE

LEL = LOWER EXPLOSIVE LIMIT

PID = PHOTO IONIZATION DETECTOR

PPB = PARTS PER BILLION

PPM = PARTS PER MILLION

NOTE: NOT TO SCALE

TECHNICAL GUIDANCE INSTRUCTION -
PURGE SAMPLING AT PASSIVE BARRIER
MITIGATION SYSTEMS

VAPOR MITIGATION SYSTEM, RISER SAMPLING SCHEMATIC

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FIGURE
1

CITY: (SAN RAFAEL, CA (PETALUMA)) SYRACUSE, NY DIV/GROUP: EBC-IM/DV DB: (J.HARRIS) LD: L.POSENAUER PM: M.BARTEE TM: H.DENG LYR:(Opt)ON=*;OFF=*REF*
C:\Users\PAI01041\OneDrive - ARCADIS\BIM 360 Docs\GE CORP ENV PROG\GE SAN JOSE O AND M\2019\AP013098.4001101-DWG\AP013098_P1-VIA_FIG 1_SAMPLING SCHEMATIC.dwg LAYOUT: 1 SAVED: 3/26/2019 2:27 PM ACADVER: 23.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE:
PLTFULL.CTB PLOTTED: 3/26/2019 2:27 PM BY: ANJANEYAKUMAR, PAVAN KUMAR

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Vent Riser Sampling Log

Page ________ **of** ________

Project Name/Location ____________________

Project/No. ____________________

Field Staff ____________________

Vent Riser Name ____________________

Estimated Total Purge Time from Model ____________________

Flow Rate from Anemometer ____________________

Minimum Purge Time from Spreadsheet ____________________

Estimated Total Purge Time from Spreadsheet ____________________

Date ____________________

Weather ____________________

Notes ____________________

____

____

____

____

Purge Screening and Monitoring

Time Interval (minutes)	**Time**	**PID** (ppm)	**PID** (ppb)	**CH_4** (percent)	**LEL** (Percent of CH_4)	**H_2S** (ppm)	**CO** (ppm)	**CO_2** (percent)	**O_2** (percent)

Sample Collection

Sample Name	**Time**	**PID at Time of Sampling** (ppm)	**Canister ID**	**Start Time**	**Initial Vacuum** (in Hg)	**End Time**	**Final Vacuum** (in Hg)	**Remarks**

Notes:

CH_4 = methane

CO = carbon monoxide

CO_2 = carbon dioxide

H_2S = hydrogen sulfide

in Hg = inches of mercury

LEL = lower explosive limit

O_2 = oxygen

PID = photoionization detector

ppb = parts per billion

ppm = parts per million

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TGI - INDOOR OR AMBIENT AIR SAMPLING AND ANALYSIS VIA USEPA METHOD TO-15

Rev #: 1

Rev Date: August 19, 2016

SOP VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
1	8/19/2016	All	Updated Rev0	Mitch Wacksman

APPROVAL SIGNATURES

Margaret Bartee

Prepared by: ______________________________ Date: 8/19/2016
Margaret Bartee

Mitch Wacksman

Reviewed by: ______________________________ Date: 8/19/2016
Mitch Wacksman

I. INTRODUCTION

This Technical Guidance Instruction (TGI) document describes the procedures to conduct a building survey prior to indoor air sampling.

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

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II. SCOPE AND APPLICATION

This Technical Guidance Instruction (TGI) document describes the procedures to collect indoor air or ambient air samples in passivated stainless steel canisters (e.g., SUMMA®) for the analysis of volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15).

III. PERSONNEL QUALIFICATIONS

Arcadis field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, site-specific training, first aid, and cardiopulmonary resuscitation (CPR), as needed. Arcadis field sampling personnel will be competent in the relevant procedures and possess the required skills and experience necessary to successfully complete the desired field work. Arcadis personnel responsible for directing indoor air and/or ambient air sample collection activities must have previous indoor air sampling experience and be able to complete the field work without direct supervision.

IV. EQUIPMENT LIST

The equipment required for indoor air sample collection is presented below:

- 6-liter, stainless steel passivated canisters (e.g., SUMMA®). Request one canister for each sampling location, plus duplicate canisters per project-specific requirements. If feasible, order extra canisters at a rate of 10 to 20% of the total number of sampling canisters (including duplicates).
- Flow controllers with in-line particulate filters and vacuum gauges. Flow controllers are pre-calibrated by the laboratory to the sampling duration [e.g., 8 hours] specified by the project team). Vacuum gauges are also generally supplied by the laboratory.
- Open-end wrench. Typical canister caps require 9/16-inch wrenches.
- Chain-of-custody (COC) form.
- Sample collection log (attached).
- Box, chair, tripod, or similar to hold canister above the ground surface at approximate breathing height (3-5 feet).
- Camera (optional, if photography is permitted at sampling locations).
- Hand-held weather meter (optional)

For abnormal situations (i.e., sumps, crawlspaces with no access, where canisters must be hidden, etc.), Teflon tubing may be used to collect an air sample. In these situations, $^1/_4$-inch Swagelok fittings (including nut, front sleeve, and back sleeve) or other methods may be appropriate to affix tubing to canister.

V. CAUTIONS

Care must be taken to minimize the potential for introducing interferences during the sampling event. As such, keep canisters away from heavy pedestrian traffic areas (e.g., main entranceways, walkways), if possible. Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens (sharpies), wear/apply fragrances, or smoke cigarettes before and/or during the sampling event.

Specify sample collection duration with the laboratory when ordering equipment, and confirm with the laboratory upon equipment receipt. Sample integrity can be compromised if sample collection is extended to the point that the canister reaches atmospheric pressure. Sample integrity is maintained if sample collection is terminated prior to the target sample duration and a measurable vacuum (e.g., 5 inches Hg) remains in the canister when sample collection is terminated.

VI. HEALTH AND SAFETY CONSIDERATIONS

All sampling personnel should review the appropriate health and safety plan (HASP) and job safety analysis (JSA) prior to beginning work to be aware of all potential hazards associated with the job site and the specific task.

VII. PROCEDURE

Preparation of Passivated Canister and Collection of Sample

1. Prior to any round of sampling, the consultant will confirm all analytical methods, methodology, current detection limits, and protocols are the most up to date version in the sampling protocol
2. Record the following information on the sampling form (use a hand-held weather meter, contact the local airport or other suitable information source [e.g., weatherunderground.com] to obtain the following information):
    - ambient temperature
    - barometric pressure
    - wind speed
    - relative humidity
    - significant recent precipitation
    - snow/ice cover
3. For indoor air sampling, note whether the heating, ventilation, and air conditioning (HVAC) system is operational and record settings.
4. Choose the sampling location in accordance with the project sampling plan. If a breathing zone sample is required, place the canister on a box, chair, tripod, or other similar stand to locate the canister orifice 3 to 5 feet above the ground or floor surface. The canister may be affixed to wall/ceiling support with nylon rope or placed on a stable surface. In general, areas near windows, doors, air supply vents, and/or other potential sources of “drafts” shall be avoided.
5. Record canister serial number and flow controller number on the sampling log and COC form. Assign sample identification (ID), and record on canister ID tag, sample collection log (Attachment A), and COC form.
6. Remove the brass dust cap from the canister with the wrench. Attach the flow controller and vacuum gauge to the canister with the wrench. Tighten with fingers first, then gently with the wrench (roughly a quarter turn). Use caution not to over tighten fittings.
7. Open the canister valve to initiate sample collection. Record the date and local time (24-hour basis) of valve opening on the sample collection log and COC form. Collection of duplicate samples will include collecting two samples side by side at the same time.
8. Check the initial canister pressure using the vacuum gauge. Record the initial pressure in the canister on the sample log and COC form. The initial pressure reading should be evaluated with respect to project-specific and jurisdictional requirements. If the initial pressure registers less

than -25 inches of Hg, then the canister is not appropriate for use, and another canister should be used.

8. Photograph the canister and surrounding area, if photography is permitted at sampling locations.
9. If feasible, check the canister approximately half-way through the sample duration and note progress on sample logs.

Termination of Sample Collection

1. Arrive at the sampling location at least 1 to 2 hours prior to the end of the sampling interval (e.g., 6 hours following sample initiation for an 8-hour sampling duration).
2. Stop collecting the sample by turning the valve on the canister when the canister pressure reaches approximately -5 inches of Hg or when the desired sample time has elapsed, whichever comes first. Leaving some vacuum in the canister provides a way to evaluate whether the canister leaks before it reaches the laboratory.
3. Record the final canister pressure. Record the date and local time (24-hour basis) of valve closing on the sample collection log and COC form.
4. Remove the flow controller from the canister, re-install brass cap on canister fitting, and tighten with the wrench.
5. Package the canister and flow controller in accordance with Department of Transportation regulations available on the Transportation Health and Safety's Team Site on the Source for return shipment to the laboratory. The canister does not require preservation with ice or refrigeration during shipment.
6. Complete the forms and sample labels provided by the laboratory as directed (e.g., affix card with string).
7. Complete COC form; copy, photograph, or scan a version for the project file (if possible); and place the form in the shipping container. Close the shipping container and affix the custody seal to the container closure. Transmit canisters via courier delivery service (e.g., Federal Express or UPS) to laboratory for analysis.

VIII. WASTE MANAGEMENT

No specific waste management procedures are required.

IX. DATA RECORDING AND MANAGEMENT

Notes will be recorded on the sampling log form (attached), with notations of project name, sample date, sample time, and sample location (e.g., description and GPS coordinates if available) sample start and finish times, canister serial number, flow controller number, initial vacuum reading, and final vacuum reading. Sampling logs and COC records will be transmitted to the Task Manager or Project Manager and stored in the project file consistent with client and project requirements.

X. QUALITY ASSURANCE

Conduct quality assurance as required by the project-specific work plan and/or Quality Assurance Project Plan (QAPP).

TGI - SUB-SLAB SOIL VAPOR OR SOIL VAPOR SAMPLING USING WHOLE AIR CANISTERS ANALYZED VIA USEPA METHOD TO-15

Rev #: 1

Date: September 18, 2016

SOP VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
1	9/18/2016	All	Updated Rev0	Mitch Wacksman

APPROVAL SIGNATURES

Prepared by: Eric Date: 9/18/2016

Eric Cathcart

Reviewed by: Mitch Wacksman Date: 9/18/2016

Mitch Wacksman (Technical Expert)

I. INTRODUCTION

This Technical Guidance Instruction (TGI) document describes the procedures to conduct a building survey prior to indoor air sampling.

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, regulation-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

II. SCOPE AND APPLICATION

This document describes the procedures for collecting exterior soil vapor or sub-slab soil vapor (herein referred to as "soil vapor") samples using whole air canisters for the analysis of volatile organic compounds (VOCs) by United States Environmental Protection Agency (USEPA) Method TO-15 (TO-15). This document assumes a sample port – either sub-slab or exterior soil vapor – has already been installed. This document covers the above ground assembly and sampling methods.

Method TO-15 uses a 1-liter 3-liter or 6-liter SUMMA® passivated stainless steel canister to collect a whole-air sample. The whole-air sample is then analyzed for VOCs using a quadrupole or ion-trap gas chromatograph/mass spectrometer (GS/MS) system to provide typical compound detection limits of 0.5 parts per billion volume (ppbv).

The following sections list the necessary equipment and detailed instructions for collecting soil vapor samples for VOC analysis.

III. PERSONNEL QUALIFICATIONS

Arcadis field sampling personnel will have current health and safety training, including 40-hour HAZWOPER training, site supervisor training, site-specific training, first-aid, and cardiopulmonary resuscitation (CPR), as needed. Arcadis field sampling personnel will be well versed in the relevant technical guidance instructions (TGIs) and possess the required skills and experience necessary to successfully complete the desired field work. Arcadis personnel responsible for leading soil vapor sample collection activities must have previous soil vapor sampling experience.

IV. EQUIPMENT LIST

The equipment required for soil vapor sample collection is presented below:

- 1,3, or 6 – liter stainless steel SUMMA® canisters (order at least one extra, if feasible) (batch certified canisters or individual certified canisters as required by the project);

- Flow controllers with in-line particulate filters and vacuum gauges; flow controllers are pre-calibrated to specified sample duration (e.g.,5-, 10, or 30- minutes) or flow rate (e.g., < 200 milliliters per minute [mL/min]); confirm with the laboratory that the flow controller comes with an in-line particulate filter and pressure gauge (order at least one extra, if feasible);

- 1/4-inch OD tubing (Teflon®, or similar);

- Extra 1/4-inch Swagelok front and back compression sleeves

- Decontaminated stainless steel Swagelok or comparable “1” fitting and ball or needle valve for isolation of purge leg of sample train;

- Stainless steel duplicate “1” fitting provided by the laboratory (if collecting duplicate [i.e., split] samples);

- 60-mL syringe equipped with a three-way leur lock valve;

- Appropriate equipment and materials for quality assurance testing as laid out in the respective quality assurance TGIs (i.e., helium leak testing, water dam testing, methane testing);

- Appropriate-sized open-end wrench (typically 9/16-inch and ½”);

- Tedlar® bag to collect purge air for venting outside a structure if working inside;

- Portable weather meter, if appropriate;

- Chain-of-custody (COC) form;
- Sample collection log (attached);
- Nitrile gloves;
- Work gloves; and
- Field notebook

V. CAUTIONS

The following cautions and field tips should be reviewed and considered prior to installing or collecting a soil vapor sample.

- Sampling personnel should not handle hazardous substances (such as gasoline), permanent marking pens (sharpies), wear/apply fragrances, or smoke cigarettes/cigars before and/or during the sampling event.

- Ensure that the flow controller is pre-calibrated to the proper sample collection duration (confirm with laboratory). Sample integrity can be compromised if sample collection is extended to the point that the canister reaches atmospheric pressure. Sample integrity is maintained if sample collection is terminated prior to the target duration and a measurable vacuum (e.g., 3 -7 – inches Hg) remains in the canister when sample collection is terminated.

- The integrity of the sample train will be tested in accordance with the project specific requirements. These procedures are contained in their own TGI documents and include helium leak testing, water dam testing, and methane screening.

- It is important to record the canister pressure, start and stop times, and sample identification on a proper field sampling form. You should observe and record the time/pressure at the start, and then again one or two hours after starting the sample collection. It is a good practice to lightly tap the pressure gauge with your finger before reading it to make sure it is not stuck. If the canister is running correctly for a 24-hour period, the vacuum will have decreased slightly after one or two hours (for example from 29 inches to 27 inches). Consult your project manager, risk assessor or air sampling expert by phone if the SUMMA canister does not appear to be working properly.

- Ensure that there is still measurable vacuum in the SUMMA® after sampling. Sometimes the gauges sent from labs have offset errors, or they stick.

- When sampling carefully consider elevation. If your site is over 2,000’ above sea level or the difference in elevation between your site and your lab is more than 2,000’ then pressure effects will be significant. If you take your samples at a high elevation they will contain less air for a given ending pressure reading. High elevation samples analyzed at low elevation will result in more dilution at the lab, which could affect reporting limits. Conversely low elevation samples when received at high elevation may appear to not have much vacuum left in them. http://www.uigi.com/Atmos_pressure.html.

- If possible, have equipment shipped a two to three days before the scheduled start of the sampling event so that all materials can be checked. Order replacements if needed.
- Requesting extra canisters and flow controllers from the laboratory should also be considered to ensure that you have enough equipment on site in case of an equipment failure.
- Check the seal around the soil vapor sampling port by using a tracer gas (e.g., helium) or other method established in the appropriate guidance document. See TGI library and project specific instructions for appropriate TGIs.

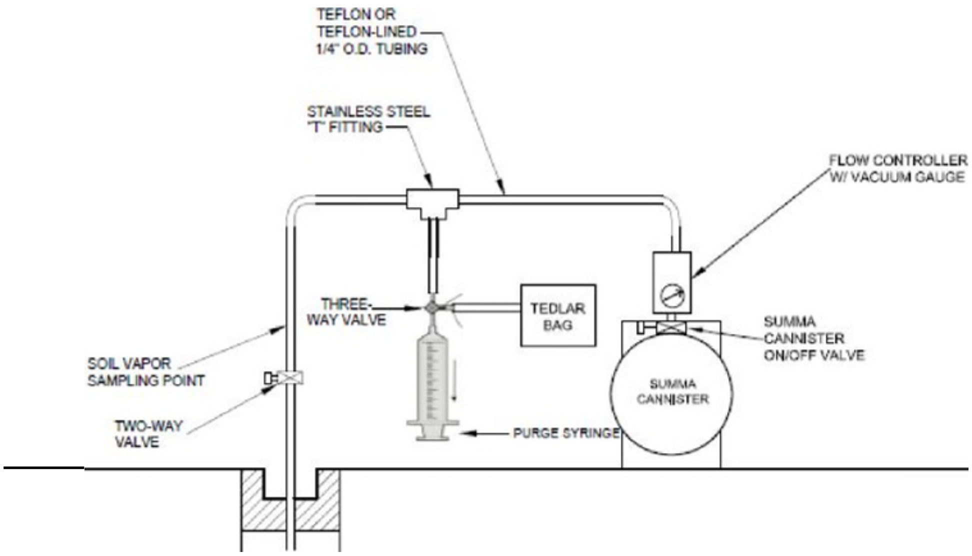
VI. HEALTH AND SAFETY CONSIDERATIONS

All sampling personnel should review the appropriate health and safety plan (HASP) and job safety analysis (JSA) prior to beginning work to be aware of all potential hazards associated with the job site and the specific task. Field sampling must be carefully performed to minimize the potential for injury and the spread of hazardous substances.

VII. SOIL VAPOR SAMPLE COLLECTION

Sample Train Assembly

The following procedures should be used to collect a soil vapor sample using a whole air canister (i.e., SUMMA canister). These methods can be used for both exterior soil vapor samples and interior sub-slab soil vapor samples collected from both permanent or temporary sample points installations. A schematic of the suggested sample train set up is included below



1. Assemble the sample train by removing the cap from the SUMMA canister and connecting the flow controller with in-line particulate filter and vacuum gauge. The flow controller attaches directly to the canister and dictates the sample duration. This piece will come preset from the laboratory.

2. Attach the canister and flow controller assembly to a stainless steel T-fitting using a short length of 1/4-inch OD Teflon tubing. This T-fitting adds a leg to the sample train that will be used to purge “dead” air from the sample train in order to collect a more representative sample.

3. Connect the purge syringe with three-way valve to one of the free ends of the T-fitting using a length of Teflon sample tubing, Swagelok compression fittings and silicon tubing.

4. Attach the Swagelok two-way valve to the remaining free end of the T-fitting using a short length of $^1/_4$-inch OD Teflon tubing. The two-way valve will be immediately adjacent to the sample point in the train assembly. This valve is used to isolate the sample train from the sample point prior to sampling in order to test the sample train’s integrity.

5. When collecting duplicate or other quality assurance/quality control (QA/QC) samples as required by applicable regulations and guidance, couple two SUMMA canisters using stainless steel Swagelok duplicate sample T-fitting supplied by the laboratory. Attach flow controller with in-line particulate filter and vacuum gauge to duplicate sample T-fitting provided by the laboratory.

6. Attach the terminal end of the two-way Swagelok valve to the sample port as appropriate. This may be done using the options below:

   a. Use a section of silicon tube to connect the Teflon sample tubing to the barbed fitting of a Vapor Pin^{TM} port.

   b. Use Swagelok compression fittings to connect Teflon tubing to sampling port. Teflon tape should never be used on Swagelok compression fitting connections.

   c. Wrap the Teflon tubing with Teflon tape to seal around the slab then use VOC free clay to further seal around the slab if using temporary points.

Sample Documentation

1. Record on the sample log and COC form the flow controller number with the appropriate SUMMA® canister number.

2. Record the following information on the sample log, if appropriate (contact the local airport or other suitable information source [e.g., site-specific measurements, weatherunderground.com] to obtain the information):

   a. wind speed and direction;

   b. ambient temperature;

   c. barometric pressure; and

   d. relative humidity.

3. Take a photograph of the SUMMA® canister and surrounding area.

Sample Collection

1. Prior to any round of sampling, the consultant will confirm all analytical methods, methodology, current detection limits, and protocols are the most up to date version in the sampling protocol.
2. Perform a leak-down-test by closing the two-way valve to the sample port. Open the three-way valve to the syringe and pull a vacuum. Quickly close the three-way valve and record the pressure indicated on the gauge connected to the canister. If there are no leaks in the system this vacuum should be held. If vacuum holds proceed with sample collection; if not attempt to rectify the situation by tightening fittings.

3. Open the two-way valve and purge the soil vapor sampling port and tubing with the portable sampling pump. Purge approximately three volumes of air from the soil vapor sampling port and sampling line using a flow rate of 200 mL/min. Purge volume is calculated by the following equation “purge volume = 3 x Pi x inner radius of tubing^2 x length of tubing. Purge air will be collected into a Tedlar bag to provide that VOCs are not released into interior spaces. Perform quality control method tests concurrently, as appropriate

4. Close the three-way valve to the syringe in order to isolate this leg of the sample train.

4. Open the SUMMA® canister valve to initiate sample collection. Record on the sample log (attached) the time sampling began and the canister pressure.

   If the initial vacuum pressure registers less than -25 inches of Hg, then the SUMMA® canister is not appropriate for use and another canister should be used.

5. Check the SUMMA canister approximately half way through the sample duration and note progress on sample logs.

Termination of Sample Collection

1. Arrive at the SUMMA® canister prior to the end of sample collection.

2. Record the final vacuum pressure. Stop collecting the sample by closing the SUMMA® canister valves. The canister should have a minimum amount of vacuum (approximately 5 inches of Hg or slightly greater).

3. Record the date and local time (24-hour basis) of valve closing on the sample collection log and COC form.

4. Disconnect sample tubing from the sample port; replace any coverings or abandon as appropriate to mitigate tripping hazards.

5. Remove the particulate filter and flow controller from the SUMMA® canister, re-install the brass plug on the canister fitting, and tighten with the appropriate wrench.

6. Package the canister and flow controller per Department of Transportation regulations for return shipment to the laboratory. These regulations can be found at the Transportation Safety Program’s Team Site on the Source. The SUMMA® canister does not require preservation with ice or refrigeration during shipment.

7. Complete the appropriate forms and sample labels as directed by the laboratory (e.g., affix card with a string).

8. Complete the COC form and place the requisite copies in a shipping container. Close the shipping container and affix a custody seal to the container closure. Ship the container to the laboratory via overnight carrier (e.g., Federal Express) for analysis.

VIII. WASTE MANAGEMENT

No specific waste management procedures are required.

IX. DATA RECORDING AND MANAGEMENT

Measurements will be recorded on the sample log at the time of measurement with notations of the project name, sample date, sample start and finish time, sample location (e.g., GPS coordinates, distance from permanent structure [e.g., two walls, corner of room]), canister serial number, flow controller serial number, initial vacuum reading, and final pressure reading. Field sampling logs and COC records will be transmitted to the Project Manager.

X. QUALITY ASSURANCE

Duplicate samples should be collected in the field as a quality assurance step per project requirements. Generally, duplicates are taken from 10% of samples, but project specific requirements should take precedence.

XI. REFERENCES

DiGiulio et. al. 2003. Draft Standard Operating Procedure (SOP) for Installation of Sub-Slab Vapor Probes and Sampling Using EPA TO-15 to Support Vapor Intrusion Investigations. http://www.cdphe.state.co.us/hm/indoorair.pdf (Attachment C)

Di Giulio et. Al. 2006. Assessment of Vapor intrusion in Homes Near the Raymark Superfund Site Using Basement and Sub-Slab Air Samples. USEPA. EPA/600/R-05/147.

New York State Department of Health (NYSDOH). 2005. DRAFT “Guidance for Evaluating Soil Vapor Intrusion in the State of New York” February 23, 2005.

APPENDIX I

QUALITY ASSURANCE PROJECT PLAN

Chevron Environmental Management Company

Appendix I
Generic Quality Assurance Project Plan (QAPP)

Former Gulf Oil Terminal
Nassau County
Oceanside, New York
NYDEC Site Number: 130165

September 2022

Appendix I
Generic Quality Assurance Project Plan

Former Gulf Oil Terminal
Nassau County
Oceanside, New York
NYDEC Site Number: 130165
September 2022

Prepared By:

Arcadis U.S., Inc.
50 Millstone Road
East Windsor
New Jersey 08520

Prepared For:

Chevron Environmental Management Company
1500 Louisiana Street, #38142
Houston, Texas 77002

Our Ref:

30064361

Alex Newbrough

Certified Project Manager

Manan Dalal

Assistant Project Manager

Contents

TABLES

ATTACHMENTS

Preface

This *Quality Assurance Project Plan* (QAPP) was prepared for the former Gulf Oil Terminal site (the Site) located in Oceanside, New York. This QAPP will support future work plans for the Site.

This QAPP was prepared in a manner consistent with the following reference and guidance documents:

- United States Environmental Protection Agency (USEPA) guidance document entitled *EPA Requirements for Quality Assurance Project Plans*, EPA-QA/R-5 (USEPA, 2001)
- USEPA *Guidance for Quality Assurance Project Plans*, EPA-QA/G-5 (USEPA, 2002)

Acronyms and Abbreviations

ASP	Analytical Services Protocol
CLP	Contract Laboratory Program
COC	Chain-of-Custody
DQOs	Data Quality Objectives
EDD	Electronic Data Deliverables
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
GIS	Geographic Information System
MS	Matrix Spike
MSD	Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Administration
OSHA	Occupational Safety and Health Administration
PCB	Polychlorinated biphenyl
QAC	Quality Assurance Coordinator
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
RPD	Relative percent difference
SDG	Sample Delivery Group
SOP	Standard Operating Procedure
SVOC	Semi-Volatile Organic Compound
TOC	Total Organic Carbon
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

1 Project Organization

1.1 Project Organization

Monitoring performed as part of the groundwater, indoor air and soil gas monitoring activities for the former Gulf Oil Terminal, located in Oceanside, New York, will require integration of personnel from the organizations identified below, collectively referred to as the “project team”. A detailed description of the responsibilities of each member of the project team is presented below.

1.1.1 Overall Project Management

On behalf of Chevron Environmental Management Company (Chevron), Arcadis has overall responsibility for the groundwater, indoor air and soil gas monitoring activities. Arcadis personnel will perform related sampling activities, evaluate data, and prepare the deliverables as specified in the section-4 of the Site Management Plan (SMP). Project direction will be provided by Chevron, with oversight by the New York State Department of Environmental Conservation (NYSDEC). A list of key project management personnel is provided below:

Company/Organization	Title	Name	Phone Number
NYSDEC	Project Manager	Steven Scharf	(518) 402-9620
Chevron	Project Manager	Rob Speer	(832) 854-5648
Arcadis	Program Manager	Kavin Gandhi	(609) 366-9031
	Project Manager	~~Edwin Ptak~~Alex Newbrough	(724) ~~934~~448-~~9501~~6218
	Field Manager/APM	Matthew Miller	(609) 366-9071
	Quality Assurance Coordinator	Dennis Capria	(315) 671-9299
Pace Analytical	Project Manager	Chris McCord	(615) 773-3281

1.1.2 Task Managers

The staff performing the monitoring and site activities will be directed by representatives of the project team. The personnel responsible for each of the site activities listed below.

Company/Organization	Title	Name	Phone Number
Arcadis	Field Task Manager	Matthew Miller	(609) 366-9071
	Health and Safety Officer		(609) 366-9071
	Database Administrator	Mosam Shah	(609) 366-9074

1.2 Team Member Responsibilities

The responsibilities of the various team members are summarized below by organization.

1.2.1 Chevron Environmental Management Company

Project Coordinator

Responsibilities and duties include:

- Provide overall direction of site actions.
- Direct Arcadis.
- Review Arcadis work products, including data, memoranda, letters, reports, and all other documents transmitted to the NYSDEC.

1.2.2 Arcadis

Program Manager

Responsibilities and duties include:

- Oversee Arcadis work products.
- Provide Arcadis approval for major project deliverables.

Project Manager

Responsibilities and duties include:

- Manage and coordinate the project as defined in the SMP, with emphasis on adhering to the objectives of the site activities.
- Review documents prepared by Arcadis.
- Ensure that corrective actions are taken for deficiencies cited during any audits of site activities.

Task Managers

The monitoring activities components will be managed by various Task Managers, as set forth in Section 1.1.2. Duties of each Task Manager include, as appropriate:

- Manage relevant day-to-day activities.
- Develop, establish, and maintain files on relevant site activities.
- Review data reductions from the relevant site activities.
- Perform final data review of field data reductions on relevant site activities.
- Ensure that corrective actions are taken for deficiencies cited during audits of relevant site activities.
- Perform overall quality assurance/quality control (QA/QC) of the relevant portions of the site activities.
- Review relevant field records and logs.

- Instruct personnel working on relevant site activities.
- Coordinate field and laboratory schedules pertaining to relevant site activities.
- Request sample bottles from laboratory.
- Review field instrumentation, maintenance, and calibration to meet quality objectives.
- Prepare reports pertaining to relevant site activities.
- Maintain field and laboratory files of notebooks/logs, data reductions, and calculations and transmit originals to the Project Manager.

Field Personnel

Responsibilities and duties include:

- Perform field procedures associated with the investigations as set forth in the field sampling procedures plans.
- Perform field analyses and collect quality assurance samples.
- Calibrate, operate, and maintain field equipment.
- Reduce field data.
- Maintain sample custody.
- Prepare field records and logs.

Quality Assurance Coordinator (QA)

Responsibilities and duties include:

- Review laboratory data packages.
- Oversee and interface with the analytical laboratory.
- Coordinate field QA/QC procedures with Task Managers (including audits of field activities) concentrating on field analytical measurements and practices to meet data quality objectives (DQOs).
- Review field reports.
- Perform and review audit reports.
- Prepare interim QA/QC compliance reports.
- Prepare a QA/QC report in accordance with United States Environmental Protection (USEPA) Region II guidelines, which includes an evaluation of field and laboratory data and data usability reports.

1.2.3 Analytical Laboratories

General responsibilities and duties of the analytical laboratories include:

- Perform sample analyses and associated laboratory QA/QC procedures.
- Supply sampling containers and shipping cartons.
- Maintain laboratory custody of sample.
- Strictly adhere to all protocols in the QAPP.

Project Manager

Responsibilities and duties include:

- Serve as primary communication link between Arcadis and laboratory technical staff.
- Monitor workloads and ensure availability of resources.
- Oversee preparation of analytical reports.
- Supervise in-house chain-of-custody (COC).

Quality Assurance Manager

Responsibilities and duties include:

- Supervise personnel reviewing and inspecting all project-related laboratory activities.
- Conduct audits of all laboratory activities.

1.2.4 NYDEC

Project Manager

Responsibilities and duties include:

- Provide NYSDEC review and approval of the monitoring reports, supporting documents, and future deliverables.
- Monitor progress of site activities.

Quality Assurance Manager

Responsibilities and duties include:

- Review and approval of the QAPP
- Review of the QA/QC portion of any submitted report
- Ensure that all activities are performed in compliance with applicable federal, state, and regional requirements.
- Perform field and laboratory audits, if necessary.

2 Project Background

2.1 Site Location and Description

The Former Gulf Oil Terminal site is located in Oceanside, Nassau County, New York. The Site consists of a partial Costco warehouse building footprint, a paved parking lot with landscaped features, and a fuel service station with a small modular building to the south. The Site is zoned for commercial and industrial use and is currently utilized for commercial use as a Costco.

The properties adjoining the Site and in the neighborhood surrounding the Site primarily include commercial and industrial properties. The properties immediately north of the Site include commercial and industrial properties;

the properties immediately east of the Site include industrial properties; and the properties to the west of the Site include commercial and industrial properties. The boundaries of the site are fully described in the metes and bounds site description that is part of the Environmental Easement provided as Appendix A in the Site Management Plan (SMP).

2.2 Site History and Summary of Activities

The site consists of three lots, Lots 502, 503, and 504. In 1931, Gulf Oil Corporation developed a portion of the site (Lot 504) as a petroleum storage terminal. Chevron acquired Gulf Oil Corporation in the mid-1980s. As part of the purchase agreement, Chevron was required to divest the northeast division. In 1986, Cumberland Farms, Inc. (CFI) purchased the northeast marketing assets of Gulf Oil Corporation from Chevron. The purchase included the Oceanside Terminal, which was transferred to CFI in May 1986. In December 1993, CFI, in a joint venture with Catamount Petroleum LP (Catamount), formed Gulf Oil Limited Partnership (Gulf). CFI owned two-thirds of Gulf as a limited partner, and Catamount owned one-third of Gulf as the general partner. In September 2005, CFI exercised its option to buy out Catamount and reorganized Gulf under a new general partner. However, ownership percentages of Gulf did not change during the reorganization. In 2015, the site was sold to Coremark L.L.C., who has leased the property to Costco. The site is currently developed as a Costco Wholesale Warehouse facility.

Operation of the petroleum storage terminal ceased in the early 1990s. Demolition of the 2003. The remaining on-site buildings (maintenance building, office building, and several small buildings associated with historical petroleum terminal operations) were demolished in 2005.

The site has undergone extensive investigation and remediation since the 1990s under NYSDEC oversight (Spill No. 92-03883). In January 2007, the NYSDEC accepted Lowe’s Home Centers, Inc. (Lowe’s) as a volunteer under the Brownfield Cleanup Program (BCP) – Site No. C130165. Following the decision by Lowe’s to withdraw from the BCP in 2009, the NYSDEC transferred the site into the Hazardous Waste Program (State Superfund Site). An Order on Consent and Administrative Settlement were executed between the NYSDEC and CEMC on December 23, 2009 (Index # W3-1142-09-08, Site #130165).

The following were previously located on the Gulf parcel:

- Nine large-quantity ASTs containing fuel oil, kerosene, and gasoline;
- Two small 550-gallon ASTs containing fuel oil for the on-site garage and office building;
- Three underground storage tanks (USTs) containing fuel oil (one 550-gallon, one 1,000-gallon, and one 5,000-gallon);
- One 1,000-gallon UST containing waste oil;
- A loading rack;
- A retention pond;
- A maintenance garage;
- A vapor recovery unit (VRU); and
- An office complex.

Four of the nine large ASTs were demolished prior to 2000, with the remaining five large ASTs reportedly demolished in 2003. The two 550-gallon ASTs containing fuel oil for the maintenance garage and the office building were demolished in 2005. A site map depicting the approximate locations of the former building, structures, tanks, and monitoring wells is provided on Figure 4a.

Light non-aqueous phase liquid (LNAPL), consisting of a mixture of No. 2 and No. 4 fuel oil, kerosene, and gasoline, had previously been detected in a monitoring well near the bulkhead at the southern portion of the site at a thickness up to 2.28 feet. LNAPL was also encountered near the former VRU and the former garage building. The observed occurrences of LNAPL and shallow soil impacts were addressed through a series of initial remedial measures. Measurable thicknesses of LNAPL have not been observed at the site since 2004.

In 2015, approximately four to seven feet of recycled concrete aggregate (RCA) fill from an NYSDEC-approved facility was added to the site.

A more detailed summary of the remedial activities performed at the site are described in section 2 of the SMP.

2.3 Current Status

After completion of the remedial work, some contamination was left at the site, which is hereafter referred to as “remaining contamination”. Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. An Environmental Easement granted to the NYSDEC, and recorded with the Nassau County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

3 Project Description

This section presents a description of the monitoring activities to be conducted during the SMP. Sampling activities associated with the SMP will be conducted under the following tasks:

- Groundwater investigation
- Indoor air sampling
- Sub-slab sampling

Sampling protocols to be followed during the investigation activities are detailed in the section-4 of the SMP. Samples collected during the investigation will be analyzed in accordance with the USEPA SW-846 Test Methods for Evaluating Solid Waste. Table 1 and 2 presents a list of the constituents that will be analyzed for samples collected as part of the groundwater and vapor intrusion monitoring program. Health and safety protocols to be followed by field personnel during completion of the investigation activities are discussed in the Health and Safety Plan.

A brief description of the objectives for each task associated with the groundwater monitoring is described in the SMP and briefly presented below.

3.1.1 Groundwater Monitoring

The objectives of the groundwater monitoring program are to:

- Collect groundwater samples to evaluate the natural attenuation for each water-bearing horizon- shallow fill unit and lower sand unit.

- Collect groundwater samples to evaluate the effectiveness of the remedial measures.

3.1.2 Vapor Intrusion Monitoring

The objectives of the vapor intrusion monitoring program are to:

- Conduct vapor intrusion monitoring to complete vapor intrusion pathway within the building structure and evaluate if there is an opportunity for human exposure, which warrants further analysis.
- Collect indoor air and sub soil gas samples to evaluate if subsurface source of vapor-forming chemicals is present underneath the building.

4 Quality Objectives and Criteria for Measurement Data

The DQO process, as described in the USEPA EPA QA/G-4 (2006) instruction document, is intended to provide a “logical framework” for planning field investigations. The following section addresses, in tum, each of the seven sequential steps in the EPA QA/G-4 QAPP DQO process.

<u>Step 1: State the Problem</u>

The sampling and analysis program is intended to generate data to evaluate the effectiveness of remedial actions.

<u>Step 2: Identify the Goal of the Study</u>

The initial use of the data is descriptive (distribution and concentration) and there is no decision point for this descriptive application. Subsequent to review of the descriptive information, an exposure evaluation will be performed based on the findings of the monitoring.

<u>Step 3: Identify Information Inputs</u>

Decision inputs incorporate both concentration and distribution of constituents of concern in site media. A fundamental basis for decision-making is that a sufficient number of data points of acceptable quality are available from the monitoring to support the decision. Thus, the necessary inputs for the decision are: 1) the proportion of non-rejected (usable) data points; and 2) the quantity of data needed to evaluate remedial actions.

The data will be evaluated for completeness, general conformance with requirements of this QAPP, and consistency among data sets and with historical data, as appropriate.

<u>Step 4: Define the Boundaries of the Study</u>

The Former Gulf Oil Terminal is located in Oceanside, Nassau County, New York. The site is an approximately 7.2-acre area and is bounded by the Former Exxon Terminal site which contains most of a Costco warehouse building (currently 85 percent of the Costco warehouse building footprint is located on Lots 712 and 713, which is not affiliated with the Former Gulf Terminal Consent Order, and 15 percent of the Costco warehouse building is on Lot 502), Daly Avenue, and Liotta Bros Recycling Corporation across Daly Avenue to the north.

Step 5: Developing the Analytical Approach

The decision on whether data can be used in the exposure evaluation will be based on the validation results. Following validation, the data will be flagged, as appropriate, and any use restrictions noted. The sampling plan has been devised so that the loss of any single data point will not hinder description of the distribution of constituents of concern or the development of a risk assessment. Given this, a reasonable decision rule would be that 90% of the data points not be rejected and deemed unusable for exposure evaluation purposes. Applicable actions would be evaluated, if needed based on the results of the exposure evaluation.

Step 6: Specify Performance or Acceptance Criteria

Specifications for this step call for: 1) giving forethought to corrective actions to improve data usability; and 2) understanding the representative nature of the sampling design. This QAPP has been designed to meet both specifications for this step. The sampling and analysis program has been developed based on a review of previous site data and knowledge of present Site conditions. Corrective actions are described elsewhere in the document and in the appended documents. The representative nature of the sampling design has been assured by discussion among professionals familiar with the Site and the appropriate government agencies

Step 7: Develop the Plan for Obtaining Data

The overall quality assurance objective is to develop and implement procedures for field sampling; COC, laboratory analysis, and reporting that will provide results to support the evaluation of the site data consistent with Natural Contingency Plan requirements. Specific procedures for sampling, COC, laboratory instrument calibration, laboratory analysis, data reporting, internal quality control, audits, preventive.

A DQO summary for the sampling investigation efforts is presented in the subsequent section. The summary consists of stated DQOs relative to data uses, data types, data quantity, sampling and analytical methods, and data measurement performance criteria.

4.1 Data Categories

Three data categories have been defined to address various analytical data uses and the associated QA/QC effort and methods required to achieve the desired levels of quality. These categories are:

Screening Data: Screening data affords a quick assessment of site characteristics or conditions. This DQO is applicable to data collection activities that involve a rapid, non-rigorous methods of analysis and quality assurance. This objective is generally applied to physical and/or chemical properties of samples, degree of contamination relative to concentration differences, and preliminary health and safety assessment.

Screening Data with Definitive Confirmation: Screening data allows rapid identification and quantitation, although the quantitation can be relative imprecise. This DQO is available for data collection activities that require qualitative and/or quantitative verification of a select portion of sample findings (10% or more). This objective can also be used to verify less rigorous laboratory-based methods.

Definitive Data: Definitive data are generated using analytical methods such as approved USEPA reference methods. Data are analyte-specific, with confirmation of analyte identity and concentration. Methods produce raw data (e.g. chromatograms, spectra, digital values) in the form of paper printouts or computer-generated electronic files.

It is anticipated that both screening and definitive data categories will be used during the investigation. Field parameters (e.g. turbidity, conductivity, temperature, and pH) which will be obtained during water column sampling for use in qualitatively interpreting other site data will be determined using screening techniques. All remaining parameters will be determined using definitive techniques.

For this project, the level of data reporting will be:

Level 4 – Full Reporting: Full "CLP-type" reporting is used for those analytes that, based on intended data use, require full documentation. This reporting level should be equivalent to NYSDEC ASP Category B reporting.

Field Investigations

As part of the monitoring activities, field investigations will be conducted to support the DQOs. Details of the field sampling investigations are described in the field sampling procedure plans and SMP.

5 Special Training Requirements/Certification

In compliance of the Occupational Safety and Health Administration's (OSHA) final rule. "Hazardous Waste: Operations and Emergency Response, 29 Code of Federal Regulations 1910.120(e)", all personnel performing sampling activities at the site, except as noted below, will have completed the requirements for OSHA 40-hour Hazardous Waste Operations and Emergency Response initial training and current 8-hour refresher training. Persons in field supervisory positions will have also completed the additional OSHA 8 hours Supervisory Training.

Prior to the commencement of field activities, copied of applicable training certificates for subcontractor personnel will be provided to Arcadis for verification of training requirements. Training certificates for Arcadis personnel working on the site are maintained at Arcadis' main headquarters in Highlands Ranch, Colorado. Arcadis employees are provided training, as necessary, for the completion of projects, as determined by Arcadis' corporate Health and Safety Officer and Education and Training department. Subcontractor personnel will be required to provide verification of training (i.e. copied of records/certificates) prior to performing sampling activities at the site. Copied of training certificates and records will be kept in the project files.

6 Documentation and Records

6.1 General

Samples of the various media will be collected as described in the field sampling procedures plan. Detailed descriptions of the documentation and reporting requirements are presented below.

6.2 Sample Designation System

6.2.1 Sample Codes

Samples will be identified with a unique system that will facilitate sample tracking. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events and conditions. An alpha-numeric system is considered appropriate and will be used by field personnel to assign each sample with a unique sample identification number. The sample identification will begin with two letters indicating the sample type and two digits indicating the sequential sample number collected from the location.

The samples types will be designated using the following codes:

Groundwater – “MW”

Trip Blank – “TB”

Equipment Rinse Blank – “RB”

The two-digit sample number beginning with “01” will be assigned in the field and incremented by one as samples are collected from one to the next.

Additional sample volumes collected for matrix spike (MS) and matrix spike duplicate (MSD) analysis will be noted on the COC forms, and the associated additional sample containers will be labeled with the appropriate suffix (MS or MSD). Rinse blanks will use to same coding scheme noted above, substituting the location code with the prefix “RB” (e.g. the first rinse blank associated with soil collection would be the named RBSD01). Field duplicates will be labeled as ordinary field samples with a unique identification number (e.g. the first field duplicate associated collection would be named DUPGW01). Duplicate samples will not be identified and the laboratory will analyze them as “blind” quality control samples.

6.2.2 Field Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and sample COC. This documentation constitutes of a record that allows reconstruction of all field events to aid in the data review and interpretation process. All documents, records, and information relating to the performance of the field work will be retained in the project file.

The various forms of documentation to be maintained throughout the action include:

- <u>Daily Production Documentation</u> - A field notebook consisting of a waterproof, bound notebook that will contain a record of all activities performed at the Site.
- <u>Sampling information</u> – Detailed notes will be made as to the exact sampling location, physical observations, and weather conditions (as appropriate).
- <u>Sample COC</u> – COC forms will provide the record of responsibility for sample collection, transport, and submittal to the laboratory. COC forms will be filles out at each sampling site, at a group of sampling sites, or at the end of each day of sampling by Arcadis field personnel designated to be responsible for sample custody. In the event the samples are relinquished by the designated sampling person to other sampling or field personnel, the COC form will be signed and dates by the appropriate personnel to document the sample transfer. The original COC form will accompany the samples to the laboratory, and copies will be forwarded to the project files. A sample COC form is included in Attachment 3.

  Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with, In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

- Field Equipment, Calibration, and Maintenance Logs – To document the calibration and maintenance of field instrumentation, calibration and maintenance logs will be maintained for each piece of field equipment thar is not factory-calibrated.

6.3 Laboratory Documentation Files

6.3.1 Laboratory Project Files

The laboratory will establish a file for all pertinent data. The file will include all correspondence, faxed information, phone logs, and COC forms. The laboratory will retain all project files and data packages for a period of 10 years.

6.3.2 Laboratory Logbooks

Workbooks, bench sheets, instrument logbooks, and instrument printouts will be used to trace the history of samples through the analytical process and document important aspects of the work, including the associated quality controls. As such, logbooks, bench sheets, instrument logs, and instrument printouts will be part of the permanent record of the laboratory.

Each page or entry will be dated and initialed by the analyst at the time of entry. Errors in entry will be crossed out in indelible ink with a single stroke, corrected without the use of white-out or by obliterating or writing directly over the erroneous entry, and initialed and dated by the individual making the correction. Pages of logbooks that are not used will be completed by lining out unused portions. Information regarding the sample, analytical procedures performed, and the results of the testing will be recorded on laboratory forms or personal notebook pages by the analyst. These notes will be dated and will also identify the analyst, the instrument used, and the instrument conditions.

Laboratory notebooks will be periodically reviewed by the laboratory group leaders for accuracy, completeness, and compliance to this QAPP. All entries and calculations will be verified by the laboratory group leader. If all entries on the pages are correct, then the laboratory group leader will initial and date the pages. Corrective action will be taken for incorrect entries before the laboratory group leader signs.

6.3.3 Computer Tape and Hard Copy Storage

All electronic files and deliverables will be retained by the laboratory for not less than 5 years; hard copy data packages (or electronic copies) will also be retained for not less than 5 years.

6.4 Data Reporting Requirements

Data will be reported both in the field and by the analytical laboratory, as described below.

6.4.1 Field Data Reporting

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks or data sheets and/or on forms. Such data will be reviewed by the appropriate Task Manager for adherence to the SMP for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

If applicable, field data forms and calculations will be processed and included in appendices to the appropriate reports (when generated). The original field logs, documents, and data reductions will be kept in the project file at the Arcadis office in Syracuse, New York.

6.4.2 Laboratory Data Reporting

The laboratory is responsible for preparing Level 4 data packages for all volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), inorganics, and general chemistry reduced data packages, and case narratives for all other analyses.

All data reports for all parameters will include, at a minimum, the following items:

Narrative: Summary of activities that took place during the course of sample analysis, including the following information:

- Laboratory name and address
- Date of sample receipt
- Cross-reference of laboratory identification number to contractor sample identification
- Analytical methods used
- Deviations from specified protocol
- Corrective action taken

Analytical Results: Reported according to analysis type and including the following information, as acceptable:

- Sample ID
- Laboratory ID
- Date of collection
- Date of receipt
- Date of extraction
- Date of analysis
- Detection limits

Sample results on the report forms will be collected for dilutions. Soil samples will be reported on a dry weight basis. Unless otherwise specified, results will be reported uncorrected for blank contamination.

The data for VOCs, SVOCs, inorganics, and general chemistry will be expanded to include all supporting documentation necessary to provide a Level 4 data package. This additional documentation will include, but is not limited to, all raw data required to recalculate any result, including printouts, chromatograms, and quantitation reports. The report also will include standards used in calibration and calculation of analytical results; sample extraction, digestion, and other preparation logs; standard preparation logs, instrument run logs; and moisture content calculations.

6.5 Project File

Project documentation will be placed in project files according to Arcadis requirements. Generally, field data and laboratory reports are filed by calendar year and task.

Documents and records are retained on site in Arcadis' offices, and off site at project sites, and storage facilities (e.g., Document Systems, Inc.). All corporate records and documents, regardless of where they are retained, are filed using the standard filing system. The most current and frequently used records are kept on site in filing cabinets or other record storage areas. Records accessed less frequently than once per month may be sent to storage and retrieved, as needed. Records must be stored in facilities that provide a suitable environment to prevent loss and minimize deterioration, tampering or damage. Such facilities may have controlled access. Electronic documents, data, databases, and electronic communication are stored within files and folders located on computerized hard disk servers. Network servers are located at all Arcadis offices. Files stored on these servers are "backed-up" daily in the event that the integrity of the electronic files is compromised.

7 Sampling Process Design

Information regarding the sampling design and rationale and associated sampling locations can be found in the SMP.

8 Sampling Method Requirements

Source materials, groundwater will be collected as described in the field sampling plan procedures (Appendix H of the SMP). The field sampling plan procedures also contain procedures that will be followed to measure water levels; collect groundwater samples; perform field measurements; and handle, package, and ship collected samples. Prior to any round of sampling, the consultant will confirm all analytical methods, methodology, current detection limits, standards, and protocols are up to date with the most current sampling program.

9 Sample Handling and Custody Requirements

9.1 Sample Containers and Preservation

Appropriate sample containers, preservation methods, and laboratory holding times for groundwater samples are discussed in laboratory standard operating procedures (Attachment 1).

The analytical laboratory will supply appropriate sample containers and preservatives, as necessary. The bottles will be purchased pre-cleaned according to USEPA Office of Solid Waste and Emergency Response Directive 9240.05A requirements. The field personnel will be responsible for properly labeling containers and preserving samples (as appropriate). Sample labeling procedures are discussed in Section 9.2.2.

9.2 Field Custody Procedures

The objective of field sample custody is to assure that samples are not tampered with from the time of sample collection through time of transport to the analytical laboratory. Persons will have “custody of samples” when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel.

Field custody documentation consists of both field logbooks and field COC forms.

9.2.1 Field Logbooks

Field logbooks will provide the means of recording data collecting activities performed. As such, entries will be described in as much detail as possible so that persons going to the Site could reconstruct a particular situation without reliance on memory.

Field logbooks will be bound field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in a secure location when not in use. Each logbook will be identified by the project specific document number. The title page of each logbook will contain the following:

- Person to whom the logbook is assigned
- Logbook number
- Project name
- Project start date
- End date

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used, and the signature of the person making the entry will be entered. The names of visitors to the Site, field sampling or investigation team personnel, and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. Entries will be made in ink, and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected or a measurement is made, a detailed description of the location of the station shall be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures documented in the field sampling procedures plan and SMP. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, volume, and number of containers. Sample identification numbers will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

9.2.2 Sample Labelling

Preprinted sample labels will be affixed to sample bottles prior to delivery at the sampling site. The following information is required on each sample label:

- Project
- Date collected
- Time collected
- Location
- Sampler
- Analysis to be performed
- Preservative
- Sample number

9.2.3 Field COC Forms

Completed COC forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field. The COC forms will contain the unique sample identification number, sample date and time, sample description, sample type, preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory. Copies of the COC will be made prior to shipment (or multiple copy forms used) for field documentation. The COC forms will remain with the samples at all times. The samples and signed COC forms will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express) or hand delivered to a mobile or permanent laboratory or placed in secure storage.

Sample labels will be completed for each sample using waterproof ink. The labels will include sample information such as: sample number and location, type of sample, date and time of sampling, sampler's name or initials, preservation, and analyses to be performed. The completed sample labels will be affixed to each sample bottle and covered with clear tape.

Whenever samples are split with a government agency or other party, a separate COC will be prepared for those samples and marked to indicate with whom the samples are being split. The person relinquishing the samples to the facility or agency should request the representatives signature acknowledging sample receipt. If the representative is unavailable or refuses, this is noted in the “Received by” space.

9.3 Management of Investigation Derived Materials and Wastes

Management of investigation-derived materials and wastes will be performed consistent with the USEPA guidance Guide to Management of Investigation – Derived Wastes, 9345.3-03FS, dated January 1992. Disposable equipment (including personal protective equipment) and debris will be containerized and appropriately labeled during the sampling events, and will be disposed of accordingly. All purged groundwater and water generated during equipment decontamination will be returned to the treatment system. Equipment will be decontaminated, as appropriate, as discussed in the field sampling procedures plan. All soil cuttings associated with drilling of monitoring wells will also be collected and temporally stored onsite in a 55-gallon drum(s), and disposed of properly following receipt of analytical results.

9.4 Packing, Handling, and Shipping Requirements

Sample packaging and shipment procedures are designed to insure that the samples will arrive at the laboratory, with the COC, intact.

Samples will be packaged for shipment as outlined below:

- Ensure that sample containers have the sample labels securely affixed to the container with clear packing tape.
- Check the caps on the sample containers to ensure that they are properly sealed.
- Wrap the sample container cap with clear packing tape to prevent it from becoming loose.
- Complete the COC form with the required sampling information and unsure that the recorded information matches the sample labels. NOTE: If the designated sampler relinquishes the samples to other sampling or field personnel for packing or other purposes, the sampler will complete the COC prior to this transfer. The appropriate personnel will sign and date the COC form to document the sample custody transfer.
- Using duct tape, secure the outside drain plug at the bottom of the cooler.
- Wrap sample containers in bubble wrap or other cushioning material.
- Place 1 to 2 inches of cushioning material at the bottom of the cooler.
- Place the sealed sample containers into the cooler.
- Place ice in plastic bags and seal. Place loosely in the cooler.
- Fill the remaining space in the cooler with cushioning material.
- Place COC forms in a plastic bag and seal. Tape the forms to the inside of the cooler lid.
- Close the lid of the cooler, lock, and secure with duct tape.
- Wrap strapping tape around both ends of the cooler at least twice.
- Mark the cooler on the outside with the following information: shipping address, return address, “Fragile” labels, and arrows indicating “this side up”. Cover the labels with clear plastic tape. Place a signed custody seal over the sample cooler lid.

Samples will be hand-delivered or delivered by an express carrier within 48 hours of the time of collection. Shipments will be accompanied by the COC form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records. If the samples are sent by common carrier, a bill of lading will be used. Receipts or bills of lading will be retained as part of the permanent project documentation. Commercial carriers are not required to sign off on the COC form as long as the forms are sealed inside the sample cooler and the custody seals remain intact.

Sample custody seals and packing materials for filled sample containers will be provided by the analytical laboratory. The filled, labeled, and sealed containers will be placed in a cooler on ice and carefully packed to eliminate the possibility of container breakage.

9.5 Laboratory Custody Procedures

9.5.1 General

Upon sample receipt, laboratory personnel will be responsible for sample custody. The original field COC form will accompany all samples requiring laboratory analysis. The laboratory will use COC guidelines described in the USEPA guidance documents. Samples will be kept secured in the laboratory until all stages of analysis are complete. All laboratory personnel having samples in their custody will be responsible for documenting and maintaining sample integrity.

9.5.2 Sample Receipt and Storage

Immediately upon sample receipt, the laboratory sample custodian will verify the cooler seal, open the cooler, and compare the contents against the field COC. If a sample container is missing, a sample container is received broken, the sample is in an inappropriate container, or has not been preserved by appropriate means, the Arcadis PM or APM will be notified. The laboratory sample custodian will be responsible for logging the samples in, assigning a unique laboratory identification number to each sample, labeling the sample bottle with the laboratory identification number, and moving the sample to an appropriate storage location to await analysis. The project name, field sample code, date sampled, date received, analysis required, storage location and date, and action for final disposition will be recorded in the laboratory tracking system. Relevant custody documentation will be placed in the project file.

9.5.3 Sample Analysis

Analysis of an acceptable sample will be initiated by worksheets that contain all pertinent information for analysis.

Samples will be organized into sample delivery groups (SDGs) by the laboratory. A SDG may contain up to 20 field samples (field duplicates, trip blanks, and rinse blanks are considered field samples for the purposes of SDG assignment). All field samples assigned to a single SDG shall be received by the laboratory over a maximum of 7 calendar days and must be processed through the laboratory (preparation, analysis, and reporting) as a group. Every SDG must include a minimum of one site-specific MS/MSD pair, which shall be received by the laboratory at the start of the SDG assignment.

9.5.4 Sample Storage Following Analysis

Samples will be maintained by the laboratory for at least one month after the final report is delivered to Arcadis. The laboratory will be responsible for the eventual and appropriate disposal of the samples. The analytical laboratory will inform Arcadis before any samples are disposed. Unused portions of the samples, sample extracts and associated wastes will be disposed of by the laboratory in accordance with applicable rules and regulations as specified in their standard operating procedure (SOP) for waste disposal.

10 Analytical Method Requirements

10.1 Field Parameters and Methods

Field analytical procedures will include the measurement of pH, turbidity, temperature, conductivity, and groundwater levels.

10.2 Laboratory Parameters and Methods

The methods listed below include the range of analyses expected to be performed. The associated laboratory SOPs can be found in Attachment 1.

Laboratory analytical requirements presented in the sub-sections below include a general summary of requirements, specifics related to each sample medium to be analyzed, and details of the methods to be used for this project. SW-846 methods with NYSDEC ASP Category B reporting deliverables will be required for all analytes.

EPA Method 8270 has been modified to include analysis of the following SVOCs: 9,10-anthracenedione, 1,4-dihydroxy-9,10-anthracenedione, 1-hydroxy-9,10-anthracenedione, 0-chloroaniline, (z)-9-octadecenamide, 2-methyl-benzenamine and p-aminotoluene. The calibration curves, purity of standard documentation, and the demonstration of capability for the additional SVOCs is included in Attachment 1 along with the SOP for EPA Method 8270.

10.2.1 General

The following tables summarize general analytical requirements:

Table	Title
Table 1	Parameters, Methods, and Target Reporting Limits for groundwater samples
Table 2	Parameters, Methods, and Target Reporting Limits for sub-slab and indoor air samples

10.2.2 Sample Matrices

10.2.2.1 Groundwater

Analyses will be performed following the methods listed in Table 1.

Analytical Requirements

The primary sources to describe the analytical methods to be used during the investigation are provided in USEPA SW-846 Test Methods for Evaluating Solid Waste, Third Edition, Update IV, USEPA Methods for

Chemical Analysis of Water and Waste with method specified QA/QC. Reporting deliverables requirements will be NYSDEC ASP Category B or equivalent.

10.2.2.2 Vapor Intrusion

Analyses will be performed following the methods listed in Table 2.

Analytical Requirements

The primary sources to describe the analytical methods to be used during the investigation are provided in EPA TO-15 and EPA Method 18-Modified. Reporting deliverables requirements will be NYSDEC ASP Category B or equivalent.

11 Quality Control Requirements

11.1 Quality Assurance Indictors

The overall quality assurance objective for this QAPP is to develop and implement procedures for sampling, COC, laboratory analysis, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action, such that valid data will be generated. These procedures are presented or referenced in the following sections of the QAPP. Specific quality control checks are discussed in Section 11.2.

Quality assurance indicators are generally defined in terms of five parameters:

1. Representativeness
2. Comparability
3. Completeness
4. Precision
5. Accuracy
6. Sensitivity

Each parameter is defined below. Specific objectives for the site actions are set forth in other sections of this QAPP as referenced below.

11.1.1 Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions and is dependent on sampling and analytical variability and the variability of environmental media at the Site. The actions have been designed to assess the presence of the chemical constituents at the time of sampling. The SMP presents the rationale for sample quantities and location. This QAPP presents field sampling and laboratory analytical methodologies. The use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements are intended to provide representative data.

11.1.2 Comparability

Comparability is the degree of confidence with which one data set can be compared to another. Comparability between this investigation, and to the extent possible, with existing data will be maintained through consistent sampling and analytical methodology set forth in this QAPP, SW-846 analytical methods with NYSDEC ASP Revision 2005, QA/QC requirements, and Category B reporting deliverables, and through use of QA/QC procedures and appropriately trained personnel.

11.1.3 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the total amount that was obtained. This will be determined upon final assessment of the analytical results, as discussed in Section 11.6.

11.1.4 Precision

Precision is the measure of reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the project objectives. To maximize precision, sampling and analytical procedures will be followed. All work for this monitoring program will adhere to established protocols presented in the SMP. Checks for analytical precision will include the analysis of MSDs, laboratory duplicates, and field duplicates. Checks for field measurement precision will include obtaining duplicate field measurements. Further discussion of precision quality control checks is provided in Section 11.4.

11.1.5 Accuracy

Accuracy is the deviation of a measurement from the true value of a known standard. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, internal standards, MSs, blank spikes, and surrogates (system monitoring compounds) will be used to assess the accuracy of the laboratory analytical data. Further discussion of these quality control samples is provided in Section 11.5.

11.1.6 Sensitivity

Sensitivity is defined as the ability of the method or instrument to detect the contaminant of concern and other target compounds at the level of interest. Method detection limit (MDL) is defined as the minimum concentration of a substance that can be identified, measured, and reported with a 99 percent confidence that the analyte concentration is greater than zero and is determined from repeated analysis of a sample in a given matrix containing the analyte. MDLs have been determined as required in Title 40 of the Code of Federal Regulation (CFR) Part 136B. The reporting limit (RL) is greater than or equal to the lowest standard used to establish the calibration curve. Results greater than the MDL and less than the RL will be qualified estimated (J) by the laboratory.

11.2 Field Quality Control Checks

11.2.1 Field Measurements

To verify the quality of data using field instrumentation, duplicate measurements will be obtained and reported for all field measurements. A duplicate measurement will involve obtaining measurements a second time at the same sampling location.

11.2.2 Sample Containers

Certified-clean sample containers in accordance with Exhibit I of the NYSDEC ASP Revision 2005 (Eagle Picher pre-cleaned containers or equivalent) will be supplied by the laboratory.

11.2.3 Field Duplicates

Field duplicates will be collected from the different site materials to verify the reproducibility of the sampling methods. Field duplicates will be prepared by placing well homogenized aliquots (except samples for VOC analysis) from the same sample location into individual sample containers, which are submitted blind to the laboratory. Field duplicate water samples, sub-slab and indoor air samples for VOC analysis will constitute co-located samples rather than homogenized aliquots. In general, field duplicates will be analyzed at a 5% frequency (every 20 samples) for the chemical constituents. Ambient sample for indoor air sampling will be collected and analyzed for EPA TO-15.

11.2.4 Rinse Blanks

Rinse blanks are used to monitor the cleanliness of the sampling equipment and the effectiveness of the cleaning procedures. Rinse blanks will be prepared and submitted for analysis once per day per matrix. Rinse blanks will be prepared by filling sample containers with analyte-free water (supplied by the laboratory) which has been routed through a cleaned sampling device. When dedicated sampling devices or sample containers are used to collect the samples, rinse blanks will not be necessary.

11.2.5 Trip Blanks

Trip blanks will be used to assess whether site samples have been exposed to non-site-related volatile constituents during storage and transport. Trip blanks will be analyzed at a frequency of one per cooler containing samples to be analyzed for volatile organic constituents. A trip blank will consist of a container filled with analyte-free water (supplied by the laboratory) which remains unopened with field samples throughout the sampling event. Trip blanks will only be analyzed for VOCs.

11.3 Analytical Laboratory Quality Control Checks

11.3.1 General

Internal laboratory quality control checks will be used to monitor data integrity. These checks will include method blanks, MS/MSDs, spike blanks, internal standards, surrogate samples, calibration standards, and reference standards. Project advisory quality control limits for surrogates, duplicates and MSs are identified in Table 2. Laboratory control charts will be used to determine long-term instrument trends.

11.3.2 Method Blanks

Sources of contamination in the analytical process, whether specific analyses or interferences, need to be identified, isolated, and corrected. The method blank is useful in identifying possible sources of contamination within the analytical process. For this reason, it is necessary that the method blank is initiated at the beginning of the analytical process and encompasses all aspects of the analytical work. As such, the method blank would assist in accounting for any potential contamination attributable to glassware, reagents, instrumentation, or other sources which could affect sample analysis. One method blank will be analyzed with each analytical series associated with no more than 20 samples.

11.3.3 MS/MSDs

MS/MSDs will be used to measure the accuracy of analyte recovery from the sample matrices and will be site-specific. MS/MSD pairs will be analyzed at a 5% frequency (every 20 samples or once every week, whichever comes first). When MS recoveries are outside quality control limits, associated control sample and surrogate spike recoveries will be evaluated, as applicable, to attempt to verify the reason for the deviation and determine the effect on the reported sample results.

11.3.4 Surrogate Spikes

Surrogates are compounds which are unlikely to occur under natural conditions that have properties similar to the analytes of interest. This type of control is primarily used for organic samples analyzed by gas chromatography/mass spectrometry (GC/MS) and GC methods and is added to the samples prior to purging or extraction. The surrogate spike is utilized to provide broader insight into the proficiency and efficiency of an analytical method on a sample-specific basis. This control reflects analytical conditions that may not be attributable to sample matrix. If surrogate spike recoveries exceed specified quality control limits, the analytical results need to be evaluated thoroughly in conjunction with other control measures. In the absence of other control measures, the integrity of the data may not be verifiable and reanalysis of the samples with additional control may be necessary.

Surrogate spike compounds will be selected utilizing the guidance provided in the analytical methods.

11.3.5 Laboratory Duplicates

For inorganics, laboratory duplicates may be analyzed to assess laboratory precision. Laboratory duplicates are defined as a separate aliquot of an individual sample that is analyzed as a separate sample

11.3.6 Calibration Standards

Calibration check standards analyzed within a particular analytical series provide insight regarding the instruments' stability. A calibration check standard will be analyzed at the beginning and end of an analytical series, or periodically throughout a series containing a large number of samples. In general, calibration check standards will be analyzed after every 12 hours, or more frequently, as specified in the applicable analytical method. In analyses where internal standards are used, a calibration check standard will only be analyzed in the beginning of an analytical series. If results of the calibration check standard exceed specified tolerances, then all samples analyzed since the last acceptable calibration check standard will be reanalyzed.

Laboratory instrument calibration standards will be selected utilizing the guidance provided in the analytical methods, as summarized in Section 13.

11.3.7 Internal Standards

Internal standard areas and retention times will be monitored for organic analyses performed by GC/MS methods. Method-specified internal standard compounds will be spiked into all field samples, calibration standards, and quality control samples after preparation and prior to analysis. If internal standard areas in one or more samples exceed the specified tolerances, the cause will be investigated, the instrument will be recalibrated if necessary, and all affected samples will be reanalyzed. The acceptability of internal standard performance will be determined using the guidance provided within the analytical methods.

11.3.8 Reference Standards/Control Samples

Reference standards are standards of known concentration and independent in origin from the calibration standards. The intent of reference standard analysis is to provide insight into the analytical proficiency within an analytical series. This includes preparation of calibration standards, validity of calibration, sample preparation, instrument set-up, and the premises inherent in quantitation. Reference standards will be analyzed at the frequencies specified within the analytical methods.

11.4 Data Precision Assessment Procedures

Field precision is difficult to measure because of temporal variations in field parameters. However, precision will be controlled through the use of experienced field personnel, properly calibrated meters, and duplicate field measurements. Field duplicates will be used to assess precision for the entire measurement system including sampling, handling, shipping, storage, preparation, and analysis. Laboratory data precision for analyses will be monitored through the use of MS/MSD and/or laboratory duplicates.

The precision of data will be measured by calculation of the relative percent difference (RPD) by the following equation:

$$RPD = \frac{A - B}{(A + B)/2} x100$$

Where:

A = Analytical results from one of two duplicate measurements

B = Analytical results from the second measurement

11.5 Data Accuracy Assessment Procedures

The accuracy of field measurements will be controlled by experienced field personnel, properly calibrated field meters, and adherence to established protocols. The accuracy of field meters will be assessed by review of calibration and maintenance logs.

Laboratory accuracy will be assessed via the use of MSs, surrogate spikes, internal standards, and reference standards. Where available and appropriate, quality assurance Performance Standards will be analyzed periodically to assess laboratory accuracy. Accuracy will be calculated in terms of percent recovery as follows:

$$\%\ Recovery = \frac{A - X}{B} x100$$

Where:

A = Value measured in spiked sample or standard

X = Value measured in original sample

B = True value of amount added to sample or true value of standard

This formula is derived under the assumption of constant accuracy over the original and spiked measurements. If any accuracy calculated by this formula is outside of the acceptable levels, data will be evaluated to determine whether the deviation represents unacceptable accuracy, or variable, but acceptable accuracy.

11.6 Data Completeness Assessment Procedures

Completeness of a field or laboratory data set will be calculated by comparing the number of valid sample results generated to the total number of results generated.

$$Completeness = \frac{Number\ valid\ results}{Total\ number\ of\ results\ generated} x100$$

As a general guideline, overall project completeness is expected to be at least 90%. The assessment of completeness will require professional judgment to determine data usability for intended purposes.

12 Instrument/Equipment Testing, Inspection, and Maintenance Requirements

12.1 General

Testing and maintenance schedules have been developed for both field and laboratory instruments. A summary of the testing and maintenance activities to be performed is presented below.

12.2 Field Instruments and Equipment

Prior to field sampling, each piece of field equipment will be inspected to ensure that it is operational. If the equipment is not operational, it will be serviced prior to its use. All meters which require charging or batteries will be fully charged and have fresh batteries. If instrument servicing is required, it is the responsibility of the appropriate Field Manager and/or onsite personnel to follow the maintenance schedule and arrange for timely service. Field instruments will be maintained according to the manufacturers' instructions.

Logbooks or calibration logs will be kept for each field instrument. Each log will contain records of operation, maintenance, calibration, and any problems and repairs. The log for each piece of equipment shall be maintained in project records. The Field Managers will review calibration and maintenance logs.

12.2.1 Equipment Maintenance

All measuring and test equipment to be used in support of the groundwater monitoring activities that directly affect the quality of the analytical data shall be subject to preventative maintenance measures that minimize equipment downtime. Equipment will be examined to certify that it is in operating condition. This includes checking the manufacturer's operating manual to ensure that all maintenance requirements are being observed. Field notes from previous sampling events will be reviewed to ensure that any prior equipment problems are not overlooked and that any necessary repairs to equipment have been carried out.

Field equipment returned from a site will be inspected to confirm that it is in working order. The inspection will be recorded in the logbook or field notebooks, as appropriate. It will also be the obligation of the last user to record any equipment problems in the logbook. Non-operational field equipment will either be repaired or replaced. Appropriate spare parts will be made available for field meters. Consultant-/subcontractor-owned or leased equipment maintenance shall be in accordance with the manufacturer's instructions.

12.3 Laboratory Instruments and Equipment

12.3.1 General

Laboratory instrument and equipment documentation procedures include details of any observed problems, corrective measure(s), routine maintenance, and instrument repair (which will include information regarding the repair and the individual who performed the repair).

Preventive maintenance of laboratory equipment generally will follow the guidelines recommended by the manufacturer. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call from the manufacturer.

12.3.2 Instrument Maintenance

Maintenance schedules for laboratory equipment adhere to the manufacturer's recommendations. Records reflect the complete history of each instrument and specify the time frame for future maintenance. Major repairs or maintenance procedures are performed through service contracts with manufacturer or qualified contractors. Paperwork associated with service calls and preventative maintenance calls will be kept on file by the laboratory.

Laboratory Systems Managers are responsible for the routine maintenance of instruments used in the particular laboratory. Any routine preventative maintenance carried out is logged into the appropriate logbooks. The frequency of routine maintenance is dictated by the nature of samples being analyzed, the requirements of the method used, and/or the judgment of the Laboratory Systems Manager. All major instruments are backed up by comparable (if not equivalent) instrument systems in the event of unscheduled downtime. An inventory of spare parts is also available to minimize equipment/instrument downtime.

12.3.3 Equipment Monitoring

On a daily basis, the operation of balances, incubators, ovens, refrigerators, and water purification systems will be checked and documented. Any discrepancies will be immediately reported to the appropriate laboratory personnel for resolution.

13 Instrument Calibration and Frequency

13.1 Field Instruments and Equipment

The calibration of field instruments is governed by specific SOPs (Attachment 1) for the applicable field analysis method, and such procedures take precedence over the following discussion.

Field personnel are responsible for ensuring that a master calibration/maintenance log is maintained following the procedures specified for each measuring device. Where applicable, each log will include, at a minimum, the following information:

- Name of device and/or instrument calibrated
- Device/instrument serial/identification numbers
- Calibration method
- Tolerance
- Calibration standard used
- Frequency of calibration
- Date(s) of calibration(s)
- Name of person(s) performing calibration(s)

Instruments and equipment used to gather, generate, or measure environmental data will be calibrated at the intervals specified by the manufacturer or more frequently, and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications. In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service.

Equipment found to be out of tolerance during the period of use shall be removed from the field and measuring and testing activities performed using the equipment shall be addressed via the corrective action system described in Section 16.4 of this QAPP.

13.2 Laboratory Instrument and Equipment

Instrument calibration will follow the specifications provided by the instrument manufacturer or specific analytical method used. The analytical methods for chemical constituents are identified in Tables 1 and 2.

When analyses are conducted according to the USEPA SW-846 methods, the calibration procedures and frequencies specified in the applicable method will be followed, as noted in the laboratory SOPs (Attachment 1).

For analyses governed by SOPs, see the appropriate SOP for the required calibration procedures and frequencies. Records of calibrations will be filed and maintained by the laboratory. These records will be subject to quality assurance audit. For all instruments, the laboratory will maintain trained repair staff with in-house spare parts or will maintain service contracts with vendors.

All standards used in the calibration of equipment are traceable, directly or indirectly, to National Institute of Standards and Technology. All standards received shall be logged into standard receipt logs maintained by the individual analytical groups. Each group shall maintain a standards log which tracks the preparation of standards used for calibration and quality control purposes.

14 Inspection/Acceptance Requirements for Supplies and Consumables

All supplies to be used in the field and laboratory will be available when needed. They will be free of target chemicals and interferences.

All laboratory reagents will be tested for acceptability, prior to use in the analyses of site samples. All standards will be verified against a second source standard. The laboratory will follow a "first in/first out" procedure for the storage and use of all consumables to minimize the risk of contamination and degradation. The various supplies and consumables required are noted in the laboratory SOPs, which are included as an attachment to this QAPP.

15 Data Management

The purpose of the data management is to ensure that all of the necessary data are accurate and readily accessible to meet the analytical and reporting objectives of the project. The field investigations will encompass a large number of samples and analytes from a large geographic area. Due to the large amount of resulting data, the need arises for a structured, comprehensive, and efficient program for management of data.

The data management program established for the project includes field documentation and sample QA/QC procedures, methods for tracking and managing the data, and a system for filing all site-related information. More specifically, data management procedures will be employed to efficiently process the information collected such that the data are readily accessible and accurate. These procedures are described in detail in the following section.

The data management plan has five elements: 1) sample designation system; 2) field activities; 3) sample tracking and management; 4) data management system; and 5) document control and inventory.

15.1 Sample Designation System

A concise and easily understandable sample designation system is an important part of the project sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy re-sampling of select locations to evaluate data gaps, if necessary. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events or conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sampled collected, as outlined in Section 6.2.1.

15.2 Field Activities

Field activities designed to gather the information necessary to make decisions during the groundwater monitoring program process require consistent documentation and accurate record keeping. During site activities, standardized procedures will be used for documentation of field activities, data security, and quality assurance. These procedures are described in further detail in the following subsections.

15.2.1 Field Documentation

Complete and accurate record keeping is a critical component of the field investigation activities. When interpreting analytical results and identifying data trends, investigators realize that field notes are an important part of the review and validation process. To ensure that the field investigation is thoroughly documented, several different information records, each with its own specific reporting requirements, will be maintained, including:

- Field logs
- COC forms

A description of each of these types of field documentation is provided below.

Field Logs

The personnel performing the field activities will keep field logs that detail all observations and measurements made during the monitoring program. Data will be recorded directly into site-dedicated, bound notebooks, with each entry dated and signed. To ensure at any future date that notebook pages are not missing, each page will be sequentially numbered. Erroneous entries will be corrected by crossing out the original entry, initialing it, and then documenting the proper information. In addition, certain media sampling locations will be surveyed to accurately record their locations. The survey crew will use their own field logs and will supply the sampling location coordinates to the Database Administrator.

COC Forms

COC forms are used as a means of documenting and tracking sample possession from time of collection to the time of disposal. A COC form will accompany each field sample collected, and one copy of the form will be filed in the field office. All field personnel will be briefed on the proper use of the COC procedure. COC procedures and a sample form are included as Attachment 2.

Instrument Calibration Records

As part of data quality assurance procedures, field monitoring and detection equipment will be routinely calibrated. Instrument calibration ensures that equipment used is of the proper type, range, accuracy, and precision to provide data compatible with the specified requirements and desired results. Calibration procedures for the various types of field instrumentation are described in Section 13.1. In order to demonstrate that established calibration procedures have been followed, calibration records will be prepared and maintained to include, as appropriate, the following:

- Calibration date and time
- Type and identification number of equipment
- Calibration frequency and acceptable tolerances
- Identification of individual(s) performing calibration
- Reference standards used
- Calibration data
- Information on calibration success or failure

The calibration record will serve as a written account of monitoring or detection equipment QA. All erratic behavior or failures of field equipment will be subsequently recorded in the calibration log.

15.2.2 Data Security

Measures will be taken during the field investigation to ensure that samples and records are not lost, damaged, or altered. When not in use, all field notebooks will be stored at the field office or locked in the field vehicle. Access to these files will be limited to the field personnel who utilize them.

15.3 Sample Management and Tracking

A record of all field documentation will be maintained to ensure the validity of data used in the site analysis. To effectively execute such documentation, specific sample tracking and data management procedures will be used throughout the sampling program.

Sample tracking will begin with the completion of COC forms as summarized in Section 9.2.3. The completed COC forms associated with samples collected will be faxed to the QAC. Copies of all completed COC forms will be maintained in the field office. The laboratory shall verify receipt of the samples electronically (via email) on the following day.

When analytical data are received from the laboratory, the QAC will review the incoming analytical data packages against the information on the COCs to confirm that the correct analyses were performed for each sample and that results for all samples submitted for analysis were received. Any discrepancies noted will be promptly followed-up by the QAC.

15.4 Data Management System

In addition to the sample tracking system, a data management system will be implemented. The central focus of the data management system will be the development of a personal computer-based project database. The project database, to be maintained by the Database Administrator, will combine pertinent geographical, field, and analytical data. Information that will be used to populate the database will be derived from three primary sources: surveying of sampling locations, field observations, and analytical results. Each of these sources is discussed in the following sections.

15.4.1 Computer Hardware

The database will be constructed on personal computer work stations connected through a network server. The network will provide access to various hardware peripherals, such as laser printers, backup storage devices, image scanners, and modems. Computer hardware will be upgraded to industrial and corporate standards, as necessary, in the future.

15.4.2 Computer Software

The database will be written in Microsoft Access, running in a Windows operating system. Geographic information system (GIS) applications will be developed in ESRI ArcGIS, with additional customization performed with Visual Basic. Tables and other database reports will be generated through Microsoft Access in conjunction with Microsoft Excel and/or Microsoft Word. These software products will be upgraded to current industrial standards, as necessary.

15.4.3 Survey Information

In general, each location sampled as part of the groundwater monitoring program will be surveyed to ensure accurate documentation of sample locations for mapping and GIS purposes (if appropriate), to facilitate the re-sampling of select sample locations during future monitoring programs and remediation activities. The surveying activities that will occur in the field will consist of the collection of information that will be used to compute a northing and easting in state plane coordinates for each sample location and the collection of information to compute elevations relative to the National Geodetic Vertical Datum of 1988 for select sample locations, as appropriate. All field books associated with the surveying activities will be stored as a record of the project activities.

15.4.4 Field Observations

An important part of the information that will ultimately reside in the data management system for use during the project will originate in the observations that are recorded in the field.

During each sampling event, appropriate field documentation will be prepared by the field personnel who performed the sampling activities. The purpose of the documentation is to create a summary and a record of the sampling event. Items to be included are the locations sampled, the sampling methodologies used, blind duplicate and sample identification numbers, equipment decontamination procedures, personnel involved in the activity, and any noteworthy events that occurred.

15.4.5 Analytical Results

Analytical results will be provided by the laboratory in both a digital (EDD) and a pdf format. The data packages will be examined to ensure that the correct analyses were performed for each sample submitted and that all of the analyses requested on the COC form were performed. If discrepancies are noted, the QAC will be notified and will promptly follow up with the laboratory to resolve any issues.

Each data package will be validated in accordance with the procedures presented in Section 20. Any data that does not meet the specified standards will be flagged pending resolution of the issue. The flag will not be removed from the data until the issue associated with the sample results is resolved. Although flags may remain for certain data, the use of that data may not necessarily be restricted.

Following completion of the data validation, the digital files will be used to populate the appropriate database tables.

- Sample identification number
- Date sampled
- Date analyzed
- Parameter name
- Analytical result
- Units
- Detection limit
- Qualifier(s)

The individual EDDs, supplied by the laboratory in either an ASCII comma separated value format or in a Microsoft Excel worksheet, will be loaded into the appropriate database table via a custom-designed user interface Visual Basic program. Any analytical data that cannot be provided by the laboratory in electronic format will be entered manually. After entry into the database, the EDD data will be compared to the field information previously entered into the database to confirm that all requested analytical data have been received.

15.4.6 Data Analysis and Reporting

The database management system will have several functions to facilitate the review and analysis of the groundwater data. Data entry screens will be developed to assist in the keypunching of field observations. Routines will also be developed to permit the user to scan analytical data from a given site for a given media. Several output functions that have been developed by Arcadis will be appropriately modified for use in the data management system.

A valuable function of the data management system will be the generation of tables of analytical results from the project databases. The capability of the data management system to directly produce tables reduces the redundant manual entry of analytical results during report preparation and precludes transcription errors that may occur otherwise. This data management system function creates a digital comma-delimited ASCII file of analytical results and qualifiers for a given media. The ASCII file is then processed through a spreadsheet, which transforms the comma-delimited file into a table of rows and columns. Tables of analytical data will be produced as part of data interpretation tasks, the reporting of data, and the generation of the monitoring reports.

Another function of the data management system will be to create digital files of analytical results and qualifiers suitable for transfer to mapping/presentation software. A function has been created by Arcadis that creates a digital file consisting of sample location number, state plane coordinates, sampling date, and detected constituents and associated concentrations and analytical qualifiers. The file is then transferred to an AutoCAD work station, where another program has been developed to plot a location's analytical data in a "box" format at the sample location (represented by the state plane coordinates). This routine greatly reduces the redundant keypunching of analytical results and facilitates the efficient production of interpretative and presentation graphics.

The data management system also has the capability of producing a digital file of select parameters that exists in one or more of the databases. This type of custom function is accomplished on an interactive basis and is best used for transferring select information into a number of analysis tools, such as statistical or graphing programs.

16 Assessment and Response Actions

16.1 General

Performance and systems audits will be completed in the field and laboratory during the groundwater monitoring as described below.

16.2 Field Audits

The following field performance and systems audits will be completed during this project. The appropriate Field Manager will monitor field performance. Field performance audit summaries will contain an evaluation of field activities to verify that activities are performed according to established protocols. The Arcadis QAC will review field reports and communicate concerns to the Arcadis Project Manager and/or Task Managers, as appropriate. In addition, the Arcadis QAC will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures. In addition, systems audits comparing scheduled QA/QC activities from this document with actual QA/QC activities completed will be performed. The appropriate Task Manager and QAC will periodically confirm that work is being performed consistent with this QAPP and SMP.

16.3 Laboratory Audits

Internal laboratory audits are conducted by the laboratory QAC. As part of the audit, the overall performance of the laboratory staff is evaluated and compared to the performance criteria outlined in the laboratory quality assurance manual and SOPs. The results of the audits are summarized and issued to each department supervisor, the Laboratory Manager, and the Laboratory Director. A systems audit of each laboratory is also performed by the QAC to determine if the procedures implemented by each laboratory are in compliance with the quality assurance manual and SOPs.

In addition to the laboratory'=s internal audits, as participants in state and federal certification programs, the laboratory is audited by representatives of the regulatory agency issuing certification. Audits are usually conducted on a bi-annual basis and focus on laboratory conformance to the specific program protocols for which the laboratory is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation, and final reports. The audit findings are formally documented and submitted to the laboratory for corrective action, if necessary.

Arcadis reserves the right to conduct an on-site audit of the laboratory prior to the start of analyses for the project. Additional audits may be performed during the course of the project, as deemed necessary.

16.4 Corrective Action

Corrective actions are required when field or analytical data are not within the objectives specified in this QAPP. Corrective actions include procedures to promptly investigate, document, evaluate, and correct data collection and/or analytical procedures. Field and laboratory corrective action procedures for the actions are described below.

16.4.1 Field Procedures

When conducting the action field work, if a condition is noted by the field crew that would have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented by the Field Manager or a designee, will be documented on a Corrective Action Form and reported to the appropriate Arcadis Task Manager, QAC, and Project Manager.

Examples of situations that would require corrective actions are provided below:

- Protocols as defines by the QAPP has not been followed
- Equipment is not in proper working order or is not properly calibrated
- QC requirements have not been met
- Issues resulting from performance or systems audits have not been resolved

Project personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities.

16.4.2 Laboratory Procedures

In the laboratory, when a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action taken will be documented and reported to the appropriate Project Manager and QAC.

Corrective action may be initiated, at a minimum, under the following conditions:

- Specific laboratory analytical protocols have not been followed

- Protocols as defined by this QAPP have not been followed
- Predetermined data acceptance standards are not obtained
- Equipment is not in proper working order or calibrated
- Sample and test results are not completely traceable
- QC requirements have not been met
- Issues resulting from performance or systems audits have not been resolved

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities. Corrective action is initiated at a point where the problem has been identified. At whatever level this occurs (analyst, supervisor, data review, or quality control), it is brought to the attention of the laboratory QAC and, ultimately, the Laboratory Director. Final approval of any action deemed necessary is subject to the approval of the Laboratory Director.

Any corrective action deemed necessary based on system or performance audits or the results of data review will be implemented. The corrective action may include sample re-extraction, re-preparation, re-analysis, cleanup, dilutions, matrix modifications, or other activities.

17 Reports to Management

17.1 Internal Reporting

The analytical laboratory will submit analytical reports to Arcadis for review. If required, Arcadis will, in turn, submit the reports to the data validator for review. Supporting data (i.e., historic data, related field or laboratory data) will also be reviewed to evaluate data quality, as appropriate. The Arcadis Quality Assurance Manager will incorporate results of the data validation reports (if required) and assessments of data usability into a summary report (if required) that will be submitted to the Arcadis Project Manager and appropriate Task Managers. If required, this report will be filed in the project file at Arcadis and will include the following:

1. Assessment of data accuracy, precision, and completeness for both field and laboratory data
2. Results of the performance and system audits
3. Significant QA/QC problems, solutions, corrections, and potential consequences
4. Analytical data validation report

17.2 Groundwater Monitoring and Vapor Intrusion Reporting

Upon sample transport to the laboratory, a copy of the chain-of-custody will be forwarded to the Arcadis Project Manager. Upon receipt of the NYSDEC ASP - Category B Data Package from the laboratory, the Arcadis Quality Assurance Manager, or designee, will determine if the data package has met the required data quality objectives.

The analytical data package will be submitted to the Arcadis Project Manager and the analytical data will be incorporated into the monitoring report in a tabulated format. The laboratory will maintain QA records related to analyses, QC and corrective action. This information will be made available to the PM upon request. Routine reporting will include documenting all internal QC checks performed for this project.

18 Data Reduction and Review

18.1 General

After field laboratory data are obtained, the data will be subject to the following:

1. Reduction, or manipulation mathematically, or otherwise into meaningful and useful forms
2. Review
3. Organization, interpretation, and reporting
4. Data validation

18.2 Field Data Reduction and Review

18.2.1 Field Data Reduction

Information collected in the field through visual observation, manual measurement, and/or field instrumentation will be recorded in field notebooks or data sheets, and/or on forms. Such data will be reviewed by the appropriate Task Manager for adherence to this QAPP and for consistency. Concerns identified as a result of this review will be discussed with the field personnel, corrected if possible, and, as necessary, incorporated into the data evaluation process.

18.2.2 Field Data Review

Field data calculations, transfers, and interpretations will be conducted by the field personnel and reviewed for accuracy by the appropriate Field Manager or APM and the QAC. Logs and documents will be checked for:

1. General completeness
2. Readability
3. Usage of appropriate procedures
4. Appropriate instrument calibration and maintenance
5. Reasonableness in comparison to present and past data collected
6. Correct sample locations
7. Correct calculations and interpretations

18.3 Laboratory Data Reduction and Review

18.3.1 Laboratory Data Reduction

The calculations used for data reduction will be specified in each of the analytical methods referenced previously. Whenever possible, analytical data will be transferred directly from the instrument to a computerized data system. Raw data will be entered into permanently bound laboratory notebooks. The data entered are sufficient to document all factors used to arrive at the reported value.

Concentration calculations for chromatographic analyses will be based on response factors. Quantitation will be performed using internal standards for GC/MS methodology. Concentration calculations for metals and wet chemistry, if appropriate, will be based on linear regression. Non-aqueous values will be reported on a dry-weight basis. Unless otherwise specified, all values will be reported uncorrected for blank contamination.

18.3.2 Laboratory Data Review

Data will be subject to multi-level review by the laboratory. The group leader will review all data reports prior to release for final data report generation. The QAC will review the final data reports, and the QA Manager will review a cross-section of the final data reports prior to shipment to Arcadis.

If discrepancies or deficiencies exist in the analytical results, then corrective action will be taken, as discussed in Section 16. Deficiencies discovered as a result of internal data review, as well as the corrective actions to be used to rectify the situation, will be documented on a Corrective Action Form. This form will be submitted to the Arcadis Project Manager.

18.4 Data validation and Verification

All data generated for health and safety and engineering design/control purposes will be subjected to the data validation and verification procedures outlined in Section 19. Data generated for disposal purposes and monitoring will not be reviewed.

19 Data Validation and Verification

Data validation entails a review of the quality control data and the raw data to verify that the laboratory was operating within required limits, the analytical results were correctly transcribed from the instrument read outs, and which, if any, environmental samples were related to any out-of-control quality control samples. The objective of data validation is to identify any questionable or invalid laboratory measurements.

Arcadis will validate all data generated producing a NYSDEC data usability summary report for each individual SDG using the most recent versions of the USEPA's National Functional Guidelines (USEPA, 1999; 2004) and USEPA Region II SOPs for data validation available at the time of project initiation, where appropriate. These procedures and criteria may be modified as necessary to address project- specific and method-specific criteria, control limits, and procedures. Data validation will consist of data screening, checking, reviewing, editing, and interpretation to document analytical data quality and to determine whether the quality is sufficient to meet the DQOs.

The data validator will verify that reduction of laboratory measurements and laboratory reporting of analytical parameters is in accordance with the procedures specified for each analytical method and/or as specified in this QAPP. Any deviations from the analytical method or any special reporting requirements apart from that specified in this QAPP will be detailed on COC forms.

Upon receipt of laboratory data, the following procedures will be executed by the data validator:

- Evaluate completeness of data package
- Verify that field COC forms were completed and that samples were handled properly

- Verify that holding times were met for each parameter. Holding time exceedances, should they occur, will be documented. Data for all samples exceeding holding time requirements will be flagged as either estimated or rejected. The decision as to which qualifier is more appropriate will be made on a case-by-case basis.
- Verify that parameters were analyzed according to the methods specified
- Review QA/QC data (i.e. make sure duplicates, blanks, and spiked were analyzed on the required number of samples, as specified in the method; verify that duplicate and MS recoveries are acceptable).
- Investigate anomalies identified during review. When anomalies are identified, they will be discussed with the Project Manager and/or Laboratory Manager, as appropriate.
- If data appears suspect, investigate the specific data of concern. Calculations will be traced back to raw data; if calculations do not agree, the cause will be determined and corrected.

Deficiencies discovered as a result of the data review, as well as the corrective actions implemented in response, will be documented and submitted in the form of a written report addressing the following topics as applicable to each method:

- Assessment of the data package
- Description of any protocol deviations
- Failures to reconcile reported and/or raw data
- Assessment of any compromised data
- Overall appraisal of the analytical data
- Table of site name, sample quantities, matrix, and fractions analyzed

It should be noted that qualified results do not necessarily invalidate data. The goal to produce the best possible data does not necessarily mean producing data without quality control qualifiers. Qualified data can provide useful information.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results will be qualified with the following codes in accordance with National Functional Guidelines:

Concentration (C) Qualifiers

U	The analyte/compound was analyzed for but not detected. The associated value is the compound quantitation limit.
J	The compound was positively identified; however, the associated numerical value is an estimated concentration greater than the method detection limit (MDL) but less than the quantitation limit (RL).

Quantitation (Q) Qualifiers

Inorganics

B	The compound has been found in the sample as well in the associated blank, its presence in the sample may be suspect
N	The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.

JN	The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
E	The compound was quantitated above the calibration range.
D	Concentration is based in a diluted sample analysis
C	Identification confirmed by GC/MS.

Validation Qualifiers

UJ	The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may not represent the actual limit of quantitation.
UB	Compound considered non-detect at the listed value due to associated blank contamination.
R	The sample results are rejected.

Two facts will be noted to all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant QC problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

Resolution of any issues regarding laboratory performance or deliverables will be handled between the laboratory and the data validator. Suggestions for reanalysis may be made by the Arcadis QAC at this point. Data validation reports will be kept in electronic format (pdf) in the project file at the Arcadis office in Syracuse, New York.

20 Reconciliation with User Requirements

The data results will be examined to determine the performance that was achieved for each data usability criteria. The performance will then be compared with the project objectives and DQOs. Deviations from objectives will be noted. Additional action may be warranted when performance does not meet performance objectives for critical data. Options for corrective action relating to incomplete information, questionable results or inconsistent data, may include any or all of the following:

- Retrieval of missing information
- Request for additional explanation or clarification
- Reanalysis of sample from extract (when appropriate)
- Recalculation or interpretation of results by the laboratory

These actions may improve the data quality, reduce uncertainty, and may eliminate the need to quantify or reject data.

If these actions do not improve the data quality to an acceptable level, the following additional actions may be taken:

- Extrapolation of missing data from existing data points

- Use of historical data
- Evaluation of the critical/non-critical nature of the sample

If the data gap cannot be resolved by these actions, an evaluation of the data bias and potential for false negatives and positives can be performed. If the resultant uncertainty is unacceptable, the following action must be taken:

- Additional sample collection and analysis

21 References

USEPA. Guide to Management of Investigation-Derived Wastes. 9345.3-03FS. (January, 1992).

USEPA. Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA-540/R-99-008 (October 1999).

USEPA. EPA Requirements for Quality Assurance Project Plans EPA-QA/R-5. Office of Environmental Information. (March, 2001).

USEPA. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA-540/R-04-004 (October 2004).

USEPA. Guidance for Quality Assurance Project Plans. EPA-QA/G-5. Office of Environmental Information. (December, 2002).

USEPA. Test Methods for Evaluating Solid Waste. SW-846 3rd Edition, Update 4. Office of Solid Waste (December 1996).

Tables

Table 1
Parameters, Methods and Target Reporting Limits
Groundwater Samples
Former Gulf Oil Terminal, Chevron Facility #6518040
Oceanside, Township of Hempstead, New York

Parameter	Units	MDL	RL	Method
Method 8260C				
ACETONE	mg/l	0.01130000	0.05000000	8260C
BENZENE	mg/l	0.00009410	0.00100000	8260C
BROMOCHLOROMETHANE	mg/l	0.00012800	0.00100000	8260C
BROMODICHLOROMETHANE	mg/l	0.00013600	0.00100000	8260C
BROMOFORM	mg/l	0.00012900	0.00100000	8260C
BROMOMETHANE	mg/l	0.00060500	0.00500000	8260C
CARBON DISULFIDE	mg/l	0.00009620	0.00100000	8260C
CARBON TETRACHLORIDE	mg/l	0.00012800	0.00100000	8260C
CHLOROBENZENE	mg/l	0.00011600	0.00100000	8260C
CHLORODIBROMOMETHANE	mg/l	0.00014000	0.00100000	8260C
CHLOROETHANE	mg/l	0.00019200	0.00500000	8260C
CHLOROFORM	mg/l	0.00011100	0.00500000	8260C
CHLOROMETHANE	mg/l	0.00096000	0.00250000	8260C
CYCLOHEXANE	mg/l	0.00018800	0.00100000	8260C
1,2-DIBROMO-3-CHLOROPROPANE	mg/l	0.00027600	0.00500000	8260C
1,2-DIBROMOETHANE	mg/l	0.00012600	0.00100000	8260C
1,2-DICHLOROBENZENE	mg/l	0.00010700	0.00100000	8260C
1,3-DICHLOROBENZENE	mg/l	0.00011000	0.00100000	8260C
1,4-DICHLOROBENZENE	mg/l	0.00012000	0.00100000	8260C
DICHLORODIFLUOROMETHANE	mg/l	0.00037400	0.00500000	8260C
1,1-DICHLOROETHANE	mg/l	0.00010000	0.00100000	8260C
1,2-DICHLOROETHANE	mg/l	0.00008190	0.00100000	8260C
1,1-DICHLOROETHENE	mg/l	0.00018800	0.00100000	8260C
CIS-1,2-DICHLOROETHENE	mg/l	0.00012600	0.00100000	8260C
TRANS-1,2-DICHLOROETHENE	mg/l	0.00014900	0.00100000	8260C
1,2-DICHLOROPROPANE	mg/l	0.00014900	0.00100000	8260C
CIS-1,3-DICHLOROPROPENE	mg/l	0.00011100	0.00100000	8260C
TRANS-1,3-DICHLOROPROPENE	mg/l	0.00011800	0.00100000	8260C
ETHYLBENZENE	mg/l	0.00013700	0.00100000	8260C
2-HEXANONE	mg/l	0.00078700	0.01000000	8260C
ISOPROPYLBENZENE	mg/l	0.00010500	0.00100000	8260C
2-BUTANONE (MEK)	mg/l	0.00119000	0.01000000	8260C
METHYL ACETATE	mg/l	0.00129000	0.02000000	8260C
METHYL CYCLOHEXANE	mg/l	0.00066000	0.00100000	8260C
METHYLENE CHLORIDE	mg/l	0.00043000	0.00500000	8260C
4-METHYL-2-PENTANONE (MIBK)	mg/l	0.00047800	0.01000000	8260C
METHYL TERT-BUTYL ETHER	mg/l	0.00010100	0.00100000	8260C
NAPHTHALENE	mg/l	0.00100000	0.00500000	8260C
TERT-BUTYL ALCOHOL	mg/l	0.00406000	0.00500000	8260C
STYRENE	mg/l	0.00011800	0.00100000	8260C
1,1,2,2-TETRACHLOROETHANE	mg/l	0.00013300	0.00100000	8260C
TETRACHLOROETHENE	mg/l	0.00030000	0.00100000	8260C
TOLUENE	mg/l	0.00027800	0.00100000	8260C
1,2,3-TRICHLOROBENZENE	mg/l	0.00023000	0.00100000	8260C
1,2,4-TRICHLOROBENZENE	mg/l	0.00048100	0.00100000	8260C
1,1,1-TRICHLOROETHANE	mg/l	0.00014900	0.00100000	8260C
1,1,2-TRICHLOROETHANE	mg/l	0.00015800	0.00100000	8260C
TRICHLOROETHENE	mg/l	0.00019000	0.00100000	8260C
TRICHLOROFLUOROMETHANE	mg/l	0.00016000	0.00500000	8260C
1,1,2-TRICHLOROTRIFLUOROETHANE	mg/l	0.00018000	0.00100000	8260C

See Notes on Page 4.

Table 1
Parameters, Methods and Target Reporting Limits
Groundwater Samples
Former Gulf Oil Terminal, Chevron Facility #6518040
Oceanside, Township of Hempstead, New York

Parameter	Units	MDL	RL	Method
Method 8260C (cont.)				
VINYL CHLORIDE	mg/l	0.00023400	0.00100000	8260C
XYLENES, TOTAL	mg/l	0.00017400	0.00300000	8260C
TOTAL TIC	mg/l	--	--	8260C
Method 8270C				
ACETOPHENONE	mg/l	0.00020800	0.01000000	8270D
ATRAZINE	mg/l	0.00025500	0.01000000	8270D
BENZALDEHYDE	mg/l	0.00169000	0.01000000	8270D
BIPHENYL	mg/l	0.00079000	0.01000000	8270D
BIS(2-CHLORETHOXY)METHANE	mg/l	0.00011600	0.01000000	8270D
BIS(2-CHLOROETHYL)ETHER	mg/l	0.00013700	0.01000000	8270D
2,2-OXYBIS(1-CHLOROPROPANE)	mg/l	0.00021000	0.01000000	8270D
4-BROMOPHENYL-PHENYLETHER	mg/l	0.00008770	0.01000000	8270D
CAPROLACTAM	mg/l	0.00030900	0.01000000	8270D
CARBAZOLE	mg/l	0.00011100	0.01000000	8270D
4-CHLOROANILINE	mg/l	0.00023400	0.01000000	8270D
4-CHLOROPHENYL-PHENYLETHER	mg/l	0.00009260	0.01000000	8270D
DIBENZOFURAN	mg/l	0.00009700	0.01000000	8270D
3,3-DICHLOROBENZIDINE	mg/l	0.00021200	0.01000000	8270D
2,4-DINITROTOLUENE	mg/l	0.00009830	0.01000000	8270D
2,6-DINITROTOLUENE	mg/l	0.00025000	0.01000000	8270D
HEXACHLORO-1,3-BUTADIENE	mg/l	0.00009680	0.01000000	8270D
HEXACHLOROCYCLOPENTADIENE	mg/l	0.00005980	0.01000000	8270D
HEXACHLOROETHANE	mg/l	0.00012700	0.01000000	8270D
ISOPHORONE	mg/l	0.00014300	0.01000000	8270D
2-NITROANILINE	mg/l	0.00010200	0.01000000	8270D
3-NITROANILINE	mg/l	0.00008690	0.01000000	8270D
4-NITROANILINE	mg/l	0.00009100	0.01000000	8270D
NITROBENZENE	mg/l	0.00029700	0.01000000	8270D
N-NITROSODIPHENYLAMINE	mg/l	0.00237000	0.01000000	8270D
N-NITROSODI-N-PROPYLAMINE	mg/l	0.00026100	0.01000000	8270D
BENZYLBUTYL PHTHALATE	mg/l	0.00076500	0.00300000	8270D
BIS(2-ETHYLHEXYL)PHTHALATE	mg/l	0.00089500	0.00300000	8270D
DI-N-BUTYL PHTHALATE	mg/l	0.00045300	0.00300000	8270D
DIETHYL PHTHALATE	mg/l	0.00028700	0.00300000	8270D
DIMETHYL PHTHALATE	mg/l	0.00026000	0.00300000	8270D
DI-N-OCTYL PHTHALATE	mg/l	0.00093200	0.00300000	8270D
1,2,4,5-TETRACHLOROBENZENE	mg/l	0.00006470	0.01000000	8270D
4-CHLORO-3-METHYLPHENOL	mg/l	0.00013100	0.01000000	8270D
2-CHLOROPHENOL	mg/l	0.00013300	0.01000000	8270D
2-METHYLPHENOL	mg/l	0.00009290	0.01000000	8270D
3&4-METHYL PHENOL	mg/l	0.00016800	0.01000000	8270D
2,4-DICHLOROPHENOL	mg/l	0.00010200	0.01000000	8270D
2,4-DIMETHYLPHENOL	mg/l	0.00006360	0.01000000	8270D
4,6-DINITRO-2-METHYLPHENOL	mg/l	0.00112000	0.01000000	8270D
2,4-DINITROPHENOL	mg/l	0.00593000	0.01000000	8270D
2-NITROPHENOL	mg/l	0.00011700	0.01000000	8270D
4-NITROPHENOL	mg/l	0.00014300	0.01000000	8270D
PENTACHLOROPHENOL	mg/l	0.00031300	0.01000000	8270D
PHENOL	mg/l	0.00433000	0.01000000	8270D
2,4,5-TRICHLOROPHENOL	mg/l	0.00010900	0.01000000	8270D

See Notes on Page 4.

Table 1
Parameters, Methods and Target Reporting Limits
Groundwater Samples
Former Gulf Oil Terminal, Chevron Facility #6518040
Oceanside, Township of Hempstead, New York

Parameter	Units	MDL	RL		Method
Method 8270C (cont.)					
2,4,6-TRICHLOROPHENOL	mg/l	0.00010000	0.01000000		8270D
TOTAL TIC	mg/l	--	--		8270D
1-METHYLNAPHTHALENE	mg/l	0.00007900	0.00100000		8270D
2-METHYLNAPHTHALENE	mg/l	0.00011700	0.00100000		8270D
NAPHTHALENE	mg/l	0.00015900	0.00100000		8270D
Method 8270C-SIM					
ANTHRACENE	mg/l	0.00001900	0.00005000		8270C-SIM
ACENAPHTHENE	mg/l	0.00001900	0.00005000		8270C-SIM
ACENAPHTHYLENE	mg/l	0.00001710	0.00005000		8270C-SIM
BENZO(A)ANTHRACENE	mg/l	0.00002030	0.00005000		8270C-SIM
BENZO(A)PYRENE	mg/l	0.00001840	0.00005000		8270C-SIM
BENZO(B)FLUORANTHENE	mg/l	0.00001680	0.00005000		8270C-SIM
BENZO(G,H,I)PERYLENE	mg/l	0.00001840	0.00005000		8270C-SIM
BENZO(K)FLUORANTHENE	mg/l	0.00002020	0.00005000		8270C-SIM
CHRYSENE	mg/l	0.00001790	0.00005000		8270C-SIM
DIBENZ(A,H)ANTHRACENE	mg/l	0.00001600	0.00005000		8270C-SIM
DIBENZOFURAN	mg/l	0.00001910	0.00005000		8270C-SIM
FLUORANTHENE	mg/l	0.00002700	0.00010000		8270C-SIM
FLUORENE	mg/l	0.00001690	0.00005000		8270C-SIM
INDENO(1,2,3-CD)PYRENE	mg/l	0.00001580	0.00005000		8270C-SIM
NAPHTHALENE	mg/l	0.00009170	0.00025000		8270C-SIM
2-METHYLNAPHTHALENE	mg/l	0.00006740	0.00025000		8270C-SIM
PHENANTHRENE	mg/l	0.00001800	0.00005000		8270C-SIM
PYRENE	mg/l	0.00001690	0.00005000		8270C-SIM
Method 6010D					
ALUMINUM	mg/l	0.07040000	0.20000000		6010D
ALUMINUM,DISSOLVED	mg/l	0.07040000	0.20000000		6010D
ANTIMONY	mg/l	0.00430000	0.01000000		6010D
ANTIMONY,DISSOLVED	mg/l	0.00430000	0.01000000		6010D
ARSENIC	mg/l	0.00440000	0.01000000		6010D
ARSENIC,DISSOLVED	mg/l	0.00440000	0.01000000		6010D
BARIUM	mg/l	0.00089500	0.00500000		6010D
BARIUM,DISSOLVED	mg/l	0.00089500	0.00500000		6010D
BERYLLIUM	mg/l	0.00046000	0.00200000		6010D
BERYLLIUM,DISSOLVED	mg/l	0.00046000	0.00200000		6010D
CADMIUM	mg/l	0.00056300	0.00200000		6010D
CADMIUM,DISSOLVED	mg/l	0.00056300	0.00200000		6010D
CALCIUM	mg/l	0.38900000	1.00000000		6010D
CALCIUM,DISSOLVED	mg/l	0.38900000	1.00000000		6010D
CHROMIUM	mg/l	0.00500000	0.01000000		6010D
CHROMIUM,DISSOLVED	mg/l	0.00500000	0.01000000		6010D
COBALT	mg/l	0.00080700	0.01000000		6010D
COBALT,DISSOLVED	mg/l	0.00080700	0.01000000		6010D
COPPER	mg/l	0.00469000	0.01000000		6010D
COPPER,DISSOLVED	mg/l	0.00469000	0.01000000		6010D
IRON	mg/l	0.04580000	0.10000000		6010D
IRON,DISSOLVED	mg/l	0.04580000	0.10000000		6010D
LEAD	mg/l	0.00295000	0.00600000		6010D
LEAD,DISSOLVED	mg/l	0.00295000	0.00600000		6010D
MAGNESIUM	mg/l	0.11100000	1.00000000		6010D

See Notes on Page 4.

Table 1
Parameters, Methods and Target Reporting Limits
Groundwater Samples
Former Gulf Oil Terminal, Chevron Facility #6518040
Oceanside, Township of Hempstead, New York

Parameter	Units	MDL	RL		Method
Method 6010D (cont.)					
MAGNESIUM,DISSOLVED	mg/l	0.11100000	1.00000000		6010D
MANGANESE	mg/l	0.00327000	0.01000000		6010D
MANGANESE,DISSOLVED	mg/l	0.00327000	0.01000000		6010D
NICKEL	mg/l	0.00298000	0.01000000		6010D
NICKEL,DISSOLVED	mg/l	0.00298000	0.01000000		6010D
POTASSIUM	mg/l	0.51000000	2.00000000		6010D
POTASSIUM,DISSOLVED	mg/l	0.51000000	2.00000000		6010D
SELENIUM	mg/l	0.00735000	0.01000000		6010D
SELENIUM,DISSOLVED	mg/l	0.00735000	0.01000000		6010D
SILVER	mg/l	0.00191000	0.00500000		6010D
SILVER,DISSOLVED	mg/l	0.00191000	0.00500000		6010D
SODIUM	mg/l	1.40000000	3.00000000		6010D
SODIUM,DISSOLVED	mg/l	1.40000000	3.00000000		6010D
THALLIUM	mg/l	0.00431000	0.01000000		6010D
THALLIUM,DISSOLVED	mg/l	0.00431000	0.01000000		6010D
VANADIUM	mg/l	0.00634000	0.02000000		6010D
VANADIUM,DISSOLVED	mg/l	0.00634000	0.02000000		6010D
ZINC	mg/l	0.00916000	0.05000000		6010D
ZINC,DISSOLVED	mg/l	0.00916000	0.05000000		6010D
Method 5210 B-2011					
BOD (BIOCHEMICAL OXYGEN DEMAND)	mg/l	1	1		
Method 9060A					
TOC (TOTAL ORGANIC CARBON)	mg/l	0.102	1		
Method RSK175					
METHANE	mg/l	0.00291	0.01		
Method 353.2					
NITRATE-NITRITE	mg/l	0.05	0.1		
Method 4500S2 D-2011					
SULFIDE	mg/l	0.025	0.05		
Method 9056A					
NITRATE	mg/l	0.048	0.1		
NITRITE	mg/l	0.042	0.1		
SULFATE	mg/l	0.594	5		

Notes:
1. mg/kg: Milligram per kilogram
2. MDL: Method Detection Limit
3. RL: Reporting Limit
4. --: Not available
5. MDL and RL provided by Pace Analytical on July 2020.

Table 2
Parameters, Methods and Target Reporting Limits
Soil Vapor/Indoor Air
Former Gulf Oil Terminal, Chevron Facility #6518040
Oceanside, Township of Hempstead, New YorK

Compound	CAS #	Molecular Weight	MDL (ppbv)	RDL (ppbv)	MDL (ug/m3)	RDL (ug/m3)
Method TO-15SIM						
1,1,1-Trichloroethane	71-55-6	133	0.0065	0.0200	0.0353	0.1088
1,1,2,2-Tetrachloroethane	79-34-5	168	0.0087	0.0200	0.0601	0.1374
1,1,2-Trichloroethane	79-00-5	133	0.00583	0.0300	0.0317	0.1632
1,1-Dichloroethane	75-34-3	98	0.00893	0.0200	0.0358	0.0802
1,1-Dichloroethene	75-35-4	96.9	0.00921	0.0200	0.0365	0.0793
1,2-Dibromoethane	106-93-4	188	0.00779	0.0200	0.0599	0.1538
1,2-Dichloropropane	78-87-5	113	0.00885	0.0300	0.0409	0.1387
1,4-Dichlorobenzene	106-46-7	147	0.00691	0.0200	0.0415	0.1202
Benzene	71-43-2	78.1	0.01120	0.0200	0.0358	0.0639
Carbon Tetrachloride	56-23-5	154	0.00995	0.0200	0.0627	0.1260
Chloroethane	75-00-3	64.5	0.00944	0.0400	0.0249	0.1055
Chloroform	67-66-3	119	0.00729	0.0200	0.0355	0.0973
Chloromethane	74-87-3	50.5	0.01620	0.0300	0.0335	0.0620
Cis-1,2-Dichloroethene	156-59-2	96.9	0.14200	0.0200	0.5628	0.0793
Cis-1,3-Dichloropropene	10061-01-5	111	0.00735	0.0200	0.0334	0.0908
Ethylbenzene	100-41-4	106	0.01260	0.0300	0.0546	0.1301
Tetrachloroethylene	127-18-4	166	0.01270	0.0200	0.0862	0.1358
Trans-1,2-dichloroethene	156-60-5	96.9	0.00499	0.0200	0.0198	0.0793
Trans-1,3-Dichloropropene	10061-02-6	111	0.00711	0.0300	0.0323	0.1362
Trichloroethylene	79-01-6	131	0.00746	0.0200	0.0400	0.1072
Vinyl Acetate	108-05-4	86.1	0.01110	0.0200	0.0391	0.0704
Vinyl chloride	75-01-4	62.5	0.00765	0.0200	0.0196	0.0511
1,1,1-Trichloroethane	71-55-6	133	0.0736	0.2000	0.4004	1.0879
1,1,2,2-Tetrachloroethane	79-34-5	168	0.0743	0.2000	0.5105	1.3742
1,1,2-Trichloroethane	79-00-5	133	0.0775	0.2000	0.4216	1.0879
1,1,2-Trichlorotrifluoroethane	76-13-1	187.4	0.0793	0.2000	0.6078	1.5329
1,1-Dichloroethane	75-34-3	98	0.0723	0.2000	0.2898	0.8016
1,1-Dichloroethene	75-35-4	96.9	0.0762	0.2000	0.3020	0.7926
1,2,4-Trichlorobenzene	120-82-1	181	0.1480	0.6300	1.0956	4.6638
1,2,4-Trimethyl benzene	95-63-6	120	0.0764	0.2000	0.3750	0.9816
1,2-Dibromoethane	106-93-4	188	0.0721	0.2000	0.5544	1.5378
1,2-Dichlorobenzene	95-50-1	147	0.1280	0.2000	0.7696	1.2025
1,2-Dichloroethane	107-06-2	99	0.0700	0.2000	0.2834	0.8098
1,2-Dichloropropane	78-87-5	113	0.0760	0.2000	0.3512	0.9243
1,2-Dichlorotetrafluoroethane	76-14-2	171	0.0890	0.2000	0.6225	1.3988
1,3,5-Trimethyl benzene	108-67-8	120	0.0779	0.2000	0.3823	0.9816
1,3-butadiene	106-99-0	54.1	0.1040	2.0000	0.2301	4.4254
1,3-Dichlorobenzene	541-73-1	147	0.1820	0.2000	1.0942	1.2025
1,4-Dichlorobenzene	106-46-7	147	0.0557	0.2000	0.3349	1.2025
1,4-Dioxane	123-91-1	88.1	0.0833	0.2000	0.3002	0.7207
2,2,4-Trimethylpentane	540-84-1	114.22	0.1330	0.2000	0.6213	0.9343
2-Butanone	78-93-3	72.1	0.0814	1.2500	0.2400	3.6861
2-Chlorotoluene	95-49-8	126	0.0828	0.2000	0.4267	1.0307
2-propanol	67-63-0	60.1	0.2640	1.2500	0.6489	3.0726
4-Ethyltoluene	622-96-8	120	0.0783	0.2000	0.3843	0.9816

Table 2
Parameters, Methods and Target Reporting Limits
Soil Vapor/Indoor Air
Former Gulf Oil Terminal, Chevron Facility #6518040
Oceanside, Township of Hempstead, New YorK

Compound	CAS #	Molecular Weight	MDL (ppbv)	RDL (ppbv)	MDL (ug/m3)	RDL (ug/m3)
Method TO-15SIM						
4-Methyl-2-Pentanone	108-10-1	100.1	0.0765	1.2500	0.3132	5.1176
Acetone	67-64-1	58.1	0.5840	1.2500	1.3877	2.9703
Allyl Chloride	107-05-1	76.53	0.1140	0.2000	0.3568	0.6260
Benzene	71-43-2	78.1	0.0715	0.2000	0.2284	0.6389
Benzyl Chloride	100-44-7	127	0.0598	0.2000	0.3106	1.0389
Bromodichloromethane	75-27-4	164	0.0702	0.2000	0.4709	1.3415
Bromoform	75-25-2	253	0.0732	0.6000	0.7574	6.2086
Bromomethane	74-83-9	94.9	0.0982	0.2000	0.3812	0.7763
Carbon Disulfide	75-15-0	76.1	0.1020	0.2000	0.3175	0.6225
Carbon Tetrachloride	56-23-5	154	0.0732	0.2000	0.4611	1.2597
Chlorobenzene	108-90-7	113	0.0832	0.2000	0.3845	0.9243
Dibromochloromethane	124-48-1	208	0.0727	0.2000	0.6185	1.7014
Chloroethane	75-00-3	64.5	0.0996	0.2000	0.2627	0.5276
Chloroform	67-66-3	119	0.0717	0.2000	0.3490	0.9734
Chloromethane	74-87-3	50.5	0.1030	0.2000	0.2127	0.4131
Cis-1,2-Dichloroethene	156-59-2	96.9	0.0784	0.2000	0.3107	0.7926
Cis-1,3-Dichloropropene	10061-01-5	111	0.0689	0.2000	0.3128	0.9080
Cyclohexane	110-82-7	84.2	0.0753	0.2000	0.2593	0.6888
Dichlorodifluoromethane	75-71-8	120.92	0.1370	0.2000	0.6775	0.9891
Ethanol	64-17-5	46.1	0.2650	0.6300	0.4997	1.1879
Ethylbenzene	100-41-4	106	0.0835	0.2000	0.3620	0.8671
Heptane	142-82-5	100	0.1040	0.2000	0.4254	0.8180
Hexachloro-1,3-Butadiene	87-68-3	261	0.1050	0.6300	1.1209	6.7252
Hexane	110-54-3	86.18	0.2060	0.6300	0.7261	2.2206
Isopropylbenzene	98-82-8	120.2	0.0777	0.2000	0.3820	0.9832
m&p-Xylene	1330-20-7	106	0.1350	0.4000	0.5853	1.7342
Methyl Butyl Ketone	591-78-6	100	0.1330	1.2500	0.5440	5.1125
Methyl Methacrylate	80-62-6	100.12	0.0876	0.2000	0.3587	0.8190
MTBE	1634-04-4	88.1	0.0647	0.2000	0.2331	0.7207
Methylene chloride	75-09-2	84.9	0.0979	0.2000	0.3399	0.6945
Naphthalene	91-20-3	128	0.3500	0.6300	1.8323	3.2982
o-Xylene	95-47-6	106	0.0828	0.2000	0.3590	0.8671
Propene	115-07-1	42.1	0.0932	0.4000	0.1605	0.6888
Styrene	100-42-5	104	0.0788	0.2000	0.3352	0.8507
Tetrachloroethylene	127-18-4	166	0.0814	0.2000	0.5527	1.3579
Tetrahydrofuran	109-99-9	72.1	0.0734	0.2000	0.2164	0.5898
Toluene	108-88-3	92.1	0.0870	0.2000	0.3277	0.7534
Trans-1,2-dichloroethene	156-60-5	96.9	0.0673	0.2000	0.2667	0.7926
Trans-1,3-Dichloropropene	10061-02-6	111	0.0728	0.2000	0.3305	0.9080
Trichloroethylene	79-01-6	131	0.0680	0.2000	0.3643	1.0716
Trichlorofluoromethane	75-69-4	137.4	0.0819	0.2000	0.4602	1.1239
Vinyl Acetate	108-05-4	86.1	0.1160	0.2000	0.4085	0.7043
Vinyl Bromide	593-60-2	106.96	0.0852	0.2000	0.3727	0.8749
Vinyl chloride	75-01-4	62.5	0.0949	0.2000	0.2426	0.5112

Attachment 1

Groundwater, Soil Vapor, Indoor Air Parameters, Laboratory Methods and Procedures

Pace Analytical®
www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: of

Section A **Required** Client Information:	**Section B** **Required** Project Information:	**Section C** Invoice Information:
Company:	Report To:	Attention:
Address:	Copy To:	Company Name:
		Address:
Email To:	Purchase Order No.:	Pace Quote Reference:
Phone: Fax:	Project Name:	Pace Project Manager:
Requested Due Date/TAT:	Project Number:	Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ________

Site Location
STATE: ________

Matrix Codes

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

	Section D **Required** Client Information			COLLECTED						*Preservatives*								**Requested Analysis Filtered (Y/N)**														
				COMPOSITE START		COMPOSITE END/GRAB												Y/N														
ITEM #	**SAMPLE ID** (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	DATE	TIME	DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	**Analysis Test**													Residual Chlorine (Y/N)	**Pace Project No./ Lab I.D.**
1																																
2																																
3																																
4																																
5																																
6																																
7																																
8																																
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER:

SIGNATURE of SAMPLER: **DATE Signed (MM/DD/YY):**

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Instructions for completing Chain of Custody (COC)

1. **Section A and B:** Complete all Client information at top of sheet: company name, address, phone, fax, contact (the person to contact if there are questions, and who will receive the final report.), e-mail address (if available), PO#, Project Name and/or Project Number as you would like to see it appear on the report.

2. **Section C:** Invoice Information: Billing information is included in this section. This information should include the name and address of the person receiving the invoice.

3. Quote Reference should be completed if a quotation was provided by Pace Analytical. The Project Manager, and Profile No. will be completed by Pace Analytical Services.

4. **Site Location:** A separate COC must be filled out for each day of sample collection. Record the two letter postal code for the US state in which the samples were collected.

5. **Regulatory Agency:** List the program that is guiding the work to ensure proper regulations are followed.

6. **Section D:** Complete a Sample Description in the "SAMPLE ID' section as you would like it to appear on the laboratory report. The following information should also be included: the sample matrix, sample type (G (grab) or C (composite). When collecting a composite, the start time and end time should be documented in the respective boxes. The collection time for a grab (G) sample should be entered in the boxes marked 'Composite End/Grab'), Sample temp at collection (if required by state), the total number of containers, and preservative used.

7. Mark if the sample was filtered in the field by marking Y or N in 'Filtered' row by the Analysis requested.

8. Requested Analysis: List the required analysis and methods on the lines provided and place a check in the column for the samples requiring the analysis. Additional comments should be referenced in the bottom left hand corner or include attachments for extended lists of parameters.

9. The sampler should print their name in the space provided and sign their name followed by the date of the sampling event at the bottom of the COC in the spaces designated for 'SAMPLER NAME AND SIGNATURE'.

10. When relinquishing custody of the samples to a representative of the laboratory or other organization, indicate the Item Numbers of those samples being transferred; sign relinquished by, date and time, and include your affiliation.

***Important Note:**

Standard Turnaround Time is 2 Weeks/10 business days. Results will be delivered by end of business on the date due unless other arrangements have been made with your project manager.

Special Project Requirements such as Low Level Detection Limits or level of QC reported must be included on the chain of custody in the Additional Comments section.

SOP - SAMPLE CHAIN OF CUSTODY

Rev: #1

Rev Date: May 23, 2017

VERSION CONTROL

Revision No	Revision Date	Page No(s)	Description	Reviewed by
0	April 19, 2017	All	Re-write to COC only	Richard Murphy
1	May 23, 2017	4	Add: Guidance on use of previous version of SOP.	Peter Frederick
		9	Add: Info on COCs for multiple shipping containers	
		7	Modify: Move letter i. to letter m. and change to “when appropriate”	

APPROVAL SIGNATURES

Prepared by:		05/23/2017
	Peter C. Frederick	Date:
Technical Expert Reviewed by:		05/23/2017
	Richard J. Murphy	Date:

1 INTRODUCTION

This document describes general and/or specific procedures, methods, actions, steps, and considerations to be used and observed by Arcadis staff when performing work, tasks, or actions under the scope and relevancy of this document. This document may describe expectations, requirements, guidance, recommendations, and/or instructions pertinent to the service, work task, or activity it covers.

It is the responsibility of the Arcadis Certified Project Manager (CPM) to provide this document to the persons conducting services that fall under the scope and purpose of this procedure, instruction, and/or guidance. The Arcadis CPM will also ensure that the persons conducting the work falling under this document are appropriately trained and familiar with its content. The persons conducting the work under this document are required to meet the minimum competency requirements outlined herein, and inquire to the CPM regarding any questions, misunderstanding, or discrepancy related to the work under this document.

This document is not considered to be all inclusive nor does it apply to all projects. It is the CPM's responsibility to determine the proper scope and personnel required for each project. There may be project- and/or client- and/or state-specific requirements that may be more or less stringent than what is described herein. The CPM is responsible for informing Arcadis and/or Subcontractor personnel of omissions and/or deviations from this document that may be required for the project. In turn, project staff are required to inform the CPM if or when there is a deviation or omission from work performed as compared to what is described herein.

In following this document to execute the scope of work for a project, it may be necessary for staff to make professional judgment decisions to meet the project's scope of work based upon site conditions, staffing expertise, regulation-specific requirements, health and safety concerns, etc. Staff are required to consult with the CPM when or if a deviation or omission from this document is required that has not already been previously approved by the CPM. Upon approval by the CPM, the staff can perform the deviation or omission as confirmed by the CPM.

2 SCOPE AND APPLICATION

This Standard Operating Procedure (SOP) describes the general Chain of Custody (COC) procedures and guidance instructions for samples collected from project sites that are relinquished from Arcadis' possession.

COC is defined as the maintenance of an unbroken record of possession of an item from the time of its collection through some analytical or testing procedure. COC is typically documented by a written record of the collection, possession, and handling of samples collected from a project location. Each sample will be tracked by a documented record that efficiently documents the individuals who were responsible for the sample during each successive transfer of that sample to various recipients beyond Arcadis' possession. This information can be used to legally establish the integrity of the samples and therefore the analytical results derived from the samples. This information can be used in addition to other records and documentation regarding the samples, such as field forms, field logs, and photographs.

A sample is considered under custody if:

- It is in your possession; or
- It is in your view, after being in your possession; or
- It was in your possession and then you then locked it up to prevent tampering; or
- It is in a designated secure area.

Continued use of previous version of SOP:

Although not recommended, Arcadis program-, project-, and client-teams may be able to use the previous version of this SOP provided that it meets all of the quality expectations of Arcadis and client, and meets applicable regulatory requirements. It is up to the program, project, and/or client-team leader to determine whether it is appropriate to adopt the current SOP or to continue using the previous version.

However, all new work not associated with the previous version of this SOP must be performed with the current version of the SOP.

When adopting this new SOP, users of the previous versions must be aware that specific handling, packing, and shipping procedures and guidance has been removed and that those should be addressed within program or project plans (e.g. QAPPs, Work Plans, SAPs, etc.) or in a more detailed SOP or TGI specific to that sampling activity, whether related to media, constituent/analyte, client, state, etc.

In addition, adopting this new SOP will require users to refer to the Arcadis DOT Safety Program for procedures and guidance on the determination and handling, packing, and shipping of samples that are or may be considered hazardous materials.

3 PERSONNEL QUALIFICATIONS

Arcadis personnel performing work under the purview of this SOP will have received appropriate training and have field experience regarding the collection of samples from project locations. Arcadis personnel will have all other applicable and appropriate training relevant to the sampling work and project site.

4 EQUIPMENT LIST

The following list provides materials that may be required for each COC. Project reporting and documentation requirements must be reviewed with the CPM prior to execution of work. Additional materials, tools, equipment, etc. may be required, and project staff are required to verify with the CPM and/or Technical Expert what specific equipment is required to complete the COC.

- Indelible ink pen (preferably either black or blue ink);
- COC form https://thesourceus.arcadissource.com/TKI/Documents/COC%20Form.pdf (**Appendix A**) from either Arcadis, laboratory receiving and analyzing the samples, or other applicable and appropriate entity for the work performed;
- When appropriate, such as for litigation or expert testimony work, custody seals or tape.

5 CAUTIONS

One way in which the law tries to ensure the integrity of evidence is by requiring proof of the chain of custody by the party who is seeking to introduce a particular piece of evidence.

A proper chain of custody requires three types of affirmations: (1) affirmation that a sample is what it purports to be (for example, soil collected from a specified location and depth); (2) affirmation of continuous possession by each individual who has had possession of the sample from the time it is collected until the time it is analyzed or held by a laboratory; and (3) affirmation by each person who has had possession that sample remained in substantially the same condition and not contaminated or affected by outside influences from the moment one person took possession until the moment that person released the evidence into the custody of another (for example, affirmation that the sample was stored in a secure location where no one but the person in custody had access to it).

Proving chain of custody is necessary to "lay a foundation" for the samples in question, by showing the absence of alteration, substitution, or change of condition.

Ensure that appropriate sample containers with applicable preservatives, coolers, and packing material are planned for and provided at the site at the time of sample collection.

Understand the offsite transfer requirements of the samples for the facility at which samples are collected.

If overnight courier service is required schedule pick-up or know where the drop-off service center is located and the hours of operation.

An Arcadis employee appropriately trained at the correct level of internal hazardous materials/DOT (Department of Transportation) shipping must complete an Arcadis shipping determination to address applicable DOT and IATA (International Air Transport Association) shipping requirements. Review the applicable Arcadis procedures and guidance instructions for sample packaging, and labeling. Prior to using air transportation, confirm air shipment is acceptable under DOT and IATA regulations.

The person relinquishing possession of the samples or other member of the project team should contact the final recipient of the samples to confirm receipt and review any special provisions on the COC or questions that they may have.

6 HEALTH AND SAFETY CONSIDERATIONS

Follow the health and safety procedures outlined in the project/site Health and Safety Plan (HASP) as well as other applicable H&S requirements, such as:

- Arcadis Hazardous Material/DOT handling, packaging, and shipping training
- Project site-specific H&S training
- Client-specific H&S training
- Constituent-specific H&S training
- Media-specific H&S training

7 PROCEDURE

Collected samples must be uniquely identified, and properly documented, containerized, labeled with unique identifier, possessed in a secure manner during remainder of sampling event, packaged, and shipped to recipient laboratory.

Sample Identification

The method of sample identification depends on the type of measurement or analyses performed. In some cases, in-situ measurements of existing conditions and/or sample location must be made during sample collection. These data will be recorded directly on field forms, logbooks, or other project record data sheets used to permanently retain this information for the project file. Examples of location identification information includes: latitude/longitudinal measurements, compass directions, well number, building number, floor number, room name, or proximity to a site feature unique to the site. Examples of in-situ measurements are pH, temperature, conductivity, flow measurement, or physical condition of the media being sampled. Physical samples collected are identified by a unique identifying number or code on a sample tag or label. These physical samples are removed from the sample location and transported to a laboratory for analyses.

In some cases, before samples are placed into individual containers and labeled as individual samples, samples may be separated into portions depending upon the analytical methods and required duplicate or triplicate analyses to be performed.

When completing a COC for samples, personnel must complete the following:

1. Written COCs must be completed with indelible ink (preferably either black or blue colored ink).
2. Written COCs must be completed using legible printed writing, and not cursive writing.
3. All entry fields on the COC form must be completed. If information is not applicable for a specific entry field, personnel will either put "N/A" or use a strike-out line or dash like "-----------" to indicate no applicable information is needed for that field.
4. Use of quotation marks or lines/down arrows to represent repetitive/duplicative text in similar fields.
5. Regardless of the type or specific COC form, the following pertinent information must be provided on the COC form:
    a. Arcadis project number
    b. Arcadis project name
    c. Project location, including street address, city, state, building number, providing as much detail as appropriate
    d. Recipient laboratory contact and sample receiving shipping location information
    e. Entities'/persons' contact information for who will be receiving analytical results
    f. Name of sampler, i.e. person collecting sample and relinquishing possession of samples to the next entity in the chain of custody
    g. Date of sample collection

  h. If appropriate for the sample media, contaminant/constituent of concern, or analytical method, document time of sample collection using standard military time

  i. Sample analytical method(s)

  j. Turnaround time required for analyses and/or reporting

  k. Instructions to laboratory regarding handling, timing, analyses, etc. as applicable and appropriate

  l. Printed name and signature of the individual person who collected the samples and relinquishing possession of the samples

  m. If appropriate or when documentation of the specific sample collection method will influence how the laboratory handles, prepares, or analyzes the samples, document the sample collection methodology used for collecting the samples (e.g. ASTM D5755)

6. The following additional specific information will be entered on the COC form, regardless of what type of COC is being used:

   a. <u>Unique Sample Identifier</u> – The sample identifier (ID) must be unique to the individual sample it is applied to. The information in which the sample ID conveys is determined by the CPM, Technical Expert, and/or other project team members in advance of sample collection so that sample identification is consistently applied for the project. The sample nomenclature may be dictated by a specific client, program, or project database and require unique identification for each sample collected for the project. Consult with the CPM and/or Technical Expert for additional information regarding sample identification.

      The sample ID could convey specific information regarding the sample to aid personnel in recognizing what the sample represents, or they may be arbitrary so as to facilitate the anonymity of the sample location, media, constituent of concern, project site, etc.

      Examples of unique identifiers include:

      1. Well locations, grid points, or soil boring identification numbers (e.g., MW-3, X-20, SB-30). When the depth interval is included, the complete sample ID would be "SB-30 (0.5-1.0) where the depth interval is in feet. Please note it is very important that the use of hyphens in sample names and depth units (i.e., feet or inches) remain consistent for all samples entered on the chain of custody form. DO NOT use the apostrophe or quotes in the sample ID.

      2. Sample names may also use the abbreviations "FB," "TB," and "DUP" as prefixes or suffixes to indicate that the sample is a field blank, trip blank, or field duplicate, respectively.

   b. List the date of sample collection. All indicated dates must be formatted using either mm/dd/yy (e.g., 03/07/09) or mm/dd/yyyy (e.g. 03/07/2009).

   c. When appropriate for the analytical procedure used, list the local time that the sample was collected. The time value should be presented using military format. For example, 3:15 P.M. should be entered as 15:15.

d. Samples should be indicated to be either “Grab” or “Composite”. Grab samples are collected from only one unique location at one specific point in time.

e. Composite samples are a group of individual samples that are combined for analysis in their totality. Composite samples need to be documented if they are either collected from a number of different locations over a broader area to be representative of the entire area being sampled, or if they are representative of a single location over an extended period of time.

f. If used, preservatives for the individual sample will be noted.

g. The requested analytical method(s) that the samples are being analyzed for must be indicated. As much detail, as necessary, should be presented to allow the analytical laboratory to properly analyze the samples. For example, polychlorinated biphenyl (PCB) analyses may be represented by entering “EPA Method 8082 – PCBs” or “EPA PLM 600-R93-116.” In cases where multiple analytical methods and/or analytical parameters are required for an individual sample, each method should be indicated for the sample (e.g., EPA 8082/8260/8270 or EPA PLM/400-point count).

h. If there are project-specific sample analytes to be reported, they should be specifically listed for each individual sample (e.g., 40 CFR 264 Appendix IX).

i. The total number of containers for each analytical method requested should be documented. This information may be included under the parameter or as a total for the sample.

j. When necessary, note which samples should be used for site specific matrix spikes.

k. Indicate special project-specific requirements pertinent to the handling, shipping, or analyses. These requirements may be on a per sample basis such as “extract and hold sample until notified,” or may be used to inform the laboratory of special reporting requirements for the entire sample delivery group (SDG).

l. Indicate turnaround time (TAT) required for samples on COC. If individual samples have differing TATs, the different TATs for each sample or groups of samples must be clearly indicated.

m. Provide contact name and phone number in the event that problems are encountered when samples are received at the laboratory. The person relinquishing possession of the samples or other member of the project team should contact the final recipient of the samples to confirm receipt and review any special provisions on the COC or questions that they may have.

n. If available, attach the Laboratory Task Order or Work Authorization forms.

o. The “Relinquished By” field must contain the signature of the Arcadis person who relinquished custody of the samples to the next entity in the chain of custody, which may be another person, the shipping courier, or the analytical laboratory.

p. Dates and times must be indicated using the following format:

   1) Date: either mm/dd/yy e.g., 01/01/17 <u>OR</u> mm/dd/yyyy e.g., 01/01/2017

   2) Time: use military format, e.g. 9:30 a.m. is 0930 and 9:30 p.m. is 2130

   q. The “Received By” section is signed by sample courier or laboratory representative who received the samples from the sampler or it is signed upon laboratory receipt from the overnight courier service.

4. When more than one page of the COC form is required to complete the total number of samples, use as many sheets as necessary to accurately and clearly document the samples and information. Some COCs may have a standard first page/cover page, and subsequent pages may not contain all the detailed fields as the first page/cover page. Ensure that any subsequent pages convey all of the necessary and pertinent information for each individual sample as required in this procedure document.
5. Pages of the COC must retain a page count of the total number of pages; e.g., Page 1 of 3, Page 2 of 3, Page 3 of 3.
6. Upon completing the COC forms, forward the original signed COC with the sample package. Ensure that the original COC form is secured with the sample package so that it remains with the physical samples for the duration of transport and handling to its final destination and ensure that the COC form will not be become damaged or rendered unreadable due to sample breakage/leakage if stored inside the sample shipping container or outside influences if COC is stored in an outside plastic pouch to the container.
7. If you’ve collected enough samples that would require more than one container to ship them all to the same laboratory or location, then each separate/individual container that contains any number of samples must have a separate COC representing only those samples contained within that specific container. For example, if you have 3 total shipping containers for all of your samples, you must have a total of 3 separate, individual COCs for each of the 3 containers representing only those samples in their representative container. Thus, every container holding samples must have its own, individual COC.
8. If electronic chain of custody (eCOC) forms are utilized, ensure that the requirements of this procedure and guidance instructions are followed to the extent possible. Verify that proper signature and COC procedures are maintained with the CPM and/or Technical Expert when using eCOC.

8 WASTE MANAGEMENT

Not Applicable.

9 DATA RECORDING AND MANAGEMENT

The original signed COC shall be submitted with the samples. Copies of COC records will be transmitted to the CPM or designee at the end of each day unless otherwise directed by the CPM. The sampling team leader retains copies of the chain of custody forms for filing in the project file. Record retention shall be in accordance with client- and project-specific requirements and Arcadis policies, the most stringent will apply.

10 QUALITY ASSURANCE

COC forms will be legibly completed in accordance with this procedure and guidance instruction document, as well as other applicable and appropriate project documents such as Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), Work Plan, or other project guidance documents.

COC records will be reviewed by the CPM or their appropriate designee for completeness and accuracy to the applicable requirements. Non-conformances will be noted and corrected in a timely manner on the copies retained by Arcadis as well as contacting the ultimate receiving entity for correction to the originally signed COC in their possession.

11 REFERENCES

Arcadis Client Document Retention Guide

Arcadis Transportation Safety Program requirements, procedures, and guidance instructions

EPA Samplers' Guide – Contract Laboratory Program Guidance for Field Samplers, EPA document EPA-540-R014-013 October 2014

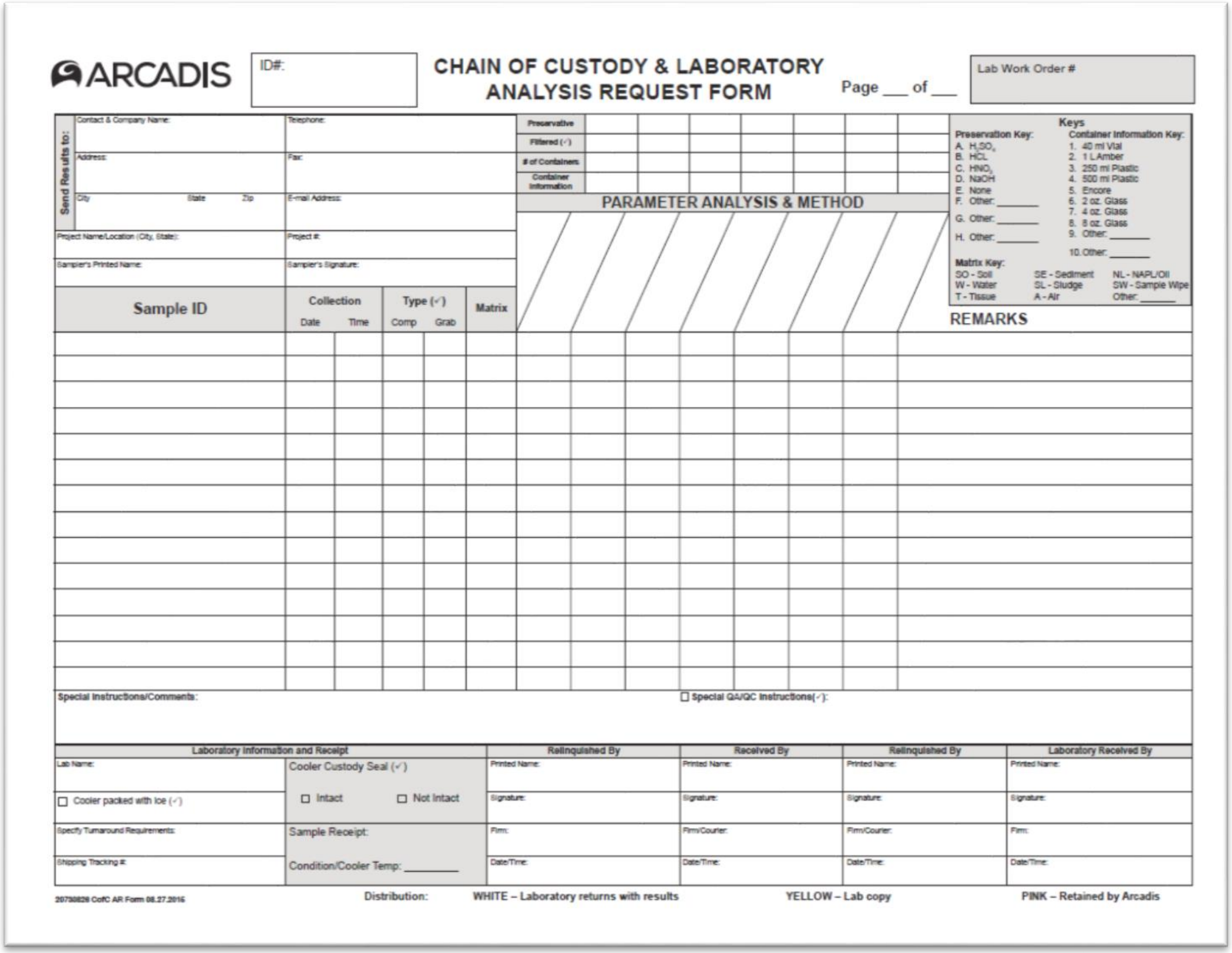
EPA Region III – *Sample Submission Procedures for the Office of Analytical Services and Quality Assurance (OASQA) Laboratory Branch* revision 13.0 January 29, 2014

EPA Region I Office Environmental Measurement and Evaluation – *Standard Operating Procedures for Chain of Custody of Samples* revision 1 March 25, 2002

EPA Region IV Science and Ecosystem Support Division *Operating Procedure for Sample and Evidence Management* January 29, 2013

APPENDIX A
Chain of Custody Form

[click image below to access form]



ARCADIS

ID#:

CHAIN OF CUSTODY & LABORATORY ANALYSIS REQUEST FORM

Page ___ of ___

Lab Work Order #

Send Results to:	Contact & Company Name:	Telephone:
	Address:	Fax:
	City State Zip	E-mail Address:
Project Name/Location (City, State):		Project #:
Sampler's Printed Name:		Sampler's Signature:

Preservative							
Filtered (✓)							
# of Containers							
Container Information							

PARAMETER ANALYSIS & METHOD

Keys

Preservation Key:
- A. H_2SO_4
- B. HCL
- C. HNO_3
- D. NaOH
- E. None
- F. Other: ______
- G. Other: ______
- H. Other: ______

Container Information Key:
- 1. 40 ml Vial
- 2. 1 L Amber
- 3. 250 ml Plastic
- 4. 500 ml Plastic
- 5. Encore
- 6. 2 oz. Glass
- 7. 4 oz. Glass
- 8. 8 oz. Glass
- 9. Other: ______
- 10. Other: ______

Matrix Key:

SO - Soil	SE - Sediment	NL - NAPL/Oil
W - Water	SL - Sludge	SW - Sample Wipe
T - Tissue	A - Air	Other: ______

Sample ID	Collection		Type (✓)		Matrix								REMARKS
	Date	Time	Comp	Grab									

Special Instructions/Comments:

☐ **Special QA/QC Instructions(✓):**

Laboratory Information and Receipt		Relinquished By	Received By	Relinquished By	Laboratory Received By
Lab Name:	Cooler Custody Seal (✓)	Printed Name:	Printed Name:	Printed Name:	Printed Name:
☐ Cooler packed with ice (✓)	☐ Intact ☐ Not Intact	Signature:	Signature:	Signature:	Signature:
Specify Turnaround Requirements:	Sample Receipt:	Firm:	Firm/Courier:	Firm/Courier:	Firm:
Shipping Tracking #:	Condition/Cooler Temp: ______	Date/Time:	Date/Time:	Date/Time:	Date/Time:

20730828 CofC AR Form 08.27.2016

Distribution: WHITE – Laboratory returns with results YELLOW – Lab copy PINK – Retained by Arcadis

APPENDIX A

Chain of Custody Form

[click image below to access form]

Attachment 2

Chain of Custody Form and Arcadis Chain of Custody SOP

METHOD 8260C
VOLATILE ORGANIC COMPOUNDS BY GAS CHROMATOGRAPHY/ MASS SPECTROMETRY (GC/MS)

SW-846 is not intended to be an analytical training manual. Therefore, method procedures are written based on the assumption that they will be performed by analysts who are formally trained in at least the basic principles of chemical analysis and in the use of the subject technology.

In addition, SW-846 methods, with the exception of required method use for the analysis of method-defined parameters, are intended to be guidance methods which contain general information on how to perform an analytical procedure or technique which a laboratory can use as a basic starting point for generating its own detailed Standard Operating Procedure (SOP), either for its own general use or for a specific project application. The performance data included in this method are for guidance purposes only, and are not intended to be and must not be used as absolute QC acceptance criteria for purposes of laboratory accreditation.

1.0 SCOPE AND APPLICATION

1.1 This method is used to determine volatile organic compounds in a variety of solid waste matrices. This method is applicable to nearly all types of samples, regardless of water content, including various air sampling trapping media, ground and surface water, aqueous sludges, caustic liquors, acid liquors, waste solvents, oily wastes, mousses, tars, fibrous wastes, polymeric emulsions, filter cakes, spent carbons, spent catalysts, soils, and sediments. The following RCRA analytes have been determined by this method:

		Appropriate Preparation Technique[a]					
Compound	CAS No.[b]	5030/ 5035	5031	5032	5021	5041	Direct Inject.
Acetone	67-64-1	ht	c	c	nd	c	c
Acetonitrile	75-05-8	pp	c	nd	nd	nd	c
Acrolein (Propenal)	107-02-8	pp	c	c	nd	nd	c
Acrylonitrile	107-13-1	pp	c	c	nd	c	c
Allyl alcohol	107-18-6	ht	c	nd	nd	nd	c
Allyl chloride	107-05-1	c	nd	nd	nd	nd	c
t-Amyl ethyl ether (TAEE)	919-94-8	c / ht	nd	nd	c	nd	c
t-Amyl methyl ether (TAME)	994-05-8	c / ht	nd	nd	c	nd	c
Benzene	71-43-2	c	nd	c	c	c	c
Benzyl chloride	100-44-7	c	nd	nd	nd	nd	c
Bis(2-chloroethyl)sulfide	505-60-2	pp	nd	nd	nd	nd	c
Bromoacetone	598-31-2	pp	nd	nd	nd	nd	c
Bromochloromethane	74-97-5	c	nd	c	c	c	c
Bromodichloromethane	75-27-4	c	nd	c	c	c	c
4-Bromofluorobenzene (surr)	460-00-4	c	nd	c	c	c	c
Bromoform	75-25-2	c	nd	c	c	c	c
Bromomethane	74-83-9	c	nd	c	c	c	c
n-Butanol	71-36-3	ht	c	nd	nd	nd	c
2-Butanone (MEK)	78-93-3	pp	c	c	nd	nd	c

		Appropriate Preparation Technique[a]					
Compound	CAS No.[b]	5030/ 5035	5031	5032	5021	5041	Direct Inject.
t-Butyl alcohol	75-65-0	ht	c	nd	nd	nd	c
Carbon disulfide	75-15-0	c	nd	c	nd	c	c
Carbon tetrachloride	56-23-5	c	nd	c	c	c	c
Chloral hydrate	302-17-0	pp	nd	nd	nd	nd	c
Chlorobenzene	108-90-7	c	nd	c	c	c	c
Chlorobenzene-d_5 (IS)		c	nd	c	c	c	c
Chlorodibromomethane	124-48-1	c	nd	c	nd	c	c
Chloroethane	75-00-3	c	nd	c	c	c	c
2-Chloroethanol	107-07-3	pp	nd	nd	nd	nd	c
2-Chloroethyl vinyl ether	110-75-8	c	nd	c	nd	nd	c
Chloroform	67-66-3	c	nd	c	c	c	c
Chloromethane	74-87-3	c	nd	c	c	c	c
Chloroprene	126-99-8	c	nd	nd	nd	nd	c
Crotonaldehyde	4170-30-3	pp	c	nd	nd	nd	c
1,2-Dibromo-3-chloropropane	96-12-8	pp	nd	nd	c	nd	c
1,2-Dibromoethane	106-93-4	c	nd	nd	c	nd	c
Dibromomethane	74-95-3	c	nd	c	c	c	c
1,2-Dichlorobenzene	95-50-1	c	nd	nd	c	nd	c
1,3-Dichlorobenzene	541-73-1	c	nd	nd	c	nd	c
1,4-Dichlorobenzene	106-46-7	c	nd	nd	c	nd	c
1,4-Dichlorobenzene-d_4 (IS)		c	nd	nd	c	nd	c
cis-1,4-Dichloro-2-butene	1476-11-5	c	nd	c	nd	nd	c
trans-1,4-Dichloro-2-butene	110-57-6	c	nd	c	nd	nd	c
Dichlorodifluoromethane	75-71-8	c	nd	c	c	nd	c
1,1-Dichloroethane	75-34-3	c	nd	c	c	c	c
1,2-Dichloroethane	107-06-2	c	nd	c	c	c	c
1,2-Dichloroethane-d_4 (surr)		c	nd	c	c	c	c
1,1-Dichloroethene	75-35-4	c	nd	c	c	c	c
trans-1,2-Dichloroethene	156-60-5	c	nd	c	c	c	c
1,2-Dichloropropane	78-87-5	c	nd	c	c	c	c
1,3-Dichloro-2-propanol	96-23-1	pp	nd	nd	nd	nd	c
cis-1,3-Dichloropropene	10061-01-5	c	nd	c	nd	c	c
trans-1,3-Dichloropropene	10061-02-6	c	nd	c	nd	c	c
1,2,3,4-Diepoxybutane	1464-53-5	c	nd	nd	nd	nd	c
Diethyl ether	60-29-7	c	nd	nd	nd	nd	c
Diisopropyl ether (DIPE)	108-20-3	c / ht	nd	nd	c	nd	c
1,4-Difluorobenzene (IS)	540-36-3	c	nd	nd	nd	c	nd
1,4-Dioxane	123-91-1	ht	c	c	nd	nd	c
Epichlorohydrin	106-89-8	I	nd	nd	nd	nd	c
Ethanol	64-17-5	I	c	c	nd	nd	c
Ethyl acetate	141-78-6	I	c	nd	nd	nd	c
Ethylbenzene	100-41-4	c	nd	c	c	c	c
Ethylene oxide	75-21-8	pp	c	nd	nd	nd	c
Ethyl methacrylate	97-63-2	c	nd	c	nd	nd	c

		Appropriate Preparation Technique[a]					
Compound	CAS No.[b]	5030/ 5035	5031	5032	5021	5041	Direct Inject.
Fluorobenzene (IS)	462-06-6	c	nd	nd	nd	nd	nd
Ethyl tert-butyl ether (ETBE)	637-92-3	c / ht	nd	nd	c	nd	c
Hexachlorobutadiene	87-68-3	c	nd	nd	c	nd	c
Hexachloroethane	67-72-1	I	nd	nd	nd	nd	c
2-Hexanone	591-78-6	pp	nd	c	nd	nd	c
Iodomethane	74-88-4	c	nd	c	nd	c	c
Isobutyl alcohol	78-83-1	ht / pp	c	nd	nd	nd	c
Isopropylbenzene	98-82-8	c	nd	nd	c	nd	c
Malononitrile	109-77-3	pp	nd	nd	nd	nd	c
Methacrylonitrile	126-98-7	pp	I	nd	nd	nd	c
Methanol	67-56-1	I	c	nd	nd	nd	c
Methylene chloride	75-09-2	c	nd	c	c	c	c
Methyl methacrylate	80-62-6	c	nd	nd	nd	nd	c
4-Methyl-2-pentanone (MIBK)	108-10-1	pp	c	c	nd	nd	c
Methyl tert-butyl ether (MTBE)	1634-04-4	c / ht	nd	nd	c	nd	c
Naphthalene	91-20-3	c	nd	nd	c	nd	c
Nitrobenzene	98-95-3	c	nd	nd	nd	nd	c
2-Nitropropane	79-46-9	c	nd	nd	nd	nd	c
N-Nitroso-di-n-butylamine	924-16-3	pp	c	nd	nd	nd	c
Paraldehyde	123-63-7	pp	c	nd	nd	nd	c
Pentachloroethane	76-01-7	I	nd	nd	nd	nd	c
2-Pentanone	107-87-9	pp	c	nd	nd	nd	c
2-Picoline	109-06-8	pp	c	nd	nd	nd	c
1-Propanol	71-23-8	ht / pp	c	nd	nd	nd	c
2-Propanol	67-63-0	ht / pp	c	nd	nd	nd	c
Propargyl alcohol	107-19-7	pp	I	nd	nd	nd	c
β-Propiolactone	57-57-8	pp	nd	nd	nd	nd	c
Propionitrile (ethyl cyanide)	107-12-0	ht	c	nd	nd	nd	pc
n-Propylamine	107-10-8	c	nd	nd	nd	nd	c
Pyridine	110-86-1	I	c	nd	nd	nd	c
Styrene	100-42-5	c	nd	c	c	c	c
1,1,1,2-Tetrachloroethane	630-20-6	c	nd	nd	c	c	c
1,1,2,2-Tetrachloroethane	79-34-5	c	nd	c	c	c	c
Tetrachloroethene	127-18-4	c	nd	c	c	c	c
Toluene	108-88-3	c	nd	c	c	c	c
Toluene-d_8 (surr)	2037-26-5	c	nd	c	c	c	c
o-Toluidine	95-53-4	pp	c	nd	nd	nd	c
1,2,4-Trichlorobenzene	120-82-1	c	nd	nd	c	nd	c
1,1,1-Trichloroethane	71-55-6	c	nd	c	c	c	c
1,1,2-Trichloroethane	79-00-5	c	nd	c	c	c	c
Trichloroethene	79-01-6	c	nd	c	c	c	c
Trichlorofluoromethane	75-69-4	c	nd	c	c	c	c
1,2,3-Trichloropropane	96-18-4	c	nd	c	c	c	c
Vinyl acetate	108-05-4	c	nd	c	nd	nd	c

		Appropriate Preparation Technique[a]					
Compound	CAS No.[b]	5030/ 5035	5031	5032	5021	5041	Direct Inject.
Vinyl chloride	75-01-4	c	nd	c	c	c	c
o-Xylene	95-47-6	c	nd	c	c	c	c
m-Xylene	108-38-3	c	nd	c	c	c	c
p-Xylene	106-42-3	c	nd	c	c	c	c

[a] See Sec. 1.2 for other appropriate sample preparation techniques
[b] Chemical Abstract Service Registry Number

c = Adequate response by this technique
ht = Method analyte only when purged at 80°C
nd = Not determined
I = Inappropriate technique for this analyte
pc = Poor chromatographic behavior
pp = Poor purging efficiency resulting in high Estimated Quantitation Limits
surr = Surrogate
IS = Internal Standard

1.2 There are various techniques by which these compounds may be introduced into the GC/MS system. The more common techniques are listed in the table above. Purge-and-trap, by Methods 5030 (aqueous samples) and 5035 (solid and waste oil samples), is the most commonly used technique for volatile organic analytes. However, other techniques are also appropriate and necessary for some analytes. These include direct injection following dilution with hexadecane (Method 3585) for waste oil samples; automated static headspace by Method 5021 for solid samples; direct injection of an aqueous sample (concentration permitting) or injection of a sample concentrated by azeotropic distillation (Method 5031); and closed system vacuum distillation (Method 5032) for aqueous, solid, oil and tissue samples. For air samples, Method 5041 provides methodology for desorbing volatile organics from trapping media (Methods 0010, 0030, and 0031). In addition, direct analysis utilizing a sample loop is used for sub-sampling from polytetrafluoroethylene (PTFE) bags (Method 0040). Method 5000 provides more general information on the selection of the appropriate introduction method.

1.3 This method can be used to quantitate most volatile organic compounds that have boiling points below 200°C. Volatile, water soluble compounds can be included in this analytical technique by the use of azeotropic distillation or closed-system vacuum distillation. Such compounds include low molecular weight halogenated hydrocarbons, aromatics, ketones, nitriles, acetates, acrylates, ethers, and sulfides. See Tables 1 and 2 for analytes and retention times that have been evaluated on a purge-and-trap GC/MS system. Also, the lower limits of quantitation for 25-mL sample volumes are presented. The following compounds are also amenable to analysis by Method 8260:

Bromobenzene
n-Butylbenzene
sec-Butylbenzene
tert-Butylbenzene
Methyl acrylate
1,3-Dichloropropane
2,2-Dichloropropane
1,1-Dichloropropene
Hexachloroethane
p-Isopropyltoluene

1-Chlorobutane
1-Chlorohexane
2-Chlorotoluene
4-Chlorotoluene
Cyclohexane
cis-1,2-Dichloroethene
Methylcyclohexane
Pentachloroethane
Pentafluorobenzene
n-Propylbenzene
1,2,3-Trichlorobenzene
1,2,4-Trimethylbenzene
1,3,5-Trimethylbenzene

1.4 The lower limits of quantitation for this method when determining an individual compound is somewhat instrument dependent and also dependent on the choice of sample preparation/introduction method. Using standard quadrupole instrumentation and the purge-and-trap technique, limits should be approximately 5 µg/kg (wet weight) for soil/sediment samples, 0.5 mg/kg (wet weight) for wastes, and 5 µg/L for ground water. Somewhat lower limits may be achieved using an ion trap mass spectrometer or other similar instrumentation. However, regardless of which instrument is used, the lower limits of quantitation will be proportionately higher for sample extracts and samples that require dilution or when a reduced sample size is used to avoid saturation of the detector. The lower limits of quantitation listed in the performance data tables are provided for guidance and may not always be achievable.

1.5 Prior to employing this method, analysts are advised to consult the base method for each type of procedure that may be employed in the overall analysis (e.g., Methods 5000 and 8000) for additional information on quality control procedures, development of QC acceptance criteria, calculations, and general guidance. Analysts also should consult the disclaimer statement at the front of the manual and the information in Chapter Two for guidance on the intended flexibility in the choice of methods, apparatus, materials, reagents, and supplies, and on the responsibilities of the analyst for demonstrating that the techniques employed are appropriate for the analytes of interest, in the matrix of interest, and at the levels of concern.

In addition, analysts and data users are advised that, except where explicitly specified in a regulation, the use of SW-846 methods is *not* mandatory in response to Federal testing requirements. The information contained in this method is provided by EPA as guidance to be used by the analyst and the regulated community in making judgments necessary to generate results that meet the data quality objectives for the intended application.

1.6 Use of this method is restricted to use by, or under supervision of, personnel appropriately experienced and trained in the use of gas chromatograph/mass spectrometers and skilled in the interpretation of mass spectra. Each analyst must demonstrate the ability to generate acceptable results with this method.

2.0 SUMMARY OF METHOD

2.1 The volatile compounds are introduced into the gas chromatograph by the purge-and-trap method or by other methods (see Sec. 1.2). The analytes are introduced directly to a wide-bore capillary column, or cryofocussed on a capillary pre-column before being flash evaporated to a narrow-bore capillary for analysis, or the effluent from the trap is sent to an injection port operating in the split mode for injection to a narrow-bore capillary column. The column is temperature-programmed to separate the analytes, which are then detected with a mass spectrometer (MS) interfaced to the gas chromatograph (GC).

2.2 Analytes eluted from the capillary column are introduced into the mass spectrometer via a jet separator or a direct connection. (Wide-bore capillary columns normally require a jet separator, whereas narrow-bore capillary columns may be directly interfaced to the ion source). Identification of target analytes is accomplished by comparing their mass spectra with the mass spectra of authentic standards. Quantitation is accomplished by comparing the response of a major (quantitation) ion relative to an internal standard using an appropriate calibration curve for the intended application.

2.3 The method includes specific calibration and quality control steps that supersede the general requirements provided in Method 8000.

3.0 DEFINITIONS

Refer to Chapter One and the manufacturer's instructions for definitions that may be relevant to this procedure.

4.0 INTERFERENCES

4.1 Solvents, reagents, glassware, and other sample processing hardware may yield artifacts and/or interferences to sample analysis. All of these materials must be demonstrated to be free from interferences under the conditions of the analysis by analyzing method blanks. Specific selection of reagents and purification of solvents by distillation in all-glass systems may be necessary. Refer to each method to be used for specific guidance on quality control procedures and to Chapter Four for general guidance on the cleaning of glassware.

4.2 Major contaminant sources are volatile materials in the laboratory and impurities in the inert purging gas and in the sorbent trap. The laboratory where the analysis is to be performed should be free of solvents other than water and methanol. Many common solvents, most notably acetone and methylene chloride, are frequently found in laboratory air at low levels. The sample receiving chamber should be loaded in an environment that is clean enough to eliminate the potential for contamination from ambient sources. In addition, the use of non-PTFE thread sealants, plastic tubing, or flow controllers with rubber components should be avoided, since such materials out-gas organic compounds which will be concentrated in the trap during the purge operation. Analyses of calibration and reagent blanks provide information about the presence of contaminants. Subtracting blank values from sample results is not permitted. If reporting values for situations where the laboratory feels is a false positive result for a sample, the laboratory should fully explain this in text accompanying the uncorrected data and / or include a data qualifier that is accompanied with an explanation.

4.3 Contamination may occur when a sample containing low concentrations of volatile organic compounds is analyzed immediately after a sample containing high concentrations of volatile organic compounds. A technique to prevent this problem is to rinse the purging apparatus and sample syringes with two portions of organic-free reagent water between samples. After the analysis of a sample containing high concentrations of volatile organic compounds, one or more blanks should be analyzed to check for cross-contamination. Alternatively, if the sample immediately following the high concentration sample does not contain the volatile organic compounds present in the high level sample, freedom from contamination has been established.

4.4 For samples containing large amounts of water-soluble materials, suspended solids, high boiling compounds, or high concentrations of compounds being determined, it may be necessary to appropriately clean the purging device, rinse it with organic-free reagent water, and then dry the purging device in an oven at 105°C. In extreme situations, the entire purge-and-trap device may require dismantling and cleaning. Screening of the samples prior to purge-and-trap GC/MS analysis is highly recommended to prevent contamination of the system. This is especially true for soil and waste samples. Screening may be accomplished with an automated headspace technique (Method 5021) or by Method 3820 (Hexadecane Extraction and Screening of Purgeable Organics).

4.5 Many analytes exhibit low purging efficiencies from a 25-mL sample. This often results in significant amounts of these analytes remaining in the sample purge vessel after analysis. After removal of the sample aliquot that was purged, and rinsing the purge vessel three times with organic-free water, the empty vessel should be subjected to a heated purge cycle prior to the analysis of another sample in the same purge vessel. This will reduce sample-to-sample carryover.

4.6 Special precautions must be taken to analyze for methylene chloride. The analytical and sample storage area should be isolated from all atmospheric sources of methylene chloride. Otherwise, random background levels will result. Since methylene chloride will permeate through PTFE tubing, all gas chromatography carrier gas lines and purge gas plumbing should be constructed from stainless steel or copper tubing. Laboratory clothing worn by the analyst should be clean, since clothing previously exposed to methylene chloride fumes during liquid/liquid extraction procedures can contribute to sample contamination.

4.7 Samples can be contaminated by diffusion of volatile organics (particularly methylene chloride and fluorocarbons) through the septum seal of the sample container into the sample during shipment and storage. A trip blank prepared from organic-free reagent water and carried through the sampling, handling, and storage protocols can serve as a check on such contamination.

4.8 Use of sensitive mass spectrometers to achieve lower quantitation levels will increase the potential to detect laboratory contaminants as interferences.

4.9 Direct injection - Some contamination may be eliminated by baking out the column between analyses. Changing the injector liner will reduce the potential for cross-contamination. A portion of the analytical column may need to be removed in the case of extreme contamination. The use of direct injection will result in the need for more frequent instrument maintenance.

4.10 If hexadecane is added to waste samples or petroleum samples that are analyzed, some chromatographic peaks will elute after the target analytes. The oven temperature program must include a post-analysis bake out period to ensure that semivolatile hydrocarbons are volatilized.

5.0 SAFETY

This method does not address all safety issues associated with its use. The laboratory is responsible for maintaining a safe work environment and a current awareness file of OSHA regulations regarding the safe handling of the chemicals listed in this method. A reference file of material safety data sheets (MSDSs) should be available to all personnel involved in these analyses.

6.0 EQUIPMENT AND SUPPLIES

The mention of trade names or commercial products in this manual is for illustrative purposes only, and does not constitute an EPA endorsement or exclusive recommendation for use. The products and instrument settings cited in SW-846 methods represent those products and settings used during method development or subsequently evaluated by the Agency. Glassware, reagents, supplies, equipment, and settings other than those listed in this manual may be employed provided that method performance appropriate for the intended application has been demonstrated and documented.

This section does not list common laboratory glassware (e.g., beakers and flasks).

6.1 Purge-and-trap device for aqueous samples - Described in Method 5030.

6.2 Purge-and-trap device for solid samples - Described in Method 5035.

6.3 Automated static headspace device for solid samples - Described in Method 5021.

6.4 Azeotropic distillation apparatus for aqueous and solid samples - Described in Method 5031.

6.5 Vacuum distillation apparatus for aqueous, solid and tissue samples - Described in Method 5032.

6.6 Desorption device for air trapping media for air samples - Described in Method 5041.

6.7 Air sampling loop for sampling from Tedlar® bags for air samples - Described in Method 0040.

6.8 Injection port liners (Agilent Catalog #18740-80200, or equivalent) - modified for direct injection analysis by placing a 1-cm plug of glass wool approximately 50-60 mm down the length of the injection port towards the oven (see illustration below). A 0.53-mm ID column is mounted 1 cm into the liner from the oven side of the injection port, according to manufacturer's specifications.

6.9 Gas chromatography/mass spectrometer/data system

6.9.1 Gas chromatograph - An analytical system complete with a temperature-programmable gas chromatograph suitable for splitless injection with appropriate interface or direct split interface for sample introduction device. The system includes all required accessories, including syringes, analytical columns, and gases.

6.9.1.1 The GC should be equipped with variable constant differential flow controllers so that the column flow rate will remain constant throughout desorption and temperature program operation.

6.9.1.2 For some column configurations, the column oven must be cooled to less than 30°C, therefore, a subambient oven controller may be necessary.

6.9.1.3 The capillary column is either directly coupled to the source or interfaced through a jet separator, depending on the size of the capillary and the requirements of the GC/MS system.

6.9.1.4 Capillary pre-column interface - This device is the interface between the sample introduction device and the capillary gas chromatograph, and is necessary when using cryogenic cooling. The interface condenses the desorbed sample components and focuses them into a narrow band on an uncoated fused-silica capillary pre-column. When the interface is flash heated, the sample is transferred to the analytical capillary column.

6.9.1.5 During the cryofocussing step, the temperature of the fused-silica in the interface is maintained at -150°C under a stream of liquid nitrogen. After the desorption period, the interface must be capable of rapid heating to 250°C in 15 seconds or less to complete the transfer of analytes.

6.9.2 Gas chromatographic columns - The following columns have been found to provide good separation of volatile compounds, however they are not listed in preferential order based on performance and the ability to achieve project-specific data quality objectives.

6.9.2.1 Column 1 - 60m x 0.32 mm ID, 1.5-µm column film thickness, (Restek) RTX-Volatiles.

6.9.2.2 Column 2 - 30 - 75 m x 0.53 mm ID capillary column coated with DB-624 (J&W Scientific), Rt_x-502.2 (RESTEK), or VOCOL (Supelco), 3-µm film thickness, or equivalent.

6.9.2.3 Column 3 - 30 m x 0.25 - 0.32 mm ID capillary column coated with 95% dimethyl - 5% diphenyl polysiloxane (DB-5, Rt_x-5, SPB-5, or equivalent), 1-µm film thickness.

6.9.2.4 Column 4 - 60m x 0.32 mm ID, capillary column (Agilent-VOC), 1.8-µm film thickness, or equivalent.

6.9.2.5 Column 5 - 20m x 0.18mm ID, 1-µm column film thickness, DB-VRX.

6.9.3 Mass spectrometer

6.9.3.1 Capable of scanning from m/z 35 to 270 every 1 sec or less, using 70 volts (nominal) electron energy in the electron impact ionization mode. The mass spectrometer must be capable of producing a mass spectrum for 4-bromofluorobenzene (BFB) which meets the criteria as outlined in Sec. 11.3.1.

6.9.3.2 An ion trap mass spectrometer may be used if it is capable of axial modulation to reduce ion-molecule reactions and can produce electron impact-like spectra that match those in the EPA/NIST Library. Because ion-molecule reactions with water and methanol in an ion trap mass spectrometer may produce interferences that coelute with chloromethane and chloroethane, the base peak for both of these analytes will be at m/z 49. This ion should be used as the quantitation ion in this case. The mass spectrometer must be capable of producing a mass spectrum for BFB which meets the criteria as outlined in Sec. 11.3.1.

6.9.4 GC/MS interface - Two alternatives may be used to interface the GC to the mass spectrometer.

6.9.4.1 Direct coupling, by inserting the column into the mass spectrometer, is generally used for 0.25 - 0.32 mm ID columns.

6.9.4.2 A jet separator, including an all-glass transfer line and glass enrichment device or split interface, is used with a 0.53 mm column.

6.9.4.3 Any enrichment device or transfer line may be used, if all of the performance specifications described in Sec. 8.0 (including acceptable calibration at 50 ng or less of BFB) can be achieved. GC/MS interfaces constructed entirely of glass or of glass-lined materials are recommended. Glass may be deactivated by silanizing with dichlorodimethylsilane.

6.9.5 Data system - A computer system that allows the continuous acquisition and storage on machine-readable media of all mass spectra obtained throughout the duration of the chromatographic program must be interfaced to the mass spectrometer. The computer must have software that allows searching any GC/MS data file for ions of a specified mass and plotting such ion abundances versus time or scan number. This type of plot is defined as an Extracted Ion Current Profile (EICP). Software must also be available that allows integrating the abundances in any EICP between specified time or scan-number limits. The most recent version of the EPA/NIST Mass Spectral Library should also be available.

6.10 Microsyringes - 10-, 25-, 100-, 250-, 500-, and 1,000-µL.

6.11 Syringe valve - Two-way, with Luer ends (three each), if applicable to the purging device.

6.12 Syringes - 5-, 10-, or 25-mL, gas-tight with shutoff valve.

6.13 Balance - Analytical, capable of weighing 0.0001 g, and top-loading, capable of weighing 0.1 g.

6.14 Glass scintillation vials - 20-mL, with PTFE-lined screw-caps or glass culture tubes with PTFE-lined screw-caps.

6.15 Vials - 2-mL, for GC autosampler.

6.16 Disposable pipets - Pasteur.

6.17 Volumetric flasks, Class A - 10-mL and 100-mL, with ground-glass stoppers.

6.18 Spatula - Stainless steel.

7.0 REAGENTS AND STANDARDS

7.1 Reagent-grade chemicals must be used in all tests. Unless otherwise indicated, it is intended that all reagents conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 Organic-free reagent water - All references to water in this method refer to organic-free reagent water, as defined in Chapter One.

7.3 Methanol, CH_3OH - Purge and trap grade or equivalent, demonstrated to be free of analytes. Store apart from other solvents.

7.4 Reagent Hexadecane - Reagent hexadecane is defined as hexadecane in which interference is not observed at the method quantitation limit of compounds of interest. Hexadecane quality is demonstrated through the analysis of a solvent blank injected directly into the GC/MS. The results of such a blank analysis must demonstrate that all interfering volatiles have been removed from the hexadecane.

7.5 Polyethylene glycol, $H(OCH_2CH_2)_nOH$ - Free of interferences at the quantitation limit of the target analytes.

7.6 Hydrochloric acid (1:1 v/v), HCl - Carefully add a measured volume of concentrated HCl to an equal volume of organic-free reagent water.

7.7 Stock standard solutions - The solutions may be prepared from pure standard materials or purchased as certified solutions. Prepare stock standard solutions in methanol, using assayed liquids or gases, as appropriate.

7.7.1 Place about 9.8 mL of methanol in a 10-mL tared ground-glass-stoppered volumetric flask. Allow the flask to stand, unstoppered, for about 10 minutes or until all alcohol-wetted surfaces have dried. Weigh the flask to the nearest 0.0001 g.

7.7.2 Add the assayed pure standard material, as described below.

7.7.2.1 Liquids - Using a 100-µL syringe, immediately add two or more drops of assayed pure standard material to the flask; then reweigh. The liquid must fall directly into the alcohol without contacting the neck of the flask.

7.7.2.2 Gases - To prepare standards for any compounds that boil below 30°C (e.g., bromomethane, chloroethane, chloromethane, or vinyl chloride), fill a 5-mL valved gas-tight syringe with the pure standard to the 5.0 mL mark. Lower the needle to 5 mm above the methanol meniscus. Slowly introduce the reference standard above the surface of the liquid. The heavy gas will rapidly dissolve in the methanol. Standards may also be prepared by using a lecture bottle equipped with a septum. Attach PTFE tubing to the side arm relief valve and direct a gentle stream of gas into the methanol meniscus.

7.7.3 Reweigh, dilute to volume, stopper, and then mix by inverting the flask several times. Calculate the concentration in milligrams per liter (mg/L) from the net gain in weight. When compound purity is assayed to be 96% or greater, the weight may be used without correction to calculate the concentration of the stock standard. Commercially-prepared stock standards may be used at any concentration if they are certified by the manufacturer or by an independent source.

7.7.4 Transfer the stock standard solution into a bottle with a PTFE-lined screw-cap. Store, with minimal headspace and protected from light, at ≤6°C or as recommended by the standard manufacturer. Standards should be returned to the refrigerator or freezer as soon as the analyst has completed mixing or diluting the standards to prevent the evaporation of volatile target compounds.

7.7.5 Frequency of Standard Preparation

7.7.5.1 Standards for the permanent gases should be monitored frequently by comparison to the initial calibration curve. Fresh standards should be prepared if this check exceeds a 20% drift. Standards for gases may need to be replaced after one week or as recommended by the standard manufacturer, unless the acceptability of the standard can be documented. Dichlorodifluoromethane and chloromethane will usually be the first compounds to evaporate from the standard and should, therefore, be monitored very closely when standards are held beyond one week.

7.7.5.2 Standards for the non-gases should be monitored frequently by comparison to the initial calibration. Fresh standards should be prepared if this check exceeds a 20% drift. Standards for non-gases may need to be replaced after one month for working standards and three months for opened stocks or as recommended by the standard manufacturer, unless the acceptability of the standard can be documented. Standards of reactive compounds such as 2-chloroethyl vinyl ether and styrene may need to be prepared more frequently.

7.7.6 Preparation of Calibration Standards From a Gas Mixture

An optional calibration procedure involves using a certified gaseous mixture daily, utilizing a commercially-available gaseous analyte mixture of bromomethane, chloromethane, chloroethane, vinyl chloride, dichloro-difluoromethane and trichlorofluoromethane in nitrogen. Mixtures of documented quality are stable for as long as six months without refrigeration. (VOA-CYL III, RESTEK Corporation, Cat. #20194 or equivalent).

7.7.6.1 Before removing the cylinder shipping cap, be sure the valve is completely closed (turn clockwise). The contents are under pressure and should be used in a well-ventilated area.

7.7.6.2 Wrap the pipe thread end of the Luer fitting with PTFE tape. Remove the shipping cap from the cylinder and replace it with the Luer fitting.

7.7.6.3 Transfer half the working standard containing other analytes, internal standards, and surrogates to the purge apparatus.

7.7.6.4 Purge the Luer fitting and stem on the gas cylinder prior to sample removal using the following sequence:

a) Connect either the 100-µL or 500-µL Luer syringe to the inlet fitting of the cylinder.

b) Make sure the on/off valve on the syringe is in the open position.

c) Slowly open the valve on the cylinder and withdraw a full syringe volume.

d) Be sure to close the valve on the cylinder before you withdraw the syringe from the Luer fitting.

e) Expel the gas from the syringe into a well-ventilated area.

f) Repeat steps a through e one more time to fully purge the fitting.

7.7.6.5 Once the fitting and stem have been purged, quickly withdraw the volume of gas you require using steps from Sec. 7.7.6.4 (a) through (d). Be sure to close the valve on the cylinder and syringe before you withdraw the syringe from the Luer fitting.

7.7.6.6 Open the syringe on/off valve for 5 seconds to reduce the syringe pressure to atmospheric pressure. The pressure in the cylinder is ~30 psi.

7.7.6.7 The gas mixture should be quickly transferred into the reagent water through the female Luer fitting located above the purging vessel.

NOTE: Make sure the arrow on the 4-way valve is pointing toward the female Luer fitting when transferring the sample from the syringe. Be sure to switch the 4-way valve back to the closed position before removing the syringe from the Luer fitting.

7.7.6.8 Transfer the remaining half of the working standard into the purging vessel. This procedure insures that the total volume of gas mix is flushed into the purging vessel, with none remaining in the valve or lines.

7.7.6.9 The concentration of each compound in the cylinder is typically 0.0025 µg/µL.

7.7.6.10 The following are the recommended gas volumes spiked into 5 mL of water to produce a typical 5-point calibration:

Gas Volume	Calibration Concentration
40 µL	20 µg/L
100 µL	50 µg/L
200 µL	100 µg/L
300 µL	150 µg/L
400 µL	200 µg/L

7.7.6.11 The following are the recommended gas volumes spiked into 25 mL of water to produce a typical 5-point calibration:

Gas Volume	Calibration Concentration
10 µL	1 µg/L
20 µL	2 µg/L

50 µL	5 µg/L
100 µL	10 µg/L
250 µL	25 µg/L

7.8 Secondary dilution standards - Using stock standard solutions, prepare secondary dilution standards in methanol containing the compounds of interest, either singly or mixed together. Secondary dilution standards must be stored with minimal headspace and should be checked frequently for signs of degradation or evaporation, especially just prior to preparing calibration standards from them. Store in a vial with no headspace. Secondary standards for most compounds should be replaced after 2-4 weeks unless the acceptability of the standard can be documented. Secondary standards for gases should be replaced after one week unless the acceptability of the standard can be documented. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations. The analyst should also handle and store standards as stated in Sec. 7.7.4 and return them to the refrigerator or freezer as soon as standard mixing or diluting is completed to prevent the evaporation of volatile target compounds.

7.9 Surrogate standards - The recommended surrogates are toluene-d_8, 4-bromofluorobenzene, and 1,2-dichloroethane-d_4. Other compounds may be used as surrogates, depending upon the analysis requirements. A stock surrogate solution in methanol should be prepared as described above, and a surrogate standard spiking solution should be prepared from the stock at an appropriate concentration in methanol. Each sample undergoing GC/MS analysis must be spiked with the surrogate spiking solution prior to analysis. If a more sensitive mass spectrometer is employed to achieve lower quantitation levels, then more dilute surrogate solutions may be required.

7.10 Internal standards - The recommended internal standards are fluorobenzene, chlorobenzene-d_5, and 1,4-dichlorobenzene-d_4. Other compounds may be used as internal standards as long as they have retention times similar to the compounds being detected by GC/MS. Prepare internal standard stock and secondary dilution standards in methanol using the procedures described in Secs. 7.7 and 7.8. It is recommended that the secondary dilution standard be prepared at a concentration of 25 mg/L of each internal standard compound. Addition of 10 µL of this standard to 5.0 mL of sample or calibration standard would be the equivalent of 50 µg/L. If a more sensitive mass spectrometer is employed to achieve lower quantitation levels, then more dilute internal standard solutions may be required. Area counts of the internal standard peaks should be between 50-200% of the areas of the target analytes in the mid-point calibration analysis.

7.11 4-Bromofluorobenzene (BFB) standard - A standard solution containing 25 ng/µL of BFB in methanol should be prepared. If a more sensitive mass spectrometer is employed to achieve lower quantitation levels, then a more dilute BFB standard solution may be required.

7.12 Calibration standards -There are two types of calibration standards used for this method: initial calibration standards and calibration verification standards. When using premixed certified solutions, store according to the manufacturer's documented holding time and storage temperature recommendations.

7.12.1 Initial calibration standards should be prepared at a minimum of five different concentrations from the secondary dilution of stock standards (see Secs. 7.7 and 7.8) or from a premixed certified solution. Prepare these solutions in organic-free reagent water. At least one of the calibration standards should correspond to a sample concentration at or below that necessary to meet the data quality objectives of the project. The remaining standards should correspond to the range of concentrations found in typical samples but should not exceed the working range of the GC/MS system. Initial calibration standards should be mixed from fresh stock standards and dilution standards when generating an initial calibration curve.

7.12.2 Calibration verification standards should be prepared at a concentration near the mid-point of the initial calibration range from the secondary dilution of stock standards (see Secs. 7.7 and 7.8) or from a premixed certified solution. Prepare these solutions in organic-free reagent water. See Sec. 11.4 for guidance on calibration verification.

7.12.3 It is the intent of EPA that all target analytes for a particular analysis be included in the initial calibration and calibration verification standard(s). These target analytes may not include the entire list of analytes (Sec. 1.1) for which the method has been demonstrated. However, the laboratory shall not report a quantitative result for a target analyte that was not included in the calibration standard(s).

7.12.4 The calibration standards must also contain the internal standards chosen for the analysis.

7.13 Matrix spiking and laboratory control sample (LCS) standards - See Method 5000 for instructions on preparing the matrix spike standard. The matrix spike and laboratory control standards should be from the same source as the initial calibration standards to restrict the influence of accuracy on the determination of recovery throughout preparation and analysis. Matrix spiking and LCS standards should be prepared from volatile organic compounds which are representative of the compounds being investigated. At a minimum, the matrix spike should include 1,1-dichloroethene, trichloroethene, chlorobenzene, toluene, and benzene. The matrix spiking solution should contain compounds that are expected to be found in the types of samples to be analyzed.

7.13.1 Some permits may require the spiking of specific compounds of interest, especially if polar compounds are a concern, since the spiking compounds listed above would not be representative of such compounds. The standard should be prepared in methanol, with each compound present at an appropriate concentration.

7.13.2 If a more sensitive mass spectrometer is employed to achieve lower quantitation levels, more dilute matrix spiking solutions may be required.

7.14 Great care must be taken to maintain the integrity of all standard solutions. It is recommended that all standards be stored with minimal headspace and protected from light, at $\leq 6^\circ$C or as recommended by the standard manufacturer using screw-cap or crimp-top amber containers equipped with PTFE liners. Standards should be returned to the refrigerator or freezer as soon as the analyst has completed mixing or diluting the standards to prevent the loss of volatile target compounds.

8.0 SAMPLE COLLECTION, PRESERVATION, AND STORAGE

8.1 See the introductory material to Chapter Four, "Organic Analytes."

8.2 Aqueous samples should be stored with minimal or no headspace to minimize the loss of highly volatile analytes.

8.3 Samples to be analyzed for volatile compounds should be stored separately from standards and from other samples expected to contain significantly different concentrations of volatile compounds, or from samples collected for the analysis of other parameters such as semivolatiles.

NOTE: Storage blanks should be used to monitor potential cross-contamination of samples due to improper storage conditions. The specific of this type of monitoring activity should be outlined in a laboratory standard operating procedure pertaining to volatiles sample storage.

9.0 QUALITY CONTROL

9.1 Refer to Chapter One for guidance on quality assurance (QA) and quality control (QC) protocols. When inconsistencies exist between QC guidelines, method-specific QC criteria take precedence over both technique-specific criteria and those criteria given in Chapter One, and technique-specific QC criteria take precedence over the criteria in Chapter One. Any effort involving the collection of analytical data should include development of a structured and systematic planning document, such as a Quality Assurance Project Plan (QAPP) or a Sampling and Analysis Plan (SAP), which translates project objectives and specifications into directions for those that will implement the project and assess the results. Each laboratory should maintain a formal quality assurance program. The laboratory should also maintain records to document the quality of the data generated. All data sheets and quality control data should be maintained for reference or inspection.

9.2 Quality control procedures necessary to evaluate the GC system operation are found in Method 8000 and include evaluation of retention time windows, calibration verification and chromatographic analysis of samples. In addition, discussions regarding the instrument QC requirements listed below can be found in the referenced sections of this method:

- The GC/MS must be tuned to meet the recommended BFB criteria prior to the initial calibration and for each 12-hr period during which analyses are performed. See Secs. 11.3.1 and 11.4.1 for further details.

- There must be an initial calibration of the GC/MS system as described in Sec. 11.3. In addition, the initial calibration curve should be verified immediately after performing the standard analyses using a second source standard (prepared using standards different from the calibration standards) spiked into organic-free reagent water. The suggested acceptance limits for this initial calibration verification analysis are 70 - 130%. Alternative acceptance limits may be appropriate based on the desired project-specific data quality objectives. Quantitative sample analyses should not proceed for those analytes that fail the second source standard initial calibration verification. However, analyses may continue for those analytes that fail the criteria with an understanding these results could be used for screening purposes and would be considered estimated values.

- The GC/MS system must meet the calibration verification acceptance criteria in Sec. 11.4, each 12 hours.

- The RRT of the sample component must fall within the RRT window of the standard component provided in Sec. 11.6.1.

9.3 Initial demonstration of proficiency

Each laboratory must demonstrate initial proficiency with each sample preparation and determinative method combination it utilizes, by generating data of acceptable accuracy and precision for target analytes in a clean matrix. If an autosampler is used to perform sample dilutions, before using the autosampler to dilute samples, the laboratory should satisfy itself that those dilutions are of equivalent or better accuracy than is achieved by an experienced analyst performing manual dilutions. The laboratory must also repeat the following operations whenever new staff are trained or significant changes in instrumentation are made. See Method 8000 for information on how to accomplish this demonstration of proficiency.

9.4 Before processing any samples, the analyst should demonstrate, through the analysis of a method blank, that interferences and/or contaminants from the analytical system, glassware, and reagents are under control. Each time a set of samples is analyzed or there is a change in reagents, a method blank should be analyzed for the compounds of interest as a safeguard against chronic laboratory contamination. The blanks should be carried through all stages of sample preparation and measurement.

9.5 Sample quality control for preparation and analysis

The laboratory must also have procedures for documenting the effect of the matrix on method performance (precision, accuracy, and method sensitivity). At a minimum, this should include the analysis of QC samples including a method blank, matrix spike, a duplicate, and a laboratory control sample (LCS) in each analytical batch and the addition of surrogates to each field sample and QC sample.

9.5.1 Documenting the effect of the matrix should include the analysis of at least one matrix spike and one duplicate unspiked sample or one matrix spike/matrix spike duplicate pair. The decision on whether to prepare and analyze duplicate samples or a matrix spike/matrix spike duplicate must be based on a knowledge of the samples in the sample batch. If samples are expected to contain target analytes, then laboratories may use one matrix spike and a duplicate analysis of an unspiked field sample. If samples are not expected to contain target analytes, laboratories should use a matrix spike and matrix spike duplicate pair.

9.5.2 A laboratory control sample (LCS) should be included with each analytical batch. The LCS consists of an aliquot of a clean (control) matrix similar to the sample matrix and of the same weight or volume. The LCS is spiked with the same analytes at the same concentrations as the matrix spike, when appropriate. When the results of the matrix spike analysis indicate a potential problem due to the sample matrix itself, the LCS results are used to verify that the laboratory can perform the analysis in a clean matrix. Also note the LCS for water sample matrices is typically prepared in organic-free reagent water similar to the continuing calibration verification standard. In these situations, a single analysis can be used for both the LCS and continuing calibration verification.

9.5.3 See Method 8000 for the details on carrying out sample quality control procedures for preparation and analysis. In-house method performance criteria for evaluating method performance should be developed using the guidance found in Method 8000.

9.5.4 Method blanks - Before processing any samples, the analyst must demonstrate that all equipment and reagent interferences are under control. Each day a set of samples is extracted or, equipment or reagents are changed, a method blank must be analyzed. If a peak is observed within the retention time window of any analyte that would prevent the determination of that analyte, determine the source and eliminate it, if possible, before processing samples.

9.6 Surrogate recoveries

The laboratory should evaluate surrogate recovery data from individual samples versus the surrogate control limits developed by the laboratory. See Method 8000 for information on evaluating surrogate data and developing and updating surrogate limits. Suggested surrogate recovery limits are provided in Table 8. Procedures for evaluating the recoveries of multiple surrogates and the associated corrective actions should be defined in an approved project plan.

9.7 The experience of the analyst performing GC/MS analyses is invaluable to the success of the methods. Each day that analysis is performed, the calibration verification standard should be evaluated to determine if the chromatographic system is operating properly. Questions that should be asked are: Do the peaks look normal? Is the response obtained comparable to the response from previous calibrations? Careful examination of the standard chromatogram can indicate whether the column is still performing acceptably, the injector is leaking, the injector septum needs replacing, etc. If any changes are made to the system (e.g., the column changed, a septum is changed), see the guidance in Method 8000 regarding whether recalibration of the system must take place.

9.8 It is recommended that the laboratory adopt additional quality assurance practices for use with this method. The specific practices that are most productive depend upon the needs of the laboratory and the nature of the samples. Whenever possible, the laboratory should analyze standard reference materials and participate in relevant performance evaluation studies.

10.0 CALIBRATION AND STANDARDIZATION

See Sec 11.3 for information on calibration and standardization.

11.0 PROCEDURE

11.1 Various alternative methods are provided for sample introduction. All internal standards, surrogates, and matrix spiking compounds (when applicable) must be added to the samples before introduction into the GC/MS system. Consult the sample introduction method for the procedures by which to add such standards.

11.1.1 Direct injection - This includes: injection of an aqueous sample containing a very high concentration of analytes; injection of aqueous concentrates from Method 5031 (azeotropic distillation); and injection of a waste oil diluted 1:1 with hexadecane (Method 3585). Direct injection of aqueous samples (non-concentrated) has very limited applications. It is only used for the determination of volatiles at the toxicity characteristic (TC) regulatory limits or at concentrations in excess of 10,000 µg/L. It may also be used in conjunction with the test for ignitability in aqueous samples (along with Methods 1010 and 1020), to determine if alcohol is present at greater than 24%.

11.1.2 Purge-and-trap - This includes purge-and-trap for aqueous samples (Method 5030) and purge-and-trap for solid samples (Method 5035). Method 5035 also provides techniques for extraction of high concentration solid and oily waste samples by methanol (and other water-miscible solvents) with subsequent purge-and-trap from an aqueous matrix using Method 5030.

11.1.2.1 Traditionally, the purge-and-trap of aqueous samples is performed at ambient temperature, while purging of soil/solid samples is performed at 40°C, to improve purging efficiency.

11.1.2.2 Aqueous and soil/solid samples may also be purged at temperatures above those being recommended as long as all calibration standards, samples, and QC samples are purged at the same temperature, appropriate trapping material is used to handle the excess water, and the laboratory demonstrates acceptable method performance for the project. Purging of aqueous and soil/solid samples at elevated temperatures (e.g., 80°C) may improve the purging performance of many of the water soluble compounds which have poor purging efficiencies at ambient temperatures.

11.1.3 Vacuum distillation - this technique may be used for the introduction of volatile organics from aqueous, solid, or tissue samples (Method 5032) into the GC/MS system.

11.1.4 Automated static headspace - this technique may be used for the introduction of volatile organics from solid samples (Method 5021) into the GC/MS system.

11.1.5 Cartridge desorption - this technique may be for the introduction of volatile organics from sorbent cartridges (Method 5041) used in the sampling of air. The sorbent cartridges are from the volatile organics sampling train (VOST) or SMVOC (Method 0031).

11.2 Recommended chromatographic conditions are provided as examples based on an assortment of analyses used to generate performance data for this method. The actual conditions will ultimately be dependent on the compounds of interest, instrument, and column manufacturer's guidelines. The maximum temperatures of operation should always be verified with the specific manufacturer.

11.2.1 General conditions

Injector temperature:	200 - 275°C
Transfer line temperature:	200 - 300°C

11.2.2 Split / splitless injection - Column 1 (example chromatogram is presented in Figure 1). The following are example conditions which may vary depending on the instrument and column manufacturer's recommendations:

Carrier gas (He) flow rate:	1.0 mL/min
Initial temperature:	35°C
Temperature program:	35°C for 1 min, 9°C/min to 250°C, hold for 2.5 min
Final temperature:	250°C, hold until all expected compounds have eluted.

11.2.3 Direct injection - Column 2. The following are example conditions which may vary depending on the instrument and column manufacturer's recommendations:

Carrier gas (He) flow rate: 4 mL/min
Column: J&W DB-624, 70m x 0.53 mm
Initial temperature: 40°C, hold for 3 minutes
Temperature program: 8°C/min
Final temperature: 260°C, hold until all expected compounds have eluted.
Column Bake out: 75 minutes

11.2.4 Direct split interface - Column 3. The following are example conditions which may vary depending on the instrument and column manufacturer's recommendations:

Carrier gas (He) flow rate: 1.5 mL/min
Initial temperature: 35°C, hold for 2 minutes
Temperature program: 4°C/min to 50°C
10°C/min to 220°C
Final temperature: 220°C, hold until all expected compounds have eluted
Split ratio: 100:1

11.2.5 Split injection - Column 4. The following are example conditions which may vary depending on the instrument and column manufacturer's recommendations:

Carrier gas (He) flow rate: 1 mL/min
Initial temperature: 35°C, hold for 2 minutes
Temperature program: 35 °C to 60 °C at 10 °C/min; 60 °C to 150 °C at 15 °C/min; 150 °C to 230 °C at 6 °C/min, final hold of 0.5 min
Final temperature: 230°C, hold until all expected compounds have eluted
Injector temperature: 250°C
Transfer line temperature: 280°C

11.2.6 Split injection - Column 5 (example chromatogram is presented in Figure 2). The following are example conditions which may vary depending on the instrument and column manufacturer's recommendations:

Carrier gas (He) flow rate: 0.9 mL/min
Initial temperature: 30°C, hold for 3 minutes
Temperature program: 10°C/min to 100°C, 20°C/min to 220°C, hold for 1 min
Final temperature: 220°C, hold until all expected compounds have eluted.
Split ratio: 50:1

11.3 Initial calibration

Establish the GC/MS operating conditions, using the following as guidance:

Mass range:	From m/z 35 - 270
Sampling rate:	To result in at least five full mass spectra across the peak but not to exceed 1 second per mass spectrum
Source temperature:	According to manufacturer's specifications
Ion trap only:	Set axial modulation, manifold temperature, and emission current to manufacturer's recommendations

11.3.1 The GC/MS system must be hardware-tuned such that injecting 50 ng or less of BFB meets the manufacturer's specified acceptance criteria or as listed in Table 3. The tuning criteria listed in Table 3 were developed using quadrupole mass spectrometer instrumentation and it is recognized that other tuning criteria may be more effective depending on the type of instrumentation, e.g., Time-of-Flight, Ion Trap, etc. In these cases it would be appropriate to follow the manufacturer's tuning instructions or some other consistent tuning criteria. However no matter which tuning criteria is selected, the system calibration must not begin until the tuning acceptance criteria are met with the sample analyses performed under the same conditions as the calibration standards.

11.3.1.1 In the absence of specific recommendations on how to acquire the mass spectrum of BFB from the instrument manufacturer, the following approach should be used: Three scans (the peak apex scan and the scans immediately preceding and following the apex) are acquired and averaged. Background subtraction is required, and must be accomplished using a single scan acquired within 20 scans of the elution of BFB. The background subtraction should be designed only to eliminate column bleed or instrument background ions. Do not subtract part of the BFB peak or any other discrete peak that does not coelute with BFB.

11.3.1.2 Use the BFB mass intensity criteria in the manufacturer's instructions as primary tuning acceptance criteria or those in Table 3 as default tuning acceptance criteria if the primary tuning criteria are not available. Alternatively, other documented tuning criteria may be used (e.g., CLP or Method 524.2), provided that method performance is not adversely affected. The analyst is always free to choose criteria that are tighter than those included in this method or to use other documented criteria provided they are used consistently throughout the initial calibration, calibration verification, and sample analyses.

NOTE: All subsequent standards, samples, MS/MSDs, LCSs, and blanks associated with a BFB analysis must use identical mass spectrometer instrument conditions.

11.3.2 Set up the sample introduction system as outlined in the method of choice (see Sec. 11.1). A different calibration curve is necessary for each method because of the differences in conditions and equipment. A set of at least five different calibration standards is necessary (see Sec. 7.12 and Method 8000). Calibration must be performed using the same sample introduction technique as that being used for samples. For Method 5030, the purging efficiency for 5 mL of water is greater than for 25 mL. Therefore, develop the standard curve with whichever volume of sample that will be analyzed.

11.3.2.1 To prepare a calibration standard, add an appropriate volume of a secondary dilution standard solution to an aliquot of organic-free reagent water in a volumetric flask. Use a microsyringe and rapidly inject the alcoholic standard into the expanded area of the filled volumetric flask underneath the surface of the reagent water. Remove the needle as quickly as possible after injection and dilute to the volume mark with additional reagent water. Mix by inverting the flask sufficiently to achieve the desired dissolution. However, excessive mixing could result in the loss of gaseous standards. Aqueous standards are not stable and should be prepared daily. Transfer 5.0 mL (or 25 mL if lower quantitation limits are required) of each standard to a gas tight syringe along with 10 µL of internal standard. Then transfer the contents to the appropriate device or syringe. Some of the introduction methods may have specific guidance on the volume of calibration standard and the way the standards are transferred to the device.

When using an autosampler, prepare the calibration standard in a volumetric flask and transfer it to a vial and seal it. Place the sample vial in the instrument carousel according to the manufacturer's instructions. Without disturbing the hermetic seal on the sample vial, a specific sample volume is withdrawn (usually 5 or 25 mL) and placed into the purging vessel along with the addition of internal standards and surrogate compounds using an automated sampler.

11.3.2.2 The internal standards selected in Sec. 7.10 should permit most of the components of interest in a chromatogram to have retention times of 0.80 - 1.20, relative to one of the internal standards. Use the base peak ion from the specific internal standard as the primary ion for quantitation (see Table 5). If interferences are noted, use the next most intense ion as the quantitation ion.

11.3.2.3 To prepare a calibration standard for direct injection analysis of waste oil, dilute standards in hexadecane.

11.3.3 Proceed with the analysis of the calibration standards following the procedure in the introduction method of choice. For direct injection, inject 1 - 2 µL into the GC/MS system. The injection volume will depend upon the chromatographic column chosen and the tolerance of the specific GC/MS system to water.

NOTE: Historically the surrogate compounds have been included in the multi-point initial calibration at variable concentrations in order to evaluate the linear response as with any target analyte. However, with improvements in instrumentation and more reliance on the autosampler, an option is available depending on the project-specific data quality requirements for allowing the autosampler (or using a manual technique) to spike the initial calibration standards with surrogates in the same manner as the samples are spiked. With this option the surrogate standards in the initial calibration can be averaged to develop a response factor and an effective one point calibration with the sole purpose to measure the surrogate recovery using the same concentration for each sample analysis. For this calibration option the surrogate linear response is less important, since multiple concentrations of surrogates are not being measured. Instead, the surrogate concentration remains constant throughout and the recovery of this known concentration can easily be attained without demonstrating if the response is linear.

Under a second calibration option, the surrogates can be calibrated in the same manner as the target analytes, however, the laboratory should have the latitude to employ either option given the instrument system limitations and the ability to meet the project's data quality objectives.

11.3.4 Tabulate the area response of the characteristic ions (see Table 5) against the concentration for each target analyte and each internal standard. Calculate response factors (RF) for each target analyte relative to one of the internal standards. The internal standard selected for the calculation of the RF for a target analyte should be the internal standard that has a retention time closest to the analyte being measured (Sec. 11.7.1).

The RF is calculated as follows:

$$RF = \frac{A_s \times C_{is}}{A_{is} \times C_s}$$

where:

A_s = Peak area (or height) of the analyte or surrogate.
A_{is} = Peak area (or height) of the internal standard.
C_s = Concentration of the analyte or surrogate.
C_{is} = Concentration of the internal standard.

11.3.4.1 Calculate the mean response factor and the relative standard deviation (RSD) of the response factors for each target analyte using the following equations. The RSD should be less than or equal to 20% for each target analyte. It is also recommended that a minimum response factor for the most common target analytes as noted in Table 4, be demonstrated for each individual calibration level as a means to ensure that these compounds are behaving as expected. In addition, meeting the minimum response factor criteria for the lowest calibration standard is critical in establishing and demonstrating the desired sensitivity. Due to the large number of compounds that may be analyzed by this method, some compounds will fail to meet this criteria. For these occasions, it is acknowledged that the failing compounds may not be critical to the specific project and therefore they may be used as qualified data or estimated values for screening purposes. The analyst should also strive to place more emphasis on meeting the calibration criteria for those compounds that are critical project compounds, rather than meeting the criteria for those less important compounds.

$$\text{mean RF} = \overline{RF} = \frac{\sum_{i=1}^{n} RF_i}{n} \qquad SD = \sqrt{\frac{\sum_{i=1}^{n} (RF_i - \overline{RF})^2}{n-1}}$$

$$RSD = \frac{SD}{\overline{RF}} \times 100$$

where:

RF_i = RF for each of the calibration standards

$\overline{RF}$ = mean RF for each compound from the initial calibration

n = Number of calibration standards, e.g., 5

11.3.4.2 If more than 10% of the compounds included with the initial calibration exceed the 20% RSD limit and do not meet the minimum correlation coefficient (0.99) for alternate curve fits, then the chromatographic system is considered too imprecise for analysis to begin. Adjust moisture control parameters, replace analytical trap or column, replace moisture trap or adjust desorb time, then repeat the calibration procedure beginning with Sec. 11.3.

11.3.5 Evaluation of retention times - The relative retention time (RRT) of each target analyte in each calibration standard should agree within 0.06 RRT units. Late-eluting target analytes usually have much better agreement. The RRT is calculated as follows:

$$RRT = \frac{\text{Retention time of the analyte}}{\text{Retention time of the internal standard}}$$

11.3.6 Linearity of target analytes - If the RSD of any target analyte is 20% or less, then the relative response factor is assumed to be constant over the calibration range, and the average relative response factor may be used for quantitation (Sec. 11.7).

11.3.6.1 If the RSD of any target analyte is greater than 20%, refer to Method 8000 for additional calibration options. One of the options must be applied to GC/MS calibration in this situation, or a new initial calibration must be performed. The average RF should not be used for compounds that have an RSD greater than 20% unless the concentration is reported as estimated.

11.3.6.2 When the RSD exceeds 20%, the plotting and visual inspection of a calibration curve can be a useful diagnostic tool. The inspection may indicate analytical problems, including errors in standard preparation, the presence of active sites in the chromatographic system, analytes that exhibit poor chromatographic behavior, etc.

11.3.6.3 Due to the large number of compounds that may be analyzed by this method, some compounds may fail to meet either the 20% RSD, minimum correlation coefficient criteria (0.99), or the acceptance criteria for alternative calibration procedures in Method 8000. Any calibration method stipulated in Method 8000 may be used, but it should be used consistently. It is considered inappropriate once the calibration analyses are completed to select an alternative calibration procedure in order to pass the recommended criteria on a case by case basis. If compounds fail to meet these criteria, the associated concentrations may still be determined but they must be reported as estimated. In order to report non-detects, it must be demonstrated that there is adequate sensitivity to detect the failed compounds at the applicable lower quantitation limit.

11.4 GC/MS calibration verification - Calibration verification consists of three steps that are performed at the beginning of each 12-hour analytical shift.

11.4.1 Prior to the analysis of samples or calibration standards, inject or introduce 50 ng or less of the 4-bromofluorobenzene standard into the GC/MS system. The resultant mass spectra for the BFB must meet the criteria as outlined in Sec. 11.3.1 before sample analysis begins. These criteria must be demonstrated each 12-hour shift during which samples are analyzed.

11.4.2 The initial calibration curve should be verified immediately after performing the standard analyses using a second source standard (prepared using standards different from the calibration standards) spiked into organic-free reagent water with a concentration preferably at the midpoint of the initial calibration range. The suggested acceptance limits for this initial calibration verification analysis are 70 - 130%. Alternative acceptance limits may be appropriate based on the desired project-specific data quality objectives. Quantitative sample analyses should not proceed for those analytes that fail the second source standard initial calibration verification. However, analyses may continue for those analytes that fail the criteria with an understanding these results could be used for screening purposes and would be considered estimated values.

11.4.3 The initial calibration (Sec. 11.3) for each compound of interest should be verified once every 12 hours prior to sample analysis, using the introduction technique and conditions used for samples. This is accomplished by analyzing a calibration standard (containing all the compounds for quantitation) at a concentration either near the midpoint concentration for the calibrating range of the GC/MS or near the action level for the project. The results must be compared against the most recent initial calibration curve and should meet the verification acceptance criteria provided in Secs. 11.4.5 through 11.4.7.

NOTE: The BFB and calibration verification standard may be combined into a single standard as long as both tuning and calibration verification acceptance criteria for the project can be met without interferences.

11.4.4 A method blank should be analyzed prior to sample analyses in order to ensure that the total system (introduction device, transfer lines and GC/MS system) is free of contaminants. If the method blank indicates contamination, then it may be appropriate to analyze a solvent blank to demonstrate that the contamination is not a result of carryover from standards or samples. See Method 8000 for method blank performance criteria.

11.4.5 Calibration verification standard criteria

11.4.5.1 Each of the most common target analytes in the calibration verification standard should meet the minimum response factors as noted in Table 4. This criterion is particularly important when the common target analytes are also critical project-required compounds. This is the same check that is applied during the initial calibration.

11.4.5.2 If the minimum response factors are not met, the system should be evaluated, and corrective action should be taken before sample analysis begins.

Possible problems include standard mixture degradation, injection port inlet contamination, contamination at the front end of the analytical column, active sites in the analytical column, trap, or chromatographic system, and problems with the moisture control system.

11.4.5.3 All target compounds of interest must be evaluated using a 20% variability criterion. Use percent difference when performing the average response factor model calibration. Use percent drift when calibrating using a regression fit model. Refer to Method 8000 for guidance on calculating percent difference and drift.

11.4.5.4 If the percent difference or percent drift for a compound is less than or equal to 20%, then the initial calibration for that compound is assumed to be valid. Due to the large numbers of compounds that may be analyzed by this method, some compounds will fail to meet the criteria. If the criterion is not met (i.e., greater than 20% difference or drift) for more than 20% of the compounds included in the initial calibration, then corrective action must be taken prior to the analysis of samples. In cases where compounds fail, they may still be reported as non-detects if it can be demonstrated that there was adequate sensitivity to detect the compound at the applicable quantitation limit. For situations when the failed compound is present, the concentrations must be reported as estimated values.

11.4.5.5 Problems similar to those listed under initial calibration could affect the ability to pass the calibration verification standard analysis. If the problem cannot be corrected by other measures, a new initial calibration must be generated. The calibration verification criteria must be met before sample analysis begins.

11.4.5.6 The method of linear regression analysis has the potential for a significant bias to the lower portion of a calibration curve, while the relative percent difference and quadratic methods of calibration do not have this potential bias. When calculating the calibration curves using the linear regression model, a minimum quantitation check on the viability of the lowest calibration point should be performed by re-fitting the response from the low concentration calibration standard back into the curve (See Method 8000 for additional details). It is not necessary to re-analyze a low concentration standard, rather the data system can recalculate the concentrations as if it were an unknown sample. The recalculated concentration of the low calibration point should be within ± 30% of the standard’s true concentration. Other recovery criteria may be applicable depending on the project’s data quality objectives and for those situations the minimum quantitation check criteria should be outlined in a laboratory standard operating procedure, or a project-specific Quality Assurance Project Plan. Analytes which do not meet the minimum quantitation calibration re-fitting criteria should be considered “out of control” and corrective action such as redefining the lower limit of quantitation and/or reporting those “out of control” target analytes as estimated when the concentration is at or near the lowest calibration point may be appropriate.

11.4.6 Internal standard retention time - The retention times of the internal standards in the calibration verification standard must be evaluated immediately after or during data acquisition. If the retention time for any internal standard changes by more than 10 seconds from that in the mid-point standard level of the most recent initial calibration sequence, then the chromatographic system must be inspected for malfunctions and corrections must be made, as required. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

11.4.7 Internal standard response - If the EICP area for any of the internal standards in the calibration verification standard changes by a factor of two (-50% to + 100%) from that in the mid-point standard level of the most recent initial calibration sequence, the mass spectrometer must be inspected for malfunctions and corrections must be made, as appropriate. When corrections are made, reanalysis of samples analyzed while the system was malfunctioning is required.

11.5 GC/MS analysis of samples

11.5.1 It is highly recommended that the sample be screened to minimize contamination of the GC/MS system from unexpectedly high concentrations of organic compounds. Some of the screening options available utilizing SW-846 methods are screening solid samples for volatile organics (Method 3815), automated headspace-GC/FID (Methods 5021/8015), automated headspace-GC/PID/ELCD (Methods 5021/8021), or waste dilution-GC/PID/ELCD (Methods 3585/8021) using the same type of capillary column. When used only for screening purposes, the quality control requirements in the methods above may be reduced as appropriate. Sample screening is particularly important when Method 8260 is used to achieve low quantitation levels.

11.5.2 BFB tuning criteria and GC/MS calibration verification criteria must be met before analyzing samples.

11.5.3 All samples and standard solutions must be allowed to warm to ambient temperature before analysis. Set up the introduction device as outlined in the method of choice.

11.5.4 The process of taking an aliquot destroys the validity of the remaining volume of an aqueous sample for future analysis when target analytes are at low concentration and taking the aliquot leaves significant headspace in the sample vial. Higher concentration samples, for example those which need to be diluted before analysis at a 5-mL purge volume, often show no detectable changes when a small aliquot is removed, the sample vial is immediately recapped, and the same vial reanalyzed at a later time. That said, it is best practice not to analyze a sample vial repeatedly. Therefore, if only one VOA vial of a relatively clean aqueous matrix such as tap water is provided to the laboratory, to protect against possible loss of sample data, the analyst should prepare two aliquots for analysis at this time. A second aliquot in a syringe is maintained only until such time when the analyst has determined that the first sample has been analyzed properly. For aqueous samples, one 20-mL syringe could be used to hold two 5-mL aliquots. If the second aliquot is to be taken from the syringe, it must be analyzed within 24 hours. Care must be taken to prevent air from leaking into the syringe.

11.5.5 Place the sample vial in the instrument carousel according to the manufacturer's instructions. Without disturbing the hermetic seal on the sample vial, a specific sample volume is withdrawn (usually 5 or 25 mL) and placed into the purging vessel along with the addition of internal standards and surrogate compounds using an automated sampler.

Alternatively, remove the plunger from a 5-mL syringe and attach a closed syringe valve. Open the sample or standard bottle, which has been allowed to come to ambient temperature, and carefully pour the sample into the syringe barrel to just short of overflowing. Replace the syringe plunger and invert before compressing the sample. Open the syringe valve and vent any residual air while adjusting the sample volume to 5.0 mL. If lower quantitation limits are required, use a 25-mL syringe, and adjust the final volume to 25.0 mL.

NOTE: For most applications pouring a sample aliquot directly into the syringe is preferred in order to minimize the loss of volatile constituents, however when smaller volumes are necessary to prepare dilutions, drawing the sample directly into the syringe is considered acceptable.

11.5.6 The following procedure may be used to dilute aqueous samples for analysis of volatiles. All steps must be performed without delays, until the diluted sample is in a gas-tight syringe.

11.5.6.1 Dilutions may be made in volumetric flasks (10- to 100-mL). Select the volumetric flask that will allow for the necessary dilution. Intermediate dilution steps may be necessary for extremely large dilutions.

11.5.6.2 Calculate the approximate volume of organic-free reagent water to be added to the volumetric flask, and add slightly less than this quantity of organic-free reagent water to the flask.

11.5.6.3 Inject the appropriate volume of the original sample from the syringe into the flask underneath the reagent water surface. Aliquots of less than 1 mL are not recommended. Dilute the sample to the mark with organic-free reagent water. Cap the flask, invert, and shake three times. Repeat this procedure for additional dilutions.

11.5.6.4 Fill a 5-mL syringe by pouring with the diluted sample, as described in Sec. 11.5.5. Should smaller sample volumes be necessary to prepare dilutions, drawing the sample directly into the syringe is considered acceptable

11.5.6.5 Systems with autosamplers allow the user to perform automated dilutions. Refer to instrument manufacturer's instructions for more information. In addition, if an autosampler is used to perform sample dilutions, before using the autosampler to dilute samples, the laboratory should satisfy itself that those dilutions are of equivalent or better accuracy than is achieved by an experienced analyst performing manual dilutions.

11.5.7 Compositing aqueous samples prior to GC/MS analysis

11.5.7.1 The following compositing options may be considered depending on the sample composition and desired data quality objectives:

11.5.7.1.1 Flask compositing - for this procedure, a 300 to 500 mL round-bottom flask is immersed in an ice bath. The individual VOA grab samples, maintained at <6°C, are slowly poured into the round-bottom flask. The flask is swirled slowly to mix the individual grab samples. After mixing, multiple aliquots of the composited sample are poured into VOA vials and sealed for subsequent analysis. An aliquot can also be poured into a syringe for immediate analysis.

11.5.7.1.2 Purge device compositing - Equal volumes of individual grab samples are added to a purge device to a total volume of 5 or 25 mL. The sample is then analyzed.

11.5.7.1.3 Syringe compositing - In the syringe compositing procedure, equal volumes of individual grab samples are aspirated into a 25 mL syringe while maintaining zero headspace in the syringe. Either the total volume in the syringe or an aliquot is subsequently analyzed. The disadvantage of this technique is that the individual samples must be poured carefully in an attempt to achieve equal volumes of each. An alternate procedure uses multiple 5 mL syringes that are filled with the individual grab samples and then injected sequentially into the 25 mL syringe. If less than five samples are used for compositing, a proportionately smaller syringe may be used, unless a 25-mL sample is to be purged.

11.5.7.2 Introduce the composited sample into the instrument, using the method of choice. (see Sec. 11.1)

11.5.8 Add appropriate volumes of the surrogate spiking solution and the internal standard spiking solution to each sample either manually or by autosampler to achieve the desired concentrations. The surrogate and internal standards may be mixed and added as a single spiking solution.

If a more sensitive mass spectrometer is employed to achieve lower quantitation levels, more dilute surrogate and internal standard solutions may be required.

11.5.9 Add 10 µL of the matrix spike solution (Sec. 7.13) to a 5-mL aliquot of the sample chosen for spiking. Disregarding any dilutions, this is equivalent to a concentration of 50 µg/L of each matrix spike standard.

11.5.9.1 Follow the same procedure in preparing the laboratory control sample (LCS), except the spike is added to a clean matrix. See Sec. 9.5 and Method 5000 for more guidance on the selection and preparation of the matrix spike and the LCS.

11.5.9.2 If a more sensitive mass spectrometer is employed to achieve lower quantitation levels, more dilute matrix spiking and LCS solutions may be required.

11.5.10 Analyze the sample following the procedure in the introduction method of choice.

11.5.10.1 For direct injection, inject 1 to 2 µL into the GC/MS system. The volume limitation will depend upon the chromatographic column chosen and the tolerance of the specific GC/MS system to water (if an aqueous sample is being analyzed).

11.5.10.2 The concentration of the internal standards, surrogates, and matrix spiking standards (if any) added to the injection aliquot must be adjusted to provide the same concentration in the 1-2 µL injection as would be introduced into the GC/MS by purging a 5-mL aliquot.

NOTE: It may be a useful diagnostic tool to monitor internal standard retention times and responses (area counts) in all samples, spikes, blanks, and standards to effectively check drifting method performance, poor injection execution, and anticipate the need for system inspection and/or maintenance.

11.5.11 If the initial analysis of the sample or a dilution of the sample has a concentration of any analyte that exceeds the upper limit of the initial calibration range, the sample must be reanalyzed at a higher dilution. Secondary ion quantitation is allowed only when there are sample interferences with the primary ion.

11.5.11.1 When ions from a compound in the sample saturate the detector, this analysis must be followed by the analysis of an organic-free reagent water blank. If the blank analysis is not free of interferences, then the system must be decontaminated. Sample analysis may not resume until the blank analysis is demonstrated to be free of interferences. Depending on the extent of the decontamination procedures, recalibration may be necessary.

11.5.11.2 All dilutions should keep the response of the major constituents (previously saturated peaks) in the upper half of the linear range of the curve.

11.5.12 The use of selected ion monitoring (SIM) is acceptable for applications requiring quantitation limits below the normal range of electron impact mass spectrometry. However, SIM may provide a lesser degree of confidence in the compound identification, since less mass spectral information is available. Using the primary ion for quantitation and the secondary ions for confirmation set up the collection groups based on their retention times. The selected ions are nominal ions and most compounds have small mass defect, usually less than 0.2 amu, in their spectra. These mass defects should be used in the acquisition table. The dwell time may be automatically calculated by the laboratory's GC/MS software or manually calculated using the following formula. The total scan time should be less than 1,000 msec and produce at least 5 to 10 scans per chromatographic peak. The start and stop times for the SIM groups are determined from the full scan analysis using the formula below:

$$\text{Dwell Time for the Group} = \frac{\text{Laboratory's Scan Time (msec)}}{\text{Total Ions in the Group}}$$

11.6 Analyte identification

11.6.1 The qualitative identification of each compound determined by this method is based on retention time, and on comparison of the sample mass spectrum, after background correction, with characteristic ions in a reference mass spectrum. The reference mass spectrum must be generated by the laboratory using the conditions of this method. The characteristic ions from the reference mass spectrum are defined to be the three ions of greatest relative intensity, or any ions over 30% relative intensity if less than three such ions occur in the reference spectrum. Compounds are identified as present when the following criteria are met.

11.6.1.1 The intensities of the characteristic ions of a compound maximize in the same scan or within one scan of each other. Selection of a peak by a data system target compound search routine where the search is based on the presence of a target chromatographic peak containing ions specific for the target compound at a compound-specific retention time will be accepted as meeting this criterion.

11.6.1.2 The relative retention time (RRT) of the sample component is within ± 0.06 RRT units of the RRT of the standard component.

11.6.1.3 The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum. (Example: For an ion with an abundance of 50% in the reference spectrum, the corresponding abundance in a sample spectrum can range between 20% and 80%.)

11.6.1.4 Structural isomers that produce very similar mass spectra should be identified as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 50% of the average of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs. The resolution should be verified on the mid-point concentration of the initial calibration as well as the laboratory designated continuing calibration verification level if closely eluting isomers are to be reported.

11.6.1.5 Identification is hampered when sample components are not resolved chromatographically and produce mass spectra containing ions contributed by more than one analyte. When gas chromatographic peaks obviously represent more than one sample component (i.e., a broadened peak with shoulder(s) or a valley between two or more maxima), appropriate selection of analyte spectra and background spectra is important.

11.6.1.6 Examination of extracted ion current profiles (EICP) of appropriate ions can aid in the selection of spectra, and in qualitative identification of compounds. When analytes coelute (i.e., only one chromatographic peak is apparent), the identification criteria may be met, but each analyte spectrum will contain extraneous ions contributed by the coeluting compound.

11.6.2 For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification will be determined by the purpose of the analyses being conducted. Data system library search routines should not use normalization routines that would misrepresent the library or unknown spectra when compared to each other.

For example, the RCRA permit or waste delisting requirements may require the reporting of non-target analytes. Only after visual comparison of sample spectra with the nearest library searches may the analyst assign a tentative identification. Use the following guidelines for making tentative identifications:

(1) Relative intensities of major ions in the reference spectrum (ions greater than 10% of the most abundant ion) should be present in the sample spectrum.

(2) The relative intensities of the major ions should agree within ± 20%. (Example: For an ion with an abundance of 50% in the standard spectrum, the corresponding sample ion abundance must be between 30 and 70%).

(3) Molecular ions present in the reference spectrum should be present in the sample spectrum.

(4) Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of coeluting compounds.

(5) Ions present in the reference spectrum but not in the sample spectrum should be reviewed for possible subtraction from the sample spectrum because of background contamination or coeluting peaks. Data system library reduction programs can sometimes create these discrepancies.

11.7 Quantitation

11.7.1 Once a compound has been identified, the quantitation of that compound will be based on the integrated abundance from the EICP of the primary characteristic ion. The internal standard used shall be the one nearest the retention time of that of a given analyte.

11.7.1.1 It is highly recommended to use the integration produced by the software if the integration is correct because the software should produce more consistent integrations. However, manual integrations are necessary when the software does not produce proper integrations due to improper baseline selection, the correct peak is missed, a coelution is integrated, a peak is partially integrated, etc. The analyst is responsible for ensuring that the integration is correct whether performed by the software or done manually.

11.7.1.2 Manual integrations should not be substituted for proper maintenance of the instrument or setup of the method (e.g. retention time updates, integration parameter files, etc). The analyst should seek to minimize manual integration by properly maintaining the instrument, updating retention times, and configuring peak integration parameters.

11.7.2 If the RSD of a compound's response factor is 20% or less, then the concentration in the extract may be determined using the average response factor ($\overline{RF}$) from initial calibration data (Sec. 11.3.5). See Method 8000 for the equations describing internal standard calibration and either linear or non-linear calibrations.

11.7.3 Where applicable, the concentration of any non-target analytes identified in the sample (Sec. 11.6.2) should be estimated. The same formulae should be used with the following modifications: The areas A_x and A_{is} should be from the total ion chromatograms, and the RF for the compound should be assumed to be 1. The resulting concentration should be reported indicating that the value is an estimate. Use the nearest internal standard free of interferences.

11.7.4 Structural isomers that produce very similar mass spectra should be quantitated as individual isomers if they have sufficiently different GC retention times. Sufficient GC resolution is achieved if the height of the valley between two isomer peaks is less than 50% of the average of the two peak heights. Otherwise, structural isomers are identified as isomeric pairs. The resolution should be verified on the mid-point concentration of the initial calibration as well as the laboratory designated continuing calibration verification level if closely eluting isomers are to be reported.

11.7.5 Quantitation of multicomponent parameters such as gasoline range organics (GROs) and total petroleum hydrocarbons (TPH) using the Method 8260 recommended internal standard quantitation technique is beyond the scope of this method. Typically, analyses for these parameters are performed using GC/FID or GC with a MS detector capability that is available with Method 8015.

12.0 DATA ANALYSIS AND CALCULATIONS

See Sec. 11.7 for information on data analysis and calculations.

13.0 METHOD PERFORMANCE

13.1 Performance data and related information are provided in SW-846 methods only as examples and guidance. The data do not represent required performance criteria for users of the methods. Instead, performance criteria should be developed on a project-specific basis, and the laboratory should establish in-house QC performance criteria for the application of this method. <u>These performance data are not intended to be and must not be used as absolute QC acceptance criteria for purposes of laboratory accreditation.</u>

13.2 This method has been tested using purge-and-trap (Method 5030) in a single laboratory using spiked water. Using a wide-bore capillary column, water was spiked at concentrations between 0.5 and 10 µg/L. Single laboratory accuracy and precision data are presented for the method analytes in Table 6. Calculated example lower limits of quantitation are presented in Table 1.

13.3 The method was tested using purge-and-trap (Method 5030) with water spiked at 0.1 to 0.5 µg/L and analyzed on a cryofocussed narrow-bore column. The accuracy and precision data for these compounds are presented in Table 7. Example lower limits of quantitation were also calculated from these data and are presented in Table 2.

13.4 Initial demonstration of capability data from two EPA Regional laboratories were submitted using purge-and-trap (Method 5030) with water spiked at 20 µg/L and analyzed on a narrow-bore column. The accuracy and precision data for these studies are presented in Tables 8 and 9.

13.5 Direct injection (Method 3585) has been used for the analysis of waste motor oil samples using a wide-bore column. Single laboratory precision and accuracy data are presented in Tables 12 and 13 for TCLP volatiles in oil. The performance data were developed by spiking and analyzing seven replicates each of new and used oil. The oils were spiked at the TCLP regulatory concentrations for most analytes, except for the alcohols, ketones, ethyl acetate and chlorobenzene which are spiked at 5 ppm, well below the regulatory concentrations. Prior to spiking, the new oil (an SAE 30-weight motor oil) was heated at 80°C overnight to remove volatiles. The used oil (a mixture of used oil drained from passenger automobiles) was not heated and was contaminated with 20 - 300 ppm of BTEX compounds and isobutanol. These contaminants contributed to the extremely high recoveries of the BTEX compounds in the used oil. Therefore, the data from the deuterated analogs of these analytes represent more typical recovery values.

13.6 Single laboratory accuracy and precision data were obtained for the Method 5035 analytes in three soil matrices: sand; a soil collected 10 feet below the surface of a hazardous waste landfill, and a surface garden soil. Sample preparation was by Method 5035. Each sample was fortified with the analytes at a concentration of 20 µg/kg. These data are listed in Tables 18, 19, and 20. All data were calculated using fluorobenzene as the internal standard added to the soil sample prior to extraction. This causes some of the results to be greater than 100% recovery because the precision of results is sometimes as great as 28%.

13.6.1 In general, the recoveries of the analytes from the sand matrix are the highest, the hazardous waste landfill soil results are somewhat less, and the surface garden soil recoveries are the lowest. This is due to the greater adsorptive capacity of the garden soil. This illustrates the necessity of analyzing matrix spike samples to assess the degree of matrix effects.

13.6.2 The recoveries of some of the gases, or very volatile compounds, such as vinyl chloride, trichlorofluoromethane, and 1,1-dichloroethene, are somewhat greater than 100%. This is due to the difficulty encountered in fortifying the soil with these compounds, allowing an equilibration period, then extracting them with a high degree of precision. Also, the garden soil results in Table 19 include some extraordinarily high recoveries for some aromatic compounds, such as toluene, xylenes, and trimethylbenzenes. This is due to contamination of the soil prior to sample collection, and to the fact that no background was subtracted.

13.7 Performance data for nonpurgeable volatiles using azeotropic distillation (Method 5031) are included in Tables 14 to 17.

13.8 Performance data for volatiles prepared using vacuum distillation (Method 5032) in soil, water, oil and fish tissue matrices are included in Tables 21 to 25.

13.9 Single laboratory accuracy and precision data were obtained for the Method 5021 analytes in a garden soil matrix. Replicate samples were fortified with the analytes at a concentration of 20 µg/kg. These data are listed in Table 28. All data were calculated using the internal standards listed for each analyte in Table 26. The recommended internal standards were selected because they generated the best accuracy and precision data for the analyte in both types of soil.

13.9.1 If a detector other than an MS is used for analysis, consideration must be given to the choice of internal standards and surrogates. They must not coelute with any other analyte and must have similar properties to the analytes. The recoveries of the analytes are 50% or higher for each matrix studied. The recoveries of the gases or very volatile compounds are greater than 100% in some cases. Also, results include high recoveries of some aromatic compounds, such as benzene, toluene, and xylenes. This is due to contamination of the soil prior to sample collection.

13.9.2 The example lower limits of quantitation using Method 5021 are listed in Table 27 and were calculated from results of seven replicate analyses of the sand matrix. Sand was chosen because it demonstrated the least degree of matrix effect of the soils studied. These lower limits of quantitation were calculated utilizing the procedure described in Chapter One and are intended to be a general indication of the capabilities of the method.

13.10 The lower limits of quantitation listed in Table 29 were determined using Method 5041 in conjunction with Method 8260. They were obtained using cleaned blank VOST tubes and reagent water. Similar results have been achieved with field samples. The lower limit of quantitation actually achieved in a given analysis will vary depending upon instrument sensitivity and the effects of the matrix. Preliminary spiking studies indicate that under the test conditions, the lower limit of quantitation for spiked compounds in extremely complex matrices may be larger by a factor of 500 - 1000.

13.11 The lower limit of quantitation for samples taken by Method 0040 and analyzed by Method 8260 is estimated to be in the range of 0.03 to 0.9 ppm (See Table 31). Matrix effects may cause the individual compound quantitation limits to be higher.

13.12 The recommended internal standards with corresponding analytes assigned for quantitation that are appropriate for Method 5041 are listed in Table 30.

14.0 POLLUTION PREVENTION

14.1 Pollution prevention encompasses any technique that reduces or eliminates the quantity and/or toxicity of waste at the point of generation. Numerous opportunities for pollution prevention exist in laboratory operations. The EPA has established a preferred hierarchy of environmental management techniques that places pollution prevention as the management option of first choice. Whenever feasible, laboratory personnel should use pollution prevention techniques to address their waste generation. When wastes cannot be feasibly reduced at the source, the Agency recommends recycling as the next best option.

14.2 For information about pollution prevention that may be applicable to laboratories and research institutions consult *Less is Better: Laboratory Chemical Management for Waste Reduction* available from the American Chemical Society's Department of Government Relations and Science Policy, 1155 16th St., N.W. Washington, D.C. 20036, http://www.acs.org.

15.0 WASTE MANAGEMENT

The Environmental Protection Agency requires that laboratory waste management practices be conducted consistent with all applicable rules and regulations. The Agency urges laboratories to protect the air, water, and land by minimizing and controlling all releases from hoods and bench operations, complying with the letter and spirit of any sewer discharge permits and regulations, and by complying with all solid and hazardous waste regulations, particularly the hazardous waste identification rules and land disposal restrictions. For further information on waste management, consult *The Waste Management Manual for Laboratory Personnel* available from the American Chemical Society at the address listed in Sec. 14.2.

16.0 REFERENCES

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17.0 TABLES, DIAGRAMS, FLOWCHARTS, AND VALIDATION DATA

The following pages contain the tables and figures referenced by this method.

TABLE 1

EXAMPLE CHROMATOGRAPHIC RETENTION TIMES AND LOWER LIMITS OF QUANTITATION FOR VOLATILE ORGANIC COMPOUNDS ON WIDE-BORE CAPILLARY COLUMNS

Compound	Retention Time (minutes)			LOQ[d]
	Column 2A[a]	Column 2B[b]	Column 2C[c]	(μg/L)
Dichlorodifluoromethane	1.35	0.70	3.13	0.10
Chloromethane	1.49	0.73	3.40	0.13
Vinyl Chloride	1.56	0.79	3.93	0.17
Bromomethane	2.19	0.96	4.80	0.11
Chloroethane	2.21	1.02	--	0.10
Trichlorofluoromethane	2.42	1.19	6.20	0.08
Acrolein	3.19			
Iodomethane	3.56			
Acetonitrile	4.11			
Carbon disulfide	4.11			
Allyl chloride	4.11			
Methylene chloride	4.40	2.06	9.27	0.03
1,1-Dichloroethene	4.57	1.57	7.83	0.12
Acetone	4.57			
trans-1,2-Dichloroethene	4.57	2.36	9.90	0.06
Acrylonitrile	5.00			
1,1-Dichloroethane	6.14	2.93	10.80	0.04
Vinyl acetate	6.43			
2,2-Dichloropropane	8.10	3.80	11.87	0.35
2-Butanone	--			
cis-1,2-Dichloroethene	8.25	3.90	11.93	0.12
Propionitrile	8.51			
Chloroform	9.01	4.80	12.60	0.03
Bromochloromethane	--	4.38	12.37	0.04
Methacrylonitrile	9.19			
1,1,1-Trichloroethane	10.18	4.84	12.83	0.08
Carbon tetrachloride	11.02	5.26	13.17	0.21
1,1-Dichloropropene	--	5.29	13.10	0.10
Benzene	11.50	5.67	13.50	0.04
1,2-Dichloroethane	12.09	5.83	13.63	0.06
Trichloroethene	14.03	7.27	14.80	0.19
1,2-Dichloropropane	14.51	7.66	15.20	0.04
Bromodichloromethane	15.39	8.49	15.80	0.08
Dibromomethane	15.43	7.93	5.43	0.24
Methyl methacrylate	15.50			
1,4-Dioxane	16.17			
2-Chloroethyl vinyl ether	--			
4-Methyl-2-pentanone	17.32			
trans-1,3-Dichloropropene	17.47	--	16.70	--
Toluene	18.29	10.00	17.40	0.11
cis-1,3-Dichloropropene	19.38	--	17.90	--

TABLE 1 (cont.)

Compound	Retention Time (minutes)			LOQ[d]
	Column 1A[a]	Column 2B[b]	Column 2C[c]	(µg/L)
1,1,2-Trichloroethane	19.59	11.05	18.30	0.10
Ethyl methacrylate	20.01			
2-Hexanone	20.30			
Tetrachloroethene	20.26	11.15	18.60	0.14
1,3-Dichloropropane	20.51	11.31	18.70	0.04
Dibromochloromethane	21.19	11.85	19.20	0.05
1,2-Dibromoethane	21.52	11.83	19.40	0.06
1-Chlorohexane	--	13.29	--	0.05
Chlorobenzene	23.17	13.01	20.67	0.04
1,1,1,2-Tetrachloroethane	23.36	13.33	20.87	0.05
Ethylbenzene	23.38	13.39	21.00	0.06
p-Xylene	23.54	13.69	21.30	0.13
m-Xylene	23.54	13.68	21.37	0.05
o-Xylene	25.16	14.52	22.27	0.11
Styrene	25.30	14.60	22.40	0.04
Bromoform	26.23	14.88	22.77	0.12
Isopropylbenzene (Cumene)	26.37	15.46	23.30	0.15
cis-1,4-Dichloro-2-butene	27.12			
1,1,2,2-Tetrachloroethane	27.29	16.35	24.07	0.04
Bromobenzene	27.46	15.86	24.00	0.03
1,2,3-Trichloropropane	27.55	16.23	24.13	0.32
n-Propylbenzene	27.58	16.41	24.33	0.04
2-Chlorotoluene	28.19	16.42	24.53	0.04
trans-1,4-Dichloro-2-butene	28.26			
1,3,5-Trimethylbenzene	28.31	16.90	24.83	0.05
4-Chlorotoluene	28.33	16.72	24.77	0.06
Pentachloroethane	29.41			
1,2,4-Trimethylbenzene	29.47	17.70	31.50	0.13
sec-Butylbenzene	30.25	18.09	26.13	0.13
tert-Butylbenzene	30.59	17.57	26.60	0.14
p-Isopropyltoluene	30.59	18.52	26.50	0.12
1,3-Dichlorobenzene	30.56	18.14	26.37	0.12
1,4-Dichlorobenzene	31.22	18.39	26.60	0.03
Benzyl chloride	32.00			
n-Butylbenzene	32.23	19.49	27.32	0.11
1,2-Dichlorobenzene	32.31	19.17	27.43	0.03
1,2-Dibromo-3-chloropropane	35.30	21.08	--	0.26
1,2,4-Trichlorobenzene	38.19	23.08	31.50	0.04
Hexachlorobutadiene	38.57	23.68	32.07	0.11
Naphthalene	39.05	23.52	32.20	0.04
1,2,3-Trichlorobenzene	40.01	24.18	32.97	0.03

TABLE 1 (cont.)

Compound	Retention Time (minutes) Column 1A[a]	 Column 2B[b]	 Column 2C[c]	LOQ[d] (µg/L)
INTERNAL STANDARDS/SURROGATES				
1,4-Difluorobenzene	13.26			
Chlorobenzene-d_5	23.10			
1,4-Dichlorobenzene-d_4	31.16			
4-Bromofluorobenzene	27.83	15.71	23.63	
1,2-Dichlorobenzene-d_4	32.30	19.08	27.25	
Dichloroethane-d_4	12.08			
Dibromofluoromethane	--			
Toluene-d_8	18.27			
Pentafluorobenzene	--			
Fluorobenzene	13.00	6.27	14.06	

[a] Column 2A - 60 meter x 0.75 mm ID VOCOL capillary. Hold at 10°C for 8 minutes, then program to 180°C at 4°C/min.

[b] Column 2B - 30 meter x 0.53 mm ID DB-624 wide-bore capillary using cryogenic oven. Hold at 10°C for 5 minutes, then program to 160°C at 6°C/min.

[c] Column 2C - 30 meter x 0.53 mm ID DB-624 wide-bore capillary, cooling GC oven to ambient temperatures. Hold at 10°C for 6 minutes, program to 70°C at 10 °C/min, program to 120°C at 5°C/min, then program to 180°C at 8°C/min.

[d] Limit of quantitation based on a 25-mL sample volume.

TABLE 2

EXAMPLE CHROMATOGRAPHIC RETENTION TIMES AND LOWER LIMITS OF QUANTITATION FOR VOLATILE ORGANIC COMPOUNDS ON NARROW-BORE CAPILLARY COLUMNS

Compound	Retention Time (minutes) Column 4[a]	Lower Limit of Quantitation (µg/L)
Dichlorodifluoromethane	0.88	0.11
Chloromethane	0.97	0.05
Vinyl chloride	1.04	0.04
Bromomethane	1.29	0.03
1,1-Dichloroethane	4.03	0.03
cis-1,2-Dichloroethene	5.07	0.06
2,2-Dichloropropane	5.31	0.08
Chloroform	5.55	0.04
Bromochloromethane	5.63	0.09
1,1,1-Trichloroethane	6.76	0.04
1,2-Dichloroethane	7.00	0.02
1,1-Dichloropropene	7.16	0.12
Carbon tetrachloride	7.41	0.02
Benzene	7.41	0.03
1,2-Dichloropropane	8.94	0.02
Trichloroethene	9.02	0.02
Dibromomethane	9.09	0.01
Bromodichloromethane	9.34	0.03
Toluene	11.51	0.08
1,1,2-Trichloroethane	11.99	0.08
1,3-Dichloropropane	12.48	0.08
Dibromochloromethane	12.80	0.07
Tetrachloroethene	13.20	0.05
1,2-Dibromoethane	13.60	0.10
Chlorobenzene	14.33	0.03
1,1,1,2-Tetrachloroethane	14.73	0.07
Ethylbenzene	14.73	0.03
p-Xylene	15.30	0.06
m-Xylene	15.30	0.03
Bromoform	15.70	0.20
o-Xylene	15.78	0.06
Styrene	15.78	0.27
1,1,2,2-Tetrachloroethane	15.78	0.20
1,2,3-Trichloropropane	16.26	0.09
Isopropylbenzene	16.42	0.10
Bromobenzene	16.42	0.11
2-Chlorotoluene	16.74	0.08
n-Propylbenzene	16.82	0.10
4-Chlorotoluene	16.82	0.06

TABLE 2 (cont.)

Compound	Retention Time (minutes) Column 4[a]	Lower Limit of Quantitation (µg/L)
1,3,5-Trimethylbenzene	16.99	0.06
tert-Butylbenzene	17.31	0.33
1,2,4-Trimethylbenzene	17.31	0.09
sec-Butylbenzene	17.47	0.12
1,3-Dichlorobenzene	17.47	0.05
p-Isopropyltoluene	17.63	0.26
1,4-Dichlorobenzene	17.63	0.04
1,2-Dichlorobenzene	17.79	0.05
n-Butylbenzene	17.95	0.10
1,2-Dibromo-3-chloropropane	18.03	0.50
1,2,4-Trichlorobenzene	18.84	0.20
Naphthalene	19.07	0.10
Hexachlorobutadiene	19.24	0.10
1,2,3-Trichlorobenzene	19.24	0.14

[a] Column 3 - 30 meter x 0.32 mm ID DB-5 capillary with 1 µm film thickness.

[b] Lower limit of quantitation based on a 25-mL sample volume.

TABLE 3

BFB (4-BROMOFLUOROBENZENE) MASS INTENSITY CRITERIA[a]

m/z	Required Intensity (relative abundance)
50	15 to 40% of m/z 95
75	30 to 60% of m/z 95
95	Base peak, 100% relative abundance
96	5 to 9% of m/z 95
173	Less than 2% of m/z 174
174	Greater than 50% of m/z 95
175	5 to 9% of m/z 174
176	Greater than 95% but less than 101% of m/z 174
177	5 to 9% of m/z 176

[a] The criteria in this table are intended to be used as default criteria for quadrupole instrumentation if optimized manufacturer's operating conditions are not available. Alternate tuning criteria may be employed (e.g., CLP or Method 524.2), provided that method performance is not adversely affected. See Sec. 11.3.1

TABLE 4

RECOMMENDED MINIMUM RELATIVE RESPONSE FACTOR CRITERIA FOR INITIAL AND CONTINUING CALIBRATION VERIFICATION

Volatile Compounds	Minimum Response Factor (RF)[a]	Typical Response Factor (RF)[b]
Dichlorodifluoromethane	0.100	0.327
Chloromethane	0.100	0.537
Vinyl chloride	0.100	0.451
Bromomethane	0.100	0.255
Chloroethane	0.100	0.254
Trichlorofluoromethane	0.100	0.426
1,1-Dichloroethene	0.100	0.313
1,1,2-Trichloro-1,2,2-trifluoroethane	0.100	0.302
Acetone	0.100	0.151
Carbon disulfide	0.100	1.163
Methyl Acetate	0.100	0.302
Methylene chloride	0.100	0.380
trans-1,2-Dichloroethene	0.100	0.351
cis-1,2-Dichloroethene	0.100	0.376
Methyl tert-Butyl Ether	0.100	0.847
1,1-Dichloroethane	0.200	0.655
2-Butanone	0.100	0.216
Chloroform	0.200	0.557
1,1,1-Trichloroethane	0.100	0.442
Cyclohexane	0.100	0.579
Carbon tetrachloride	0.100	0.353
Benzene	0.500	1.368
1,2-Dichloroethane	0.100	0.443
Trichloroethene	0.200	0.338
Methylcyclohexane	0.100	0.501
1,2-Dichloropropane	0.100	0.382

Volatile Compounds	Minimum Response Factor (RF)[a]	Typical Response Factor (RF)[b]
Bromodichloromethane	0.200	0.424
cis-1,3-Dichloropropene	0.200	0.537
trans-1,3-Dichloropropene	0.100	0.515
4-Methyl-2-pentanone	0.100	0.363
Toluene	0.400	1.577
1,1,2-Trichloroethane	0.100	0.518
Tetrachloroethene	0.200	0.606
2-Hexanone	0.100	0.536
Dibromochloromethane	0.100	0.652
1,2-Dibromoethane	0.100	0.634
Chlorobenzene	0.500	1.733
Ethylbenzene	0.100	2.827
meta-/para-Xylene	0.100	1.080
ortho-Xylene	0.300	1.073
Styrene	0.300	1.916
Bromoform	0.100	0.413
Isopropylbenzene	0.100	2.271
1,1,2,2-Tetrachloroethane	0.300	0.782
1,3-Dichlorobenzene	0.600	1.408
1,4-Dichlorobenzene	0.500	1.427
1,2-Dichlorobenzene	0.400	1.332
1,2-Dibromo-3-chloropropane	0.050	0.129
1,2,4-Trichlorobenzene	0.200	0.806

[a] The project-specific response factors obtained may be affected by the quantitation ion selected and when using possible alternate ions the actual response factors may be lower than those listed. In addition, lower than the recommended minimum response factors may be acceptable for those compounds that are not considered critical target analytes and the associated data may be used for screening purposes.

[b] Data provided by EPA Region III laboratory.

TABLE 5

CHARACTERISTIC MASSES (m/z) FOR PURGEABLE ORGANIC COMPOUNDS

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
Acetone	58	43
Acetonitrile	41	40, 39
Acrolein	56	55, 58
Acrylonitrile	53	52, 51
Allyl alcohol	57	58, 39
Allyl chloride	76	41, 39, 78
Benzene	78	-
Benzyl chloride	91	126, 65, 128
Bromoacetone	136	43, 138, 93, 95
Bromobenzene	156	77, 158
Bromochloromethane	128	49, 130
Bromodichloromethane	83	85, 127
Bromoform	173	175, 254
Bromomethane	94	96
iso-Butanol	74	43
n-Butanol	56	41
2-Butanone	72	43
n-Butylbenzene	91	92, 134
sec-Butylbenzene	105	134
tert-Butylbenzene	119	91, 134
Carbon disulfide	76	78
Carbon tetrachloride	117	119
Chloral hydrate	82	44, 84, 86, 111
Chloroacetonitrile	48	75
Chlorobenzene	112	77, 114
1-Chlorobutane	56	49
Chlorodibromomethane	129	208, 206
Chloroethane	64 (49*)	66 (51*)
2-Chloroethanol	49	44, 43, 51, 80
Bis(2-chloroethyl) sulfide	109	111, 158, 160
2-Chloroethyl vinyl ether	63	65, 106
Chloroform	83	85
Chloromethane	50 (49*)	52 (51*)
Chloroprene	53	88, 90, 51
3-Chloropropionitrile	54	49, 89, 91
2-Chlorotoluene	91	126
4-Chlorotoluene	91	126
1,2-Dibromo-3-chloropropane	75	155, 157
Dibromochloromethane	129	127
1,2-Dibromoethane	107	109, 188
Dibromomethane	93	95, 174

TABLE 5 (cont.)

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
1,2-Dichlorobenzene	146	111, 148
1,2-Dichlorobenzene-d_4	152	115, 150
1,3-Dichlorobenzene	146	111, 148
1,4-Dichlorobenzene	146	111, 148
cis-1,4-Dichloro-2-butene	75	53, 77, 124, 89
trans-1,4-Dichloro-2-butene	53	88, 75
Dichlorodifluoromethane	85	87
1,1-Dichloroethane	63	65, 83
1,2-Dichloroethane	62	98
1,1-Dichloroethene	96	61, 63
cis-1,2-Dichloroethene	96	61, 98
trans-1,2-Dichloroethene	96	61, 98
1,2-Dichloropropane	63	112
1,3-Dichloropropane	76	78
2,2-Dichloropropane	77	97
1,3-Dichloro-2-propanol	79	43, 81, 49
1,1-Dichloropropene	75	110, 77
cis-1,3-Dichloropropene	75	77, 39
trans-1,3-Dichloropropene	75	77, 39
1,2,3,4-Diepoxybutane	55	57, 56
Diethyl ether	74	45, 59
1,4-Dioxane	88	58, 43, 57
Epichlorohydrin	57	49, 62, 51
Ethanol	31	45, 27, 46
Ethyl acetate	88	43, 45, 61
Ethylbenzene	91	106
Ethylene oxide	44	43, 42
Ethyl methacrylate	69	41, 99, 86, 114
Hexachlorobutadiene	225	223, 227
Hexachloroethane	201	166, 199, 203
2-Hexanone	43	58, 57, 100
2-Hydroxypropionitrile	44	43, 42, 53
Iodomethane	142	127, 141
Isobutyl alcohol	43	41, 42, 74
Isopropylbenzene	105	120
p-Isopropyltoluene	119	134, 91
Malononitrile	66	39, 65, 38
Methacrylonitrile	41	67, 39, 52, 66
Methyl acrylate	55	85
Methyl-t-butyl ether	73	57
Methylene chloride	84	86, 49
Methyl iodide	142	127, 141

TABLE 5 (cont.)

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
Methyl methacrylate	69	41, 100, 39
4-Methyl-2-pentanone	100	43, 58, 85
Naphthalene	128	-
Nitrobenzene	123	51, 77
2-Nitropropane	46	-
2-Picoline	93	66, 92, 78
Pentachloroethane	167	130, 132, 165, 169
Propargyl alcohol	55	39, 38, 53
β-Propiolactone	42	43, 44
Propionitrile (ethyl cyanide)	54	52, 55, 40
n-Propylamine	59	41, 39
n-Propylbenzene	91	120
Pyridine	79	52
Styrene	104	78
1,2,3-Trichlorobenzene	180	182, 145
1,2,4-Trichlorobenzene	180	182, 145
1,1,1,2-Tetrachloroethane	131	133, 119
1,1,2,2-Tetrachloroethane	83	131, 85
Tetrachloroethene	164	129, 131, 166
Toluene	92	91
1,1,1-Trichloroethane	97	99, 61
1,1,2-Trichloroethane	83	97, 85
Trichloroethene	95	97, 130, 132
Trichlorofluoromethane	101	103
1,2,3-Trichloropropane	75	77
1,2,4-Trimethylbenzene	105	120
1,3,5-Trimethylbenzene	105	120
Vinyl acetate	43	86
Vinyl chloride	62	64
o-Xylene	106	91
m-Xylene	106	91
p-Xylene	106	91
Internal Standards/Surrogates:		
Benzene-d_6	84	83
Bromobenzene-d_5	82	162
Bromochloromethane-d_2	51	131
1,4-Difluorobenzene	114	
Chlorobenzene-d_5	117	
1,4-Dichlorobenzene-d_4	152	115, 150
1,1,2-Trichloroethane-d_3	100	
4-Bromofluorobenzene	95	174, 176

Compound	Primary Characteristic Ion	Secondary Characteristic Ion(s)
Internal Standards/Surrogates		
Chloroform-d_1	84	
Dibromofluoromethane	113	
Dichloroethane-d_4	102	
Toluene-d_8	98	
Pentafluorobenzene	168	
Fluorobenzene	96	77

* Characteristic ion for an ion trap mass spectrometer (to be used when ion-molecule reactions are observed).

TABLE 6

SINGLE LABORATORY ACCURACY AND PRECISION DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A WIDE-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Conc. Range (µg/L)	Number of Samples	% Recovery[a]	Standard Deviation of Recovery[b]	RSD
Benzene	0.1 - 10	31	97	6.5	5.7
Bromobenzene	0.1 - 10	30	100	5.5	5.5
Bromochloromethane	0.5 - 10	24	90	5.7	6.4
Bromodichloromethane	0.1 - 10	30	95	5.7	6.1
Bromoform	0.5 - 10	18	101	6.4	6.3
Bromomethane	0.5 - 10	18	95	7.8	8.2
n-Butylbenzene	0.5 - 10	18	100	7.6	7.6
sec-Butylbenzene	0.5 - 10	16	100	7.6	7.6
tert-Butylbenzene	0.5 - 10	18	102	7.4	7.3
Carbon tetrachloride	0.5 - 10	24	84	7.4	8.8
Chlorobenzene	0.1 - 10	31	98	5.8	5.9
Chloroethane	0.5 - 10	24	89	8.0	9.0
Chloroform	0.5 - 10	24	90	5.5	6.1
Chloromethane	0.5 - 10	23	93	8.3	8.9
2-Chlorotoluene	0.1 - 10	31	90	5.6	6.2
4-Chlorotoluene	0.1 - 10	31	99	8.2	8.3
1,2-Dibromo-3-Chloropropane	0.5 - 10	24	83	16.6	19.9
Dibromochloromethane	0.1 - 10	31	92	6.5	7.0
1,2-Dibromoethane	0.5 - 10	24	102	4.0	3.9
Dibromomethane	0.5 - 10	24	100	5.6	5.6
1,2-Dichlorobenzene	0.1 - 10	31	93	5.8	6.2
1,3-Dichlorobenzene	0.5 - 10	24	99	6.8	6.9
1,4-Dichlorobenzene	0.2 - 20	31	103	6.6	6.4
Dichlorodifluoromethane	0.5 - 10	18	90	6.9	7.7
1,1-Dichlorobenzene	0.5 - 10	24	96	5.1	5.3
1,2-Dichlorobenzene	0.1 - 10	31	95	5.1	5.4
1,1-Dichloroethene	0.1 - 10	34	94	6.3	6.7
cis-1,2-Dichloroethene	0.5 - 10	18	101	6.7	6.7
trans-1,2-Dichloroethene	0.1 - 10	30	93	5.2	5.6
1,2-Dichloropropane	0.1 - 10	30	97	5.9	6.1
1,3-Dichloropropane	0.1 - 10	31	96	5.7	6.0
2,2-Dichloropropane	0.5 - 10	12	86	14.6	16.9
1,1-Dichloropropene	0.5 - 10	18	98	8.7	8.9
Ethylbenzene	0.1 - 10	31	99	8.4	8.6
Hexachlorobutadiene	0.5 - 10	18	100	6.8	6.8
Isopropylbenzene	0.5 - 10	16	101	7.7	7.6
p-Isopropyltoluene	0.1 - 10	23	99	6.7	6.7
Methylene chloride	0.1 - 10	30	95	5.0	5.3

TABLE 6 (cont.)

Compound	Conc. Range (µg/L)	Number of Samples	% Recovery[a]	Standard Deviation of Recovery[b]	RSD
Naphthalene	0.1 -100	31	104	8.6	8.2
n-Propylbenzene	0.1 - 10	31	100	5.8	5.8
Styrene	0.1 -100	39	102	7.3	7.2
1,1,1,2-Tetrachloroethane	0.5 - 10	24	90	6.1	6.8
1,1,2,2-Tetrachloroethane	0.1 - 10	30	91	5.7	6.3
Tetrachloroethene	0.5 - 10	24	89	6.0	6.8
Toluene	0.5 - 10	18	102	8.1	8.0
1,2,3-Trichlorobenzene	0.5 - 10	18	109	9.4	8.6
1,2,4-Trichlorobenzene	0.5 - 10	18	108	9.0	8.3
1,1,1-Trichloroethane	0.5 - 10	18	98	7.9	8.1
1,1,2-Trichloroethane	0.5 - 10	18	104	7.6	7.3
Trichloroethene	0.5 - 10	24	90	6.5	7.3
Trichlorofluoromethane	0.5 - 10	24	89	7.2	8.1
1,2,3-Trichloropropane	0.5 - 10	16	108	15.6	14.4
1,2,4-Trimethylbenzene	0.5 - 10	18	99	8.0	8.1
1,3,5-Trimethylbenzene	0.5 - 10	23	92	6.8	7.4
Vinyl chloride	0.5 - 10	18	98	6.5	6.7
o-Xylene	0.1 - 31	18	103	7.4	7.2
m-Xylene	0.1 - 10	31	97	6.3	6.5
p-Xylene	0.5 - 10	18	104	8.0	7.7

[a] Recoveries were calculated using internal standard method. The internal standard was fluorobenzene.

[b] Standard deviation was calculated by pooling data from three concentrations.

TABLE 7

SINGLE LABORATORY ACCURACY AND PRECISION DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Conc. (µg/L)	Number of Samples	% Recovery[a]	Standard Deviation of Recovery[b]	RSD
Benzene	0.1	7	99	6.2	6.3
Bromobenzene	0.5	7	97	7.4	7.6
Bromochloromethane	0.5	7	97	5.8	6.0
Bromodichloromethane	0.1	7	100	4.6	4.6
Bromoform	0.5	7	101	5.4	5.3
Bromomethane	0.5	7	99	7.1	7.2
n-Butylbenzene	0.5	7	94	6.0	6.4
sec-Butylbenzene	0.5	7	110	7.1	6.5
tert-Butylbenzene	0.5	7	110	2.5	2.3
Carbon tetrachloride	0.1	7	108	6.8	6.3
Chlorobenzene	0.1	7	91	5.8	6.4
Chloroethane	0.1	7	100	5.8	5.8
Chloroform	0.1	7	105	3.2	3.0
Chloromethane	0.5	7	101	4.7	4.7
2-Chlorotoluene	0.5	7	99	4.6	4.6
4-Chlorotoluene	0.5	7	96	7.0	7.3
1,2-Dibromo-3-chloropropane	0.5	7	92	10.0	10.9
Dibromochloromethane	0.1	7	99	5.6	5.7
1,2-Dibromoethane	0.5	7	97	5.6	5.8
Dibromomethane	0.5	7	93	5.6	6.0
1,2-Dichlorobenzene	0.1	7	97	3.5	3.6
1,3-Dichlorobenzene	0.1	7	101	6.0	5.9
1,4-Dichlorobenzene	0.1	7	106	6.5	6.1
Dichlorodifluoromethane	0.1	7	99	8.8	8.9
1,1-Dichloroethane	0.5	7	98	6.2	6.3
1,2-Dichloroethane	0.1	7	100	6.3	6.3
1,1-Dichloroethene	0.1	7	95	9.0	9.5
cis-1,2-Dichloroethene	0.1	7	100	3.5	3.7
trans-1,2-Dichloroethene	0.1	7	98	7.2	7.3
1,2-Dichloropropane	0.5	7	96	6.0	6.3
1,3-Dichloropropane	0.5	7	99	5.8	5.9
2,2-Dichloropropane	0.5	7	99	4.9	4.9
1,1-Dichloropropene	0.5	7	102	7.4	7.3
Ethylbenzene	0.5	7	99	5.2	5.3
Hexachlorobutadiene	0.5	7	100	6.7	6.7
Isopropylbenzene	0.5	7	102	6.4	6.3
p-Isopropyltoluene	0.5	7	113	13.0	11.5
Methylene chloride	0.5	7	97	13.0	13.4
Naphthalene	0.5	7	98	7.2	7.3

TABLE 7 (cont.)

Compound	Conc. (µg/L)	Number of Samples	% Recovery[a]	Standard Deviation of Recovery[b]	RSD
n-Propylbenzene	0.5	7	99	6.6	6.7
Styrene	0.5	7	96	19.0	19.8
1,1,1,2-Tetrachloroethane	0.5	7	100	4.7	4.7
1,1,2,2-Tetrachloroethane	0.5	7	100	12.0	12.0
Tetrachloroethene	0.1	7	96	5.0	5.2
Toluene	0.5	7	100	5.9	5.9
1,2,3-Trichlorobenzene	0.5	7	102	8.9	8.7
1,2,4-Trichlorobenzene	0.5	7	91	16.0	17.6
1,1,1-Trichloroethane	0.5	7	100	4.0	4.0
1,1,2-Trichloroethane	0.5	7	102	4.9	4.8
Trichloroethene	0.1	7	104	2.0	1.9
Trichlorofluoromethane	0.1	7	97	4.6	4.7
1,2,3-Trichloropropane	0.5	7	96	6.5	6.8
1,2,4-Trimethylbenzene	0.5	7	96	6.5	6.8
1,3,5-Trimethylbenzene	0.5	7	101	4.2	4.2
Vinyl chloride	0.1	7	104	0.2	0.2
o-Xylene	0.5	7	106	7.5	7.1
m-Xylene	0.5	7	106	4.6	4.3
p-Xylene	0.5	7	97	6.1	6.3

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[a] Recoveries were calculated using internal standard method. Internal standard was fluorobenzene.

TABLE 8

US EPA REGION III LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (μg/L)	Replicate #1	Replicate #2	Replicate #3	Replicate #4	Average	%Rec	RSD
Acetone	20	23.78	21.41	21.10	21.95	22.06	110.3	5.4
Benzene	20	19.42	19.31	18.41	20.08	19.31	96.5	3.6
Bromobenzene	20	22.74	19.32	18.61	19.52	20.05	100.2	9.2
Bromochloromethane	20	22.87	19.58	18.91	19.60	20.24	101.2	8.8
Bromodichloromethane	20	18.07	18.10	17.57	18.69	18.11	90.5	2.5
Bromoform	20	18.97	19.39	18.88	19.09	19.08	95.4	1.2
Bromomethane	20	18.93	18.76	17.77	19.86	18.83	94.2	4.5
2-Butanone	20	21.81	20.70	21.61	22.01	21.53	107.7	2.7
n-Butylbenzene	20	22.16	19.14	18.04	19.12	19.62	98.1	9.0
sec-Butylbenzene	20	22.84	19.36	18.15	19.39	19.94	99.7	10.1
tert-Butylbenzene	20	21.87	18.62	17.64	18.62	19.19	95.9	9.6
Carbon disulfide	20	19.01	18.69	17.25	20.23	18.80	94.0	6.5
Carbon tetrachloride	20	19.46	18.74	17.77	20.34	19.08	95.4	5.7
Chlorobenzene	20	19.54	19.39	18.77	20.23	19.48	97.4	3.1
Chloroethane	20	18.86	18.89	17.06	19.95	18.69	93.5	6.4
2-Chloroethylvinyl ether	20	18.26	16.54	16.31	16.51	16.91	84.5	5.4
Chloroform	20	19.47	19.62	18.60	20.14	19.46	97.3	3.3
Chloromethane	20	18.89	18.27	16.78	19.37	18.33	91.6	6.1
2-Chlorotoluene	20	22.82	19.45	18.52	19.69	20.12	100.6	9.3
4-Chlorotoluene	20	22.46	19.08	18.19	19.38	19.78	98.9	9.4
Cyclohexane	20	19.10	18.60	17.46	20.20	18.84	94.2	6.0
1,2-Dibromo-3-chloropropane	20	18.90	18.07	18.54	18.64	18.54	92.7	1.9

TABLE 8 (cont.)

US EPA REGION III LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (µg/L)	Replicate #1	Replicate #2	Replicate #3	Replicate #4	Average	%Rec	RSD
Dibromochloromethane	20	19.70	19.62	19.23	19.83	19.60	98.0	1.3
1,2-Dibromoethane	20	19.95	19.92	19.83	20.39	20.02	100.1	1.2
Dibromomethane	20	22.77	19.72	19.47	20.21	20.54	102.7	7.4
1,2-Dichlorobenzene	20	18.85	18.89	18.29	19.56	18.90	94.5	2.8
1,3-Dichlorobenzene	20	19.27	19.22	18.71	19.91	19.28	96.4	2.6
1,4-Dichlorobenzene	20	19.60	19.49	18.81	20.20	19.53	97.6	2.9
Dichlorodifluoromethane	20	21.07	20.36	18.76	22.20	20.60	103.0	7.0
1,1-Dichloroethane	20	19.23	19.42	18.22	20.15	19.26	96.3	4.1
1,2-Dichloroethane	20	20.15	20.21	19.71	20.67	20.19	100.9	1.9
1,1-Dichloroethene	20	19.36	18.98	17.78	20.59	19.18	95.9	6.0
cis-1,2-Dichloroethene	20	18.56	18.67	17.77	19.40	18.60	93.0	3.6
trans-1,2-Dichloroethene	20	19.26	18.96	17.85	20.04	19.03	95.1	4.8
1,2-Dichloropropane	20	19.73	19.46	18.74	20.18	19.53	97.6	3.1
1,3-Dichloropropane	20	22.23	19.68	19.51	19.59	20.25	101.3	6.5
2,2-Dichloropropane	20	23.16	19.40	17.71	19.08	19.84	99.2	11.8
1,1-Dichloro-1-propene	20	23.24	19.70	18.29	19.97	20.30	101.5	10.3
cis-1,3-Dichloropropene	20	18.96	19.09	18.47	19.54	19.02	95.1	2.3
trans-1,3-Dichloropropene	20	20.19	20.31	19.57	20.36	20.11	100.5	1.8
Ethylbenzene	20	19.55	19.28	18.21	20.21	19.31	96.6	4.3
Hexachlorobutadiene	20	21.14	18.20	17.30	18.34	18.75	93.7	8.9
2-Hexanone	20	23.39	21.20	21.24	22.01	21.96	109.8	4.7
Isopropylbenzene	20	19.13	18.91	17.81	19.84	18.92	94.6	4.4

TABLE 8 (cont.)

US EPA REGION III LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (μg/L)	Replicate #1	Replicate #2	Replicate #3	Replicate #4	Average	%Rec	RSD
p-Isopropyltoluene	20	22.28	18.98	17.93	18.93	19.53	97.7	9.7
Methylene chloride	20	20.03	19.89	20.17	20.56	20.16	100.8	1.4
Methyl acetate	20	20.21	19.73	20.34	20.77	20.26	101.3	2.1
Methyl cyclohexane	20	19.24	18.80	17.75	20.18	18.99	95.0	5.3
4-Methyl-2-pentanone	20	22.00	21.19	21.44	22.00	21.66	108.3	1.9
Methyl tert-butyl ether	20	20.23	20.30	19.82	20.41	20.19	101.0	1.3
Naphthalene	20	20.98	18.60	18.42	18.89	19.22	96.1	6.2
n-Propylbenzene	20	22.56	19.20	18.05	19.31	19.78	98.9	9.8
Styrene	20	16.72	16.46	15.90	16.87	16.49	82.4	2.6
1,1,1,2-Tetrachloroethane	20	22.67	19.12	18.58	19.46	19.96	99.8	9.2
1,1,2,2-Tetrachloroethane	20	20.54	20.21	20.24	20.96	20.49	102.4	1.7
Tetrachloroethene	20	18.88	18.57	17.32	19.67	18.61	93.1	5.2
Toluene	20	20.01	19.59	18.78	20.51	19.72	98.6	3.7
1,2,3-Trichlorobenzene	20	21.68	19.12	18.59	19.20	19.65	98.2	7.0
1,2,4-Trichlorobenzene	20	19.39	18.50	18.13	19.04	18.77	93.8	3.0
1,1,1-Trichloroethane	20	19.06	18.58	17.47	19.95	18.77	93.8	5.5
1,1,2-Trichloroethane	20	19.76	19.91	19.47	20.33	19.87	99.3	1.8
Trichloroethene	20	20.19	19.84	18.42	20.67	19.78	98.9	4.9
Trichlorofluoromethane	20	18.25	17.98	16.79	18.98	18.00	90.0	5.1
1,2,3-Trichloropropane	20	21.83	19.89	19.76	20.32	20.45	102.3	4.6

TABLE 8 (cont.)

US EPA REGION III LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (µg/L)	Replicate #1	Replicate #2	Replicate #3	Replicate #4	Average	%Rec	RSD
1,1,2-Trichloro-1,2,2-trifluoroethane	20	20.33	19.65	18.54	21.18	19.93	99.6	5.6
1,2,4-Trimethylbenzene	20	22.67	19.41	18.47	19.45	20.00	100.0	9.2
1,3,5-Trimethylbenzene	20	22.51	19.13	18.09	19.20	19.73	98.7	9.7
Vinyl acetate	20	22.23	19.92	19.44	19.86	20.36	101.8	6.2
Vinyl chloride	20	19.85	19.72	18.08	21.12	19.69	98.5	6.3
o-Xylene	20	19.78	19.63	18.87	20.46	19.69	98.4	3.3
m & p-Xylene	40	39.08	38.42	36.45	40.21	38.54	96.4	4.1
Surrogates								
1,2-Dichloroethane-d_4	20	20.33	20.33	20.35	20.41	20.36	101.8	0.2
Toluene-d_8	20	20.39	20.24	20.36	20.21	20.30	101.5	0.4
Bromofluorobenzene	20	20.18	20.17	20.12	20.19	20.17	100.8	0.2

TABLE 9

US EPA REGION VI LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (µg/L)	Rep. #1	Rep. #2	Rep. #3	Rep. #4	Rep. #5	Average	%Rec	RSD
Acetone	20	18.69	22.81	19.57	21.73	21.30	20.82	104	8.0
Benzene	20	17.99	19.64	18.25	19.77	20.06	19.14	96	5.0
Bromodichloromethane	20	17.86	20.40	18.39	20.45	20.02	19.42	97	6.2
Bromoform	20	18.47	20.16	18.12	20.83	20.39	19.59	98	6.2
Bromomethane	20	18.53	21.27	19.25	20.66	21.31	20.20	101	6.2
2-Butanone	20	17.20	20.88	18.33	20.86	20.84	19.62	98	8.9
Carbon disulfide	20	18.63	20.86	19.00	20.99	21.50	20.20	101	6.4
Carbon tetrachloride	20	17.82	20.11	18.41	19.79	20.19	19.26	96	5.6
Chlorobenzene	20	18.11	20.65	18.47	20.60	20.63	19.69	98	6.5
Chloroethane	20	21.84	20.31	19.18	20.57	21.70	20.72	104	5.3
Chloroform	20	18.48	21.32	19.10	21.28	20.44	20.12	101	6.4
Chloromethane	20	18.35	20.08	19.11	20.38	19.18	19.42	97	4.2
Cyclohexane	20	18.00	20.07	18.01	19.55	20.35	19.20	96	5.9
1,2-Dibromo-3-chloropropane	20	17.23	20.88	18.03	21.62	20.69	19.69	98	9.8
Dibromochloromethane	20	17.36	20.07	18.23	19.76	20.07	19.10	95	6.5
1,2-Dibromoethane	20	17.97	20.06	18.13	20.01	20.88	19.41	97	6.6
1,2-Dichlorobenzene	20	17.74	19.92	18.11	19.41	20.05	19.05	95	5.6
1,3-Dichlorobenzene	20	17.95	20.10	17.98	19.90	20.25	19.24	96	6.1
1,4-Dichlorobenzene	20	18.05	19.66	18.22	19.47	19.67	19.01	95	4.3
Dichlorodifluoromethane	20	18.81	21.17	19.46	20.98	20.76	20.24	101	5.1
1,1-Dichloroethane	20	18.34	20.86	18.57	20.43	20.69	19.78	99	6.2
1,2-Dichloroethane	20	18.94	21.32	19.35	21.44	20.63	20.34	102	5.6

TABLE 9 (cont.)

US EPA REGION VI LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (µg/L)	Rep. #1	Rep. #2	Rep. #3	Rep. #4	Rep #5	Average	%Rec	RSD
1,1-Dichloroethene	20	17.69	20.18	18.44	21.12	19.81	19.45	97	7.1
cis-1,2-Dichloroethene	20	18.23	20.74	18.49	20.13	19.60	19.44	97	5.5
trans-1,2-Dichloroethene	20	18.29	20.50	18.25	19.89	20.04	19.39	97	5.4
1,2-Dichloropropane	20	17.97	20.35	18.23	19.98	20.44	19.39	97	6.2
cis-1,3-Dichloropropene	20	16.29	17.93	16.14	17.93	17.77	17.21	86	5.3
trans-1,3-Dichloropropene	20	16.83	18.88	16.93	18.46	18.50	17.92	90	5.4
Ethylbenzene	20	17.03	19.05	17.20	18.82	19.04	18.23	91	5.6
2-Hexanone	20	17.00	20.59	18.63	19.59	21.16	19.39	97	8.5
Isopropylbenzene	20	17.22	19.51	17.32	18.75	19.19	18.40	92	5.8
Methylene chloride	20	18.56	20.23	18.76	20.53	20.06	19.63	98	4.6
Methyl acetate	20	18.74	21.20	19.04	21.21	20.57	20.15	101	5.9
Methyl cyclohexane	20	18.36	20.51	18.33	20.50	20.26	19.59	98	5.8
4-Methyl-2-pentanone	20	15.91	19.04	16.86	18.10	18.86	17.75	89	7.6
Methyl tert-butyl ether	20	17.52	20.14	18.03	20.41	19.46	19.11	96	6.7
Styrene	20	17.59	19.93	17.88	19.52	19.87	18.96	95	6.0
1,1,2,2-Tetrachloroethane	20	18.29	21.59	19.00	22.17	21.09	20.43	102	8.3
Tetrachloroethene	20	18.12	20.53	18.80	20.79	20.91	19.83	99	6.5
Toluene	20	18.36	20.57	18.77	20.25	20.85	19.76	99	5.7
1,2,4-Trichlorobenzene	20	16.97	18.95	17.09	18.38	18.86	18.05	90	5.3
1,1,1-Trichloroethane	20	18.30	19.87	18.49	20.37	19.91	19.39	97	4.8
1,1,2-Trichloroethane	20	17.68	19.74	18.02	20.37	19.84	19.13	96	6.3
Trichloroethene	20	17.89	19.49	18.20	19.80	20.06	19.09	95	5.1

TABLE 9 (cont.)

US EPA REGION VI LABORATORY INITIAL DEMONSTRATION OF CAPABILITY DATA FOR PURGEABLE VOLATILE ORGANIC COMPOUNDS IN WATER DETERMINED WITH A NARROW-BORE CAPILLARY COLUMN (METHOD 5030)

Compound	Spike Conc. (µg/L)	Rep. #1	Rep. #2	Rep. #3	Rep. #4	Rep. #5	Average	%Rec	RSD
Trichlorofluoromethane	20	19.53	21.52	19.86	21.76	21.68	20.87	104	5.2
1,1,2-Trichloro-1,2,2-trifluoroethane	20	19.48	21.10	18.18	21.16	21.46	20.28	101	6.9
Vinyl chloride	20	19.22	21.48	19.35	21.33	20.97	20.47	102	5.4
o-Xylene	20	17.89	19.87	17.58	19.38	20.00	18.94	95	6.0
m & p-Xylene	40	36.15	40.29	36.51	39.44	40.57	38.59	96	5.5
Surrogates									
1,2-Dichloroethane-d_4	50	45.62	45.78	45.94	46.31	45.35	45.80	92	0.8
Toluene-d_8	50	47.00	47.17	47.65	47.24	46.93	47.20	94	0.6
Bromofluorobenzene	50	48.40	49.46	49.32	48.61	49.48	49.05	98	1.0

TABLE 10

EXAMPLE SURROGATE SPIKE RECOVERY LIMITS FOR WATER AND SOIL/SEDIMENT SAMPLES

Surrogate Compound	Water	Soil/Sediment
4-Bromofluorobenzene[a]	86-115	74-121
Dibromofluoromethane[a]	86-118	80-120
Toluene-d_8[a]	88-110	81-117
Dichloroethane-d_4[a]	80-120	80-120

[a] Single laboratory data, for guidance only.

TABLE 11

RECOMMENDED QUANTITY OF EXTRACT FOR ANALYSIS OF HIGH CONCENTRATION SAMPLES

Approximate Concentration Range (µg/kg)	Volume of Extract[a]
500 - 10,000	100 µL
1,000 - 20,000	50 µL
5,000 - 100,000	10 µL
25,000 - 500,000	100 µL of 1/50 dilution[b]

Calculate appropriate dilution factor for concentrations exceeding this table.

[a] The volume of solvent added to 5 mL of water being purged should be kept constant. Therefore, add to the 5-mL syringe whatever volume of solvent is necessary to maintain a volume of 100 µL added to the syringe.

[b] Dilute an aliquot of the solvent extract and then take 100 µL for analysis.

TABLE 12

DIRECT INJECTION ANALYSIS OF NEW OIL AT VARIOUS CONCENTRATIONS (METHOD 3585)

Compound	Recovery (%)	%RSD	Blank (ppm)	Spike (ppm)
Acetone	91	14.8	1.9	5.0
Benzene	86	21.3	0.1	0.5
n-Butanol*,**	107	27.8	0.5	5.0
iso-Butanol*,**	95	19.5	0.9	5.0
Carbon tetrachloride	86	44.7	0.0	0.5
Carbon disulfide**	53	22.3	0.0	5.0
Chlorobenzene	81	29.3	0.0	5.0
Chloroform	84	29.3	0.0	6.0
1,4-Dichlorobenzene	98	24.9	0.0	7.5
1,2-Dichloroethane	101	23.1	0.0	0.5
1,1-Dichloroethene	97	45.3	0.0	0.7
Diethyl ether	76	24.3	0.0	5.0
Ethyl acetate	113	27.4	0.0	5.0
Ethylbenzene	83	30.1	0.2	5.0
Hexachloroethane	71	30.3	0.0	3.0
Methylene chloride	98	45.3	0.0	5.0
Methyl ethyl ketone	79	24.6	0.4	5.0
MIBK	93	31.4	0.0	5.0
Nitrobenzene	89	30.3	0.0	2.0
Pyridine	31	35.9	0.0	5.0
Tetrachloroethene	82	27.1	0.0	0.7
Trichlorofluoromethane	76	27.6	0.0	5.0
1,1,2-Trichlorotrifluoroethane	69	29.2	0.0	5.0
Toluene	73	21.9	0.6	5.0
Trichloroethene	66	28.0	0.0	0.5
Vinyl chloride	63	35.2	0.0	0.2
o-Xylene	83	29.5	0.4	5.0
m/p-Xylene	84	29.5	0.6	10.0

* Alternate mass employed
** IS quantitation

Data are taken from Reference 9.

TABLE 13

SINGLE LABORATORY PERFORMANCE DATA FOR THE DIRECT INJECTION METHOD - USED OIL (METHOD 3585)

Compound	Recovery (%)	%RSD	Blank (ppm)	Spike (ppm)
Acetone**	105	54	2.0	5.0
Benzene	3135	44	14	0.5
Benzene-d_6	56	44	2.9	0.5
n-Butanol**	100	71	12	5.0
iso-Butanol*,**	132	27	0	5.0
Carbon tetrachloride	143	68	0	0.5
Carbon tetrachloride-^{13}C	99	44	5.1	0.5
Carbon disulfide**	95	63	0	5.0
Chlorobenzene	148	71	0	5.0
Chlorobenzene-d_5	60	44	3.6	5.0
Chloroform	149	74	0	6.0
Chloroform-d_1	51	44	2.6	6.0
1,4-Dichlorobenzene	142	72	0	7.5
1,4-Dichlorobenzene-d_4	53	44	3.4	7.5
1,2-Dichloroethane**	191	54	0	0.5
1,1-Dichloroethene*	155	51	0	0.7
1,1-Dichloroethene-d_2	68	44	3.4	0.7
Diethyl ether**	95	66	0	5.0
Ethyl acetate*,**	126	39	0	5.0
Ethylbenzene	1298	44	54	5.0
Ethylbenzene-d_{10}	63	44	3.6	5.0
Hexachloroethane	132	72	0	3.0
Hexachloroethane-^{13}C	54	45	3.5	3.0
Methylene chloride**	86	65	0.3	5.0
Methyl ethyl ketone**	107	64	0	5.0
4-Methyl-2-pentanone (MIBK)**	100	74	0.1	5.0
Nitrobenzene	111	80	0	2.0
Nitrobenzene-d_5	65	53	4.0	2.0
Pyridine**	68	85	0	5.0
Pyridine-d_5	ND	--	0	5.0
Tetrachloroethene**	101	73	0	0.7
Trichlorofluoromethane**	91	70	0	5.0
1,1,2-Cl_3F_3ethane**	81	70	0	5.0
Toluene	2881	44	128	5.0
Toluene-d_8	63	44	3.6	5.0
Trichloroethene	152	57	0	0.5
Trichloroethene-d_1	55	44	2.8	0.5

TABLE 13 (cont.)

Compound	Recovery (%)	%RSD	Blank (ppm)	Spike (ppm)
Vinyl chloride**	100	69	0	0.2
o-Xylene	2292	44	105	5.0
o-Xylene-d_{10}	76	44	4.2	5.0
m-/p-Xylene	2583	44	253	10.0
p-Xylene-d_{10}	67	44	3.7	10.0

* Alternate mass employed
** IS quantitation
ND = Not Detected

Data are based on seven measurements and are taken from Reference 9.

TABLE 14

TARGET COMPOUNDS, SURROGATES, AND INTERNAL STANDARDS (METHOD 5031)

Target Compound	Surrogate	Internal Standard
Acetone	d_6-Acetone	d_8-Isopropyl alcohol
Acetonitrile	d_3-Acetonitrile	d_8-Isopropyl alcohol
Acrylonitrile	d_8-Isopropyl alcohol	
Allyl alcohol	d_7-Dimethyl formamide	
Crotonaldehyde	d_8-Isopropyl alcohol	
1,4-Dioxane	d_8-1,4-Dioxane	d_7-Dimethyl formamide
Isobutyl alcohol	d_7-Dimethyl formamide	
Methanol	d_3-Methanol	d_8-Isopropyl alcohol
Methyl ethyl ketone	d_8-Isopropyl alcohol	
N-Nitroso-di-n-butylamine	d_7-Dimethyl formamide	
Paraldehyde	d_7-Dimethyl formamide	
2-Picoline	d_7-Dimethyl formamide	
Propionitrile	d_8-Isopropyl alcohol	
Pyridine	d_5-Pyridine	d_7-Dimethyl formamide
o-Toluidine	d_7-Dimethyl formamide	

TABLE 15

RECOMMENDED CONCENTRATIONS FOR CALIBRATION SOLUTIONS (METHOD 5031)

Compound	Concentration(s) (ng/µL)
Internal Standards	
d_5-benzyl alcohol	10.0
d_{14}-Diglyme	10.0
d_7-Dimethyl formamide	10.0
d_8-Isopropyl alcohol	10.0
Surrogates	
d_6-Acetone	10.0
d_3-Acetonitrile	10.0
d_8-1,4-Dioxane	10.0
d_3-Methanol	10.0
d_5-Pyridine	10.0
Target Compounds	
Acetone	1.0, 5.0, 10.0, 25.0, 100.0
Acetonitrile	1.0, 5.0, 10.0, 25.0, 100.0
Acrylonitrile	1.0, 5.0, 10.0, 25.0, 100.0
Allyl alcohol	1.0, 5.0, 10.0, 25.0, 100.0
Crotonaldehyde	1.0, 5.0, 10.0, 25.0, 100.0
1,4-Dioxane	1.0, 5.0, 10.0, 25.0, 100.0
Isobutyl alcohol	1.0, 5.0, 10.0, 25.0, 100.0
Methanol	1.0, 5.0, 10.0, 25.0, 100.0
Methyl ethyl ketone	1.0, 5.0, 10.0, 25.0, 100.0
N-Nitroso-di-n-butylamine	1.0, 5.0, 10.0, 25.0, 100.0
Paraldehyde	1.0, 5.0, 10.0, 25.0, 100.0
2-Picoline	1.0, 5.0, 10.0, 25.0, 100.0
Propionitrile	1.0, 5.0, 10.0, 25.0, 100.0
Pyridine	1.0, 5.0, 10.0, 25.0, 100.0
o-Toluidine	1.0, 5.0, 10.0, 25.0, 100.0

TABLE 16

CHARACTERISTIC IONS AND RETENTION TIMES FOR VOCs (METHOD 5031)

Compound	Quantitation Ion[a]	Secondary Ions	Retention Time (min)[b]
Internal Standards			
d_8-Isopropyl alcohol	49		1.75
d_{14}-Diglyme	66	98,64	9.07
d_7-Dimethyl formamide	50	80	9.20
Surrogates			
d_6-Acetone	46	64,42	1.03
d_3-Methanol	33	35,30	1.75
d_3-Acetonitrile	44	42	2.63
d_8-1,4-Dioxane	96	64,34	3.97
d_5-Pyridine	84	56,79	6.73
d_5-Phenol[c]	99	71	15.43
Target Compounds			
Acetone	43	58	1.05
Methanol	31	29	1.52
Methyl ethyl ketone	43	72,57	1.53
Methacrylonitrile[c]	67	41	2.38
Acrylonitrile	53	52,51	2.53
Acetonitrile	41	40,39	2.73
Methyl isobutyl ketone[c]	85	100,58	2.78
Propionitrile	54	52,55	3.13
Crotonaldehyde	41	70	3.43
1,4-Dioxane	58	88,57	4.00
Paraldehyde	45	89	4.75
Isobutyl alcohol	43	33,42	5.05
Allyl alcohol	57	39	5.63
Pyridine	79	50,52	6.70
2-Picoline	93	66	7.27
N-Nitroso-di-n-butylamine	84	116	12.82
Aniline[c]	93	66,92	13.23
o-Toluidine	106	107	13.68
Phenol[c]	94	66,65	15.43

[a] These ions were used for quantitation in selected ion monitoring.

[b] GC column: DB-Wax, 30 meter x 0.53 mm, 1 µm film thickness.
Oven program: 45°C for 4 min, increased to 220°C at 12°C/min.

[c] Compound removed from target analyte list due to poor accuracy and precision.

TABLE 17

METHOD ACCURACY AND PRECISION BY MEAN PERCENT RECOVERY AND PERCENT RELATIVE STANDARD DEVIATION[a] (METHOD 5031 - MACRODISTILLATION TECHNIQUE)

(Single Laboratory and Single Operator)

	25 ppb Spike		100 ppb Spike		500 ppb Spike	
Compound	Mean %R	%RSD	Mean %R	%RSD	Mean %R	%RSD
d_6-Acetone	66	24	69	14	65	16
d_3-Acetonitrile	89	18	80	18	70	10
d_8-1,4-Dioxane	56	34	58	11	61	18
d_3-Methanol	43	29	48	19	56	14
d_5-Pyridine	83	6.3	84	7.8	85	9.0
Acetone	67	45	63	14	60	14
Acetonitrile	44	35	52	15	56	15
Acrylonitrile	49	42	47	27	45	27
Allyl alcohol	69	13	70	9.7	73	10
Crotonaldehyde	68	22	68	13	69	13
1,4-Dioxane	63	25	55	16	54	13
Isobutyl alcohol	66	14	66	5.7	65	7.9
Methanol	50	36	46	22	49	18
Methyl ethyl ketone	55	37	56	20	52	19
N-Nitroso-di-n-butylamine	57	21	61	15	72	18
Paraldehyde	65	20	66	11	60	8.9
Picoline	81	12	81	6.8	84	8.0
Propionitrile	67	22	69	13	68	13
Pyridine	74	7.4	72	6.7	74	7.3
o-Toluidine	52	31	54	15	58	12

[a] Data from analysis of seven aliquots of reagent water spiked at each concentration, using a quadrupole mass spectrometer in the selected ion monitoring mode.

TABLE 18

RECOVERIES IN SAND SAMPLES FORTIFIED AT 20 µg/kg (ANALYSIS BY METHOD 5035)

	Recovery per Replicate (ng)							Mean
Compound	1	2	3	4	5	Mean	RSD	Rec
Vinyl chloride	8.0	7.5	6.7	5.4	6.6	6.8	13.0	34.2
Trichlorofluoromethane	13.3	16.5	14.9	13.0	10.3	13.6	15.2	68.0
1,1-Dichloroethene	17.1	16.7	15.1	14.8	15.6	15.9	5.7	79.2
Methylene chloride	24.5	22.7	19.7	19.4	20.6	21.4	9.1	107
trans-1,2-Dichloroethene	22.7	23.6	19.4	18.3	20.1	20.8	0.7	104
1,2-Dichloroethane	18.3	18.0	16.7	15.6	15.9	16.9	6.4	84.4
cis-1,2-Dichloroethene	26.1	23.1	22.6	20.3	20.8	22.6	9.0	113
Bromochloromethane	24.5	25.4	20.9	20.1	20.1	22.2	10.2	111
Chloroform	26.5	26.0	22.1	18.9	22.1	23.1	12.2	116
1,1,1-Trichloroethane	21.5	23.0	23.9	16.7	31.2	23.4	21.2	117
Carbon tetrachloride	23.6	24.2	22.6	18.3	23.3	22.4	9.4	112
Benzene	22.4	23.9	20.4	17.4	19.2	20.7	11.2	103
Trichloroethene	21.5	20.5	19.2	14.4	19.1	18.9	12.7	94.6
1,2-Dichloropropane	24.9	26.3	23.1	19.0	23.3	23.3	10.5	117
Dibromomethane	25.4	26.4	21.6	20.4	23.6	23.5	9.6	117
Bromodichloromethane	25.7	26.7	24.1	17.9	23.0	23.5	13.1	117
Toluene	28.3	25.0	24.8	16.3	23.6	23.6	16.9	118
1,1,2-Trichloroethane	25.4	24.5	21.6	17.7	22.1	22.2	12.1	111
1,3-Dichloropropane	25.4	24.2	22.7	17.0	22.2	22.3	12.8	112
Dibromochloromethane	26.3	26.2	23.7	18.2	23.2	23.5	12.5	118
Chlorobenzene	22.9	22.5	19.8	14.6	19.4	19.9	15.0	99.3
1,1,1,2-Tetrachloroethane	22.4	27.7	25.1	19.4	22.6	23.4	12.0	117
Ethylbenzene	25.6	25.0	22.1	14.9	24.0	22.3	17.5	112
p-Xylene	22.5	22.0	19.8	13.9	20.3	19.7	15.7	98.5
o-Xylene	24.2	23.1	21.6	14.0	20.4	20.7	17.3	103
Styrene	23.9	21.5	20.9	14.3	20.5	20.2	15.7	101
Bromoform	26.8	25.6	26.0	20.1	23.5	24.4	9.9	122
iso-Propylbenzene	25.3	25.1	24.2	15.4	24.6	22.9	16.6	114
Bromobenzene	19.9	21.8	20.0	15.5	19.1	19.3	10.7	96.3
1,2,3-Trichloropropane	25.9	23.0	25.6	15.9	21.4	22.2	15.8	111
n-Propylbenzene	26.0	23.8	22.6	13.9	21.9	21.6	19.0	106
2-Chlorotoluene	23.6	23.8	21.3	13.0	21.5	20.6	19.2	103
4-Chlorotoluene	21.0	19.7	18.4	12.1	18.3	17.9	17.1	89.5
1,3,5-Trimethylbenzene	24.0	22.1	22.5	13.8	22.9	21.1	17.6	105
sec-Butylbenzene	25.9	25.3	27.8	16.1	28.6	24.7	18.1	124
1,2,4-Trimethylbenzene	30.6	39.2	22.4	18.0	22.7	26.6	28.2	133
1,3-Dichlorobenzene	20.3	20.6	18.2	13.0	17.6	17.9	15.2	89.7
p-iso-Propyltoluene	21.6	22.1	21.6	16.0	22.8	20.8	11.8	104
1,4-Dichlorobenzene	18.1	21.2	20.0	13.2	17.4	18.0	15.3	90.0
1,2-Dichlorobenzene	18.4	22.5	22.5	15.2	19.9	19.7	13.9	96.6
n-Butylbenzene	13.1	20.3	19.5	10.8	18.7	16.5	23.1	82.4
1,2,4-Trichlorobenzene	14.5	14.9	15.7	8.8	12.3	13.3	18.8	66.2
Hexachlorobutadiene	17.6	22.5	21.6	13.2	21.6	19.3	18.2	96.3
1,2,3-Trichlorobenzene	14.9	15.9	16.5	11.9	13.9	14.6	11.3	73.1

Data in Tables 17, 18, and 19 are from Reference 15.

TABLE 19
RECOVERIES IN HAZARDOUS WASTE LANDFILL SOILS FORTIFIED AT 20 µg/kg (ANALYSIS BY METHOD 5035)

	Recovery per Replicate (ng)							Mean
Compound	1	2	3	4	5	Mean	RSD	Rec
Vinyl chloride	33.4	31.0	30.9	29.7	28.6	30.8	5.2	154
Trichlorofluoromethane	37.7	20.8	20.0	21.8	20.5	24.1	28.2	121
1,1-Dichloroethene	21.7	33.5	39.8	30.2	32.5	31.6	18.5	158
Methylene chloride	20.9	19.4	18.7	18.3	18.4	19.1	5.1	95.7
trans-1,2-Dichloroethene	21.8	18.9	20.4	17.9	17.8	19.4	7.9	96.8
1,1-Dichloroethane	23.8	21.9	21.3	21.3	20.5	21.8	5.2	109
cis-1,2-Dichloroethene	21.6	18.8	18.5	18.2	18.2	19.0	6.7	95.2
Bromochloromethane	22.3	19.5	19.3	19.0	19.2	20.0	6.0	100
Chloroform	20.5	17.1	17.3	16.5	15.9	17.5	9.2	87.3
1,1,1-Trichloroethane	16.4	11.9	10.7	9.5	9.4	11.6	22.4	57.8
Carbon tetrachloride	13.1	11.3	13.0	11.8	11.2	12.1	6.7	60.5
Benzene	21.1	19.3	18.7	18.2	16.9	18.8	7.4	94.1
Trichloroethene	19.6	16.4	16.5	16.5	15.5	16.9	8.3	84.5
1,2-Dichloropropane	21.8	19.0	18.3	18.8	16.5	18.9	9.0	94.4
Dibromomethane	20.9	17.9	17.9	17.2	18.3	18.4	6.9	92.1
Bromodichloromethane	20.9	18.0	18.9	18.2	17.3	18.6	6.6	93.2
Toluene	22.2	17.3	18.8	17.0	15.9	18.2	12.0	91.2
1,1,2-Trichloroethane	21.0	16.5	17.2	17.2	16.5	17.7	9.6	88.4
1,3-Dichloropropane	21.4	17.3	18.7	18.6	16.7	18.5	8.8	92.6
Dibromochloromethane	20.9	18.1	19.0	18.8	16.6	18.7	7.5	93.3
Chlorobenzene	20.8	18.4	17.6	16.8	14.8	17.7	11.2	88.4
1,1,1,2-Tetrachloroethane	19.5	19.0	17.8	17.2	16.5	18.0	6.2	90.0
Ethylbenzene	21.1	18.3	18.5	16.9	15.3	18.0	10.6	90.0
p-Xylene	20.0	17.4	18.2	16.3	14.4	17.3	10.9	86.3
o-Xylene	20.7	17.2	16.8	16.2	14.8	17.1	11.4	85.7
Styrene	18.3	15.9	16.2	15.3	13.7	15.9	9.3	79.3
Bromoform	20.1	15.9	17.1	17.5	16.1	17.3	8.6	86.7
iso-Propylbenzene	21.0	18.1	19.2	18.4	15.6	18.4	9.6	92.2
Bromobenzene	20.4	16.2	17.2	16.7	15.4	17.2	10.1	85.9
1,1,2,2-Tetrachloroethane	23.3	17.9	21.2	18.8	16.8	19.6	12.1	96.0
1,2,3-Trichloropropane	18.4	14.6	15.6	16.1	15.6	16.1	8.0	80.3
n-Propylbenzene	20.4	18.9	17.9	17.0	14.3	17.7	11.6	88.4
2-Chlorotoluene	19.1	17.3	16.1	16.0	14.4	16.7	9.2	83.6
4-Chlorotoluene	19.0	15.5	16.8	15.9	13.6	16.4	10.6	81.8
1,3,5-Trimethylbenzene	20.8	18.0	17.4	16.1	14.7	17.4	11.7	86.9
sec-Butylbenzene	21.4	18.3	18.9	17.0	14.9	18.1	11.8	90.5
1,2,4-Trimethylbenzene	20.5	18.6	16.8	15.3	13.7	17.0	14.1	85.0
1,3-Dichlorobenzene	17.6	15.9	15.6	14.2	14.4	15.6	7.9	77.8
p-iso-Propyltoluene	20.5	17.0	17.1	15.6	13.4	16.7	13.9	83.6
1,4-Dichlorobenzene	18.5	13.8	14.8	16.7	14.9	15.7	10.5	78.7
1,2-Dichlorobenzene	18.4	15.0	15.4	15.3	13.5	15.5	10.5	77.6
n-Butylbenzene	19.6	15.9	15.9	14.4	18.9	16.9	11.7	84.6
1,2,4-Trichlorobenzene	15.2	17.2	17.4	13.6	12.1	15.1	13.5	75.4
Hexachlorobutadiene	18.7	16.2	15.5	13.8	16.6	16.1	10.0	80.7
Naphthalene	13.9	11.1	10.2	10.8	11.4	11.5	11.0	57.4
1,2,3-Trichlorobenzene	14.9	15.2	16.8	13.7	12.7	14.7	9.5	73.2

TABLE 20
RECOVERIES IN GARDEN SOIL FORTIFIED AT 20 µg/kg (ANALYSIS BY METHOD 5035)

	Recovery per Replicate (ng)							Mean
Compound	1	2	3	4	5	Mean	RSD	Rec
Vinyl chloride	12.7	10.9	9.8	8.1	7.2	9.7	20.2	48.7
Trichlorofluoromethane	33.7	6.4	30.3	27.8	22.9	24.2	39.6	121
1,1-Dichloroethene	27.7	20.5	24.1	15.1	13.2	20.1	26.9	101
Methylene chloride	25.4	23.9	24.7	22.2	24.2	24.1	4.4	120
trans-1,2-Dichloroethene	2.8	3.0	3.3	2.2	2.4	2.7	15.0	13.6
1,1-Dichloroethane	24.1	26.3	27.0	20.5	21.2	23.8	11.0	119
cis-1,2-Dichloroethene	8.3	10.2	8.7	5.8	6.4	7.9	20.1	39.4
Bromochloromethane	11.1	11.8	10.2	8.8	9.0	10.2	11.2	50.9
Chloroform	16.7	16.9	17.0	13.8	15.0	15.9	7.9	79.3
1,1,1-Trichloroethane	24.6	22.8	22.1	16.2	20.9	21.3	13.4	107
Carbon tetrachloride	19.4	20.3	22.2	20.0	20.2	20.4	4.6	102
Benzene	21.4	22.0	22.4	19.6	20.4	21.2	4.9	106
Trichloroethene	12.4	16.5	14.9	9.0	9.9	12.5	22.9	62.7
1,2-Dichloropropane	19.0	18.8	19.7	16.0	17.6	18.2	7.1	91.0
Dibromomethane	7.3	8.0	6.9	5.6	6.8	6.9	11.3	34.6
Bromodichloromethane	14.9	15.9	15.9	12.8	13.9	14.7	8.3	73.3
Toluene	42.6	39.3	45.1	39.9	45.3	42.4	5.9	212
1,1,2-Trichloroethane	13.9	15.2	1.4	21.3	14.9	15.9	17.0	79.6
1,3-Dichloropropane	13.3	16.7	11.3	10.9	9.5	12.3	20.3	61.7
Dibromochloromethane	14.5	13.1	14.5	11.9	14.4	13.7	7.6	68.3
Chlorobenzene	8.4	10.0	8.3	6.9	7.8	8.3	12.1	41.3
1,1,1,2-Tetrachloroethane	16.7	16.7	15.6	15.8	15.7	16.1	3.2	80.4
Ethylbenzene	22.1	21.4	23.1	20.1	22.6	21.9	4.8	109
p-Xylene	41.4	38.4	43.8	38.3	44.0	41.2	6.1	206
o-Xylene	31.7	30.8	34.3	30.4	33.2	32.1	4.6	160
Styrene	0	0	0	0	0	0	0	0
Bromoform	8.6	8.9	9.1	7.0	7.7	8.3	9.4	41.4
iso-Propylbenzene	18.1	18.8	9.7	18.3	19.6	18.9	3.5	94.4
Bromobenzene	5.1	5.4	5.3	4.4	4.0	4.8	11.6	24.1
1,1,2,2-Tetrachloroethane	14.0	13.5	14.7	15.3	17.1	14.9	8.5	74.5
1,2,3-Trichloropropane	11.0	12.7	11.7	11.7	11.9	11.8	4.5	59.0
n-Propylbenzene	13.4	13.3	14.7	12.8	13.9	13.6	4.7	68.1
2-Chlorotoluene	8.3	9.0	11.7	8.7	7.9	9.1	14.8	45.6
4-Chlorotoluene	5.1	5.4	5.5	4.8	4.5	5.0	7.9	25.2
1,3,5-Trimethylbenzene	31.3	27.5	33.0	31.1	33.6	31.3	6.8	157
sec-Butylbenzene	13.5	13.4	16.4	13.8	15.4	14.5	8.3	72.5
1,2,4-Trimethylbenzene	38.7	32.4	40.8	34.1	40.3	37.3	9.1	186
1,3-Dichlorobenzene	3.6	3.6	3.7	3.0	3.2	3.4	8.0	17.2
p-iso-Propyltoluene	14.7	14.1	16.1	13.9	15.1	14.8	5.2	73.8
1,4-Dichlorobenzene	3.0	3.5	3.3	2.6	2.8	3.0	10.2	15.0
1,2-Dichlorobenzene	3.6	4.3	4.0	3.5	3.6	3.8	8.3	19.0
n-Butylbenzene	17.4	13.8	14.0	18.9	24.0	17.6	21.2	88.0
1,2,4-Trichlorobenzene	2.8	2.9	3.3	2.6	3.2	3.0	8.5	15.0
Hexachlorobutadiene	4.8	4.0	6.1	5.6	6.0	5.3	15.1	26.4
Naphthalene	5.5	5.1	5.5	4.7	5.6	5.3	6.2	26.5
1,2,3-Trichlorobenzene	2.2	2.3	2.4	2.2	2.3	2.3	3.5	11.4

Data in Table 19 are from Reference 15.

TABLE 21

VOLATILE ORGANIC ANALYTE RECOVERY FROM SOIL USING VACUUM DISTILLATION (METHOD 5032)[a]

Compound	Soil/H_2O[b] Recovery		Soil/Oil[c] Recovery		Soil/Oil/H_2O[d] Recovery	
	Mean	RSD	Mean	RSD	Mean	RSD
Chloromethane	61	20	40	18	108	68
Bromomethane	58	20	47	13	74	13
Vinyl chloride	54	12	46	11	72	20
Chloroethane	46	10	41	8	52	14
Methylene chloride	60	2	65	8	76	11
Acetone	INT[e]	INT	44	8		
Carbon disulfide	47	13	53	10	47	4
1,1-Dichloroethene	48	9	47	5	58	3
1,1-Dichloroethane	61	6	58	9	61	6
trans-1,2-Trichloroethane	54	7	60	7	56	5
cis-1,2-Dichloroethene	60	4	72	6	63	8
Chloroform	104	11	93	6	114	15
1,2-Dichloroethane	177	50	117	8	151	22
2-Butanone	INT	36	38	INT		
1,1,1-Trichloroethane	124	13	72	16	134	26
Carbon tetrachloride	172	122	INT	INT		
Vinyl acetate	88	11	INT			
Bromodichloromethane	93	4	91	23	104	23
1,1,2,2-Tetrachloroethane	96	13	50	12	104	7
1,2-Dichloropropane	105	8	102	6	111	6
trans-1,3-Dichloropropene	134	10	84	16	107	8
Trichloroethene	98	9	99	10	100	5
Dibromochloromethane	119	8	125	31	142	16
1,1,2-Trichloroethane	126	10	72	16	97	4
Benzene	99	7	CONT[f]	CONT		
cis-1,3-Dichloropropene	123	12	94	13	112	9
Bromoform	131	13	58	18	102	9
2-Hexanone	155	18	164	19	173	29
4-Methyl-2-pentanone	152	20	185	20	169	18
Tetrachloroethene	90	9	123	14	128	7
Toluene	94	3	CONT	CONT		
Chlorobenzene	98	7	93	18	112	5
Ethylbenzene	114	13	CONT	CONT		
Styrene	106	8	93	18	112	5
p-Xylene	97	9	CONT	CONT		
o-Xylene	105	8	112	12	144	13

TABLE 21 (cont.)

Compound	Soil/H_2O[b] Recovery Mean	RSD	Soil/Oil[c] Recovery Mean	RSD	Soil/Oil/H_2O Recovery Mean	RSD
Surrogates						
1,2-Dichloroethane	177	50	117	8	151	22
Toluene-d_8	96	6	79	12	82	6
Bromofluorobenzene	139	13	37	13	62	5

[a] Results are for 10 min. distillation times, and condenser temperature held at -10°C. A 30 m x 0.53 mm ID stable wax column with a 1 µm film thickness was used for chromatography. Standards and samples were replicated and precision value reflects the propagated errors. Each analyte was spiked at 50 ppb. Vacuum distillation efficiencies (Method 5032) are modified by internal standard corrections. Method 8260 internal standards may introduce bias for some analytes. See Method 5032 to identify alternate internal standards with similar efficiencies to minimize bias.

[b] Soil samples spiked with 0.2 mL water containing analytes and then 5 mL water added to make slurry.

[c] Soil sample + 1 g cod liver oil, spiked with 0.2 mL water containing analytes.

[d] Soil samples + 1 g cod liver oil, spiked as above with 5 mL of water added to make slurry.

[e] Interference by co-eluting compounds prevented accurate measurement of analyte.

[f] Contamination of sample matrix by analyte prevented assessment of efficiency.

TABLE 22

VACUUM DISTILLATION EFFICIENCIES FOR VOLATILE ORGANIC ANALYTES IN FISH TISSUE (METHOD 5032)[a]

Compound	Efficiency Mean (%)	RSD (%)
Chloromethane	N/A[b]	
Bromomethane	N/A[b]	
Vinyl chloride	N/A[b]	
Chloroethane	N/A[b]	
Methylene chloride	CONT[c]	
Acetone	CONT[c]	
Carbon disulfide	79	36
1,1-Dichloroethene	122	39
1,1-Dichloroethane	126	35
trans-1,2-Trichloroethene	109	46
cis-1,2-Dichloroethene	106	22
Chloroform	111	32
1,2-Dichloroethane	117	27
2-Butanone	INT[d]	
1,1,1-Trichloroethane	106	30
Carbon tetrachloride	83	34
Vinyl acetate	INT[d]	
Bromodichloromethane	97	22
1,1,2,2-Tetrachloroethane	67	20
1,2-Dichloropropane	117	23
trans-1,3-Dichloropropene	92	22
Trichloroethene	98	31
Dibromochloromethane	71	19
1,1,2-Trichloroethane	92	20
Benzene	129	35
cis-1,3-Dichloropropene	102	24
Bromoform	58	19
2-Hexanone	INT[d]	
4-Methyl-2-pentanone	113	37
Tetrachloroethene	66	20
Toluene	CONT[c]	
Chlorobenzene	65	19
Ethylbenzene	74	19
Styrene	57	14
p-Xylene	46	13
o-Xylene	83	20

TABLE 22 (cont.)

Compound	Efficiency Mean (%)	RSD (%)
Surrogates		
1,2-Dichloroethane	115	27
Toluene-d_8	88	24
Bromofluorobenzene	52	15

[a] Results are for 10 min. distillation times and condenser temperature held at -10°C. Five replicate 10-g aliquots of fish spiked at 25 ppb were analyzed using GC/MS external standard quantitation. A 30 m x 0.53 mm ID stable wax column with a 1 µm film thickness was used for chromatography. Standards were replicated and results reflect 1 sigma propagated standard deviation.

[b] No analyses.

[c] Contamination of sample matrix by analyte prevented accurate assessment of analyte efficiency.

[d] Interfering by co-eluting compounds prevented accurate measurement of analyte.

TABLE 23

VOLATILE ORGANIC ANALYTES RECOVERY FOR WATER USING VACUUM DISTILLATION (METHOD 5032)[a]

Compound	5 mL H_2O Recovery Mean	RSD	20 mL H_2O Recovery Mean	RSD	20 mL H_2O/Oil[b] Recovery Mean	RSD
Chloromethane	114	27	116	29	176	67
Bromomethane	131	14	121	14	113	21
Vinyl chloride	131	13	120	16	116	23
Chloroethane	110	15	99	8	96	16
Methylene chloride	87	16	105	15	77	6
Acetone	83	22	65	34	119	68
Carbon disulfide	138	17	133	23	99	47
1,1-Dichloroethene	105	11	89	4	96	18
1,1-Dichloroethane	118	10	119	11	103	25
trans-1,2-Dichloroethene	105	11	107	14	96	18
cis-1,2-Dichloroethene	106	7	99	5	104	23
Chloroform	114	6	104	8	107	21
1,2-Dichloroethane	104	6	109	8	144	19
2-Butanone	83	50	106	31	INT[c]	
1,1,1-Trichloroethane	118	9	109	9	113	23
Carbon tetrachloride	102	6	108	12	109	27
Vinyl acetate	90	16	99	7	72	36
Bromodichloromethane	104	3	110	5	99	5
1,1,2,2-Tetrachloroethane	85	17	81	7	111	43
1,2-Dichloropropane	100	6	103	2	104	7
trans-1,3-Dichloropropene	105	8	105	4	92	4
Trichloroethene	98	4	99	2	95	5
Dibromochloroethane	99	8	99	6	90	25
1,1,2-Trichloroethane	98	7	100	4	76	12
Benzene	97	4	100	5	112	10
cis-1,3-Dichloropropene	106	5	105	4	98	3
Bromoform	93	16	94	8	57	21
2-Hexanone	60	17	63	16	78	23
4-Methyl-2-pentanone	79	24	63	14	68	15
Tetrachloroethene	101	3	97	7	77	14
Toluene	100	6	97	8	85	5
Chlorobenzene	98	6	98	4	88	16
Ethylbenzene	100	3	92	8	73	13
Styrene	98	4	97	9	88	16
p-Xylene	96	4	94	8	60	12
o-Xylene	96	7	95	6	72	14

TABLE 23 (cont.)

Compound	5 mL H_2O^b Recovery Mean	RSD	20 mL H_2O^c Recovery Mean	RSD	20 mL H_2O/Oil Recovery Mean	RSD
Surrogates						
1,2-Dichloroethane	104	6	109	6	144	19
Toluene-d_8	104	5	102	2	76	7
Bromofluorobenzene	106	6	106	9	40	8

[a] Results are for 10 min. distillation times, and condenser temperature held at -10°C. A 30 m x 0.53 mm ID stable wax column with a 1 µm film thickness was used for chromatography. Standards and samples were replicated and precision values reflect the propagated errors. Concentrations of analytes were 50 ppb for 5-mL samples and 25 ppb for 20-mL samples. Recovery data generated with comparison to analyses of standards without the water matrix.

[b] Sample contained 1 gram cod liver oil and 20 mL water. An emulsion was created by adding 0.2 mL of water saturated with lecithin.

[c] Interference by co-eluting compounds prevented accurate assessment of recovery.

TABLE 24

VOLATILE ORGANIC ANALYTE RECOVERY FROM FISH OIL USING VACUUM DISTILLATION (METHOD 5032)[a]

Compound	Recovery Mean (%)	RSD (%)
Chloromethane	N/A[b]	
Bromomethane	N/A[b]	
Vinyl chloride	N/A[b]	
Chloroethane	N/A[b]	
Methylene chloride	62	32
Acetone	108	55
Carbon disulfide	98	46
1,1-Dichloroethene	97	24
1,1-Dichloroethane	96	22
trans-1,2-Trichloroethene	86	23
cis-1,2-Dichloroethene	99	11
Chloroform	93	14
1,2-Dichloroethane	138	31
2-Butanone	INT[c]	
1,1,1-Trichloroethane	89	14
Carbon tetrachloride	129	23
Vinyl acetate	INT[c]	
Bromodichloromethane	106	14
1,1,2,2-Tetrachloroethane	205	46
1,2-Dichloropropane	107	24
trans-1,3-Dichloropropene	98	13
Trichloroethene	102	8
Dibromochloromethane	168	21
1,1,2-Trichloroethane	95	7
Benzene	146	10
cis-1,3-Dichloropropene	98	11
Bromoform	94	18
2-Hexanone	INT[c]	
4-Methyl-2-pentanone	INT[c]	
Tetrachloroethene	117	22
Toluene	108	8
Chlorobenzene	101	12
Ethylbenzene	96	10
Styrene	120	46
p-Xylene	87	23
o-Xylene	90	10

TABLE 24 (cont.)

Compound	Recovery Mean (%)	RSD (%)
Surrogates		
1,2-Dichloroethane-d_4	137	30
Toluene-d_8	84	6
Bromofluorobenzene	48	2

[a] Results are for 10 min. distillation times and condenser temperature held at -10°C. Five replicates of 10-g fish oil aliquots spiked at 25 ppb were analyzed. Quantitation was performed with a 30 m x 0.53 mm ID stable wax column with a 1 µm film thickness. Standards and samples were replicated and precision value reflects the propagated errors. Vacuum distillation efficiencies (Method 5032) are modified by internal standard corrections. Method 8260 internal standards may bias for some analytes. See Method 5032 to identify alternate internal standards with similar efficiencies to minimize bias.

[b] Not analyzed.

[c] Interference by co-eluting compounds prevented accurate measurement of analyte.

TABLE 25

EXAMPLE LOWER LIMITS OF QUANTITATION FOR VOLATILE ORGANIC ANALYTES IN FISH OIL (METHOD 5032)[a]

	Lower Limit of Quantitation (ppb)	
Compound	External Standard Method	Internal Standard Method
Chloromethane	N/A[b]	N/A[b]
Bromomethane	N/A[b]	N/A[b]
Vinyl chloride	N/A[b]	N/A[b]
Chloroethane	N/A[b]	N/A[b]
Methylene chloride	80	50
Acetone	120	60
Carbon disulfide	190	180
1,1-Dichloroethene	190	180
1,1-Dichloroethane	130	140
trans-1,2-Dichloroethene	90	100
cis-1,2-Dichloroethene	80	70
Chloroform	60	70
1,2-Dichloroethane	60	60
2-Butanone	INT[c]	INT[c]
1,1,1-Trichloroethane	80	100
Carbon tetrachloride	150	130
Vinyl acetate	INT[c]	INT[c]
Bromodichloromethane	50	60
1,1,2,2-Tetrachloroethane	90	20
1,2-Dichloropropane	120	150
trans-1,3-Dichloropropene	80	50
Trichloroethene	60	40
Dibromochloromethane	40	70
1,1,2-Trichloroethane	70	50
Benzene	30	50
cis-1,3-Dichloropropene	60	40
Bromoform	100	50
2-Hexanone	INT[c]	INT[c]
4-Methyl-2-pentanone	INT[c]	INT[c]
Tetrachloroethene	120	100
Toluene	90	50
Chlorobenzene	70	60
Ethylbenzene	90	40
Styrene	160	180
p-Xylene	180	200
o-Xylene	80	70

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[a] Method quantitation limits (MQLs) are estimated as the result of five replicated analyses of 1 g cod liver oil spiked at 25 ppb. MQLs were calculated as three times the standard deviation. Quantitation was performed using a 30 m x 0.53 mm ID stable wax column with a 1 µm film thickness. MQLs can be used to establish the lower limit of instrument quantitation, however, since they are statistical approximations of the actual method sensitivity, it is recommended that the lowest calibration concentration be used to establish the minimum quantitation limit.

[b] No analyses.

[c] Interference by co-eluting compounds prevented accurate quantitation.

TABLE 26

INTERNAL STANDARDS FOR ANALYTES AND SURROGATES PREPARED USING EQUILIBRIUM HEADSPACE ANALYSIS (METHOD 5021)

Chloroform-d_1	1,1,2-TCA-d_3	Bromobenzene-d_5
Dichlorodifluoromethane	1,1,1-Trichloroethane	Chlorobenzene
Chloromethane	1,1-Dichloropropene	Bromoform
Vinyl chloride	Carbon tetrachloride	Styrene
Bromomethane	Benzene	iso-Propylbenzene
Chloroethane	Dibromomethane	Bromobenzene
Trichlorofluoromethane	1,2-Dichloropropane	n-Propylbenzene
1,1-Dichloroethene	Trichloroethene	2-Chlorotoluene
Methylene chloride	Bromodichloromethane	4-Chlorotoluene
trans-1,2-Dichloroethene	cis-1,3-Dichloropropene	1,3,5-Trimethylbenzene
1,1-Dichloroethane	trans-1,3-Dichloropropene	tert-Butylbenzene
cis-1,2-Dichloroethene	1,1,2-Trichloroethane	1,2,4-Trimethylbenzene
Bromochloromethane	Toluene	sec-Butylbenzene
Chloroform	1,3-Dichloropropane	1,3-Dichlorobenzene
2,2-Dichloropropane	Dibromochloromethane	1,4-Dichlorobenzene
1,2-Dichloroethane	1,2-Dibromoethane	p-iso-Propyltoluene
	Tetrachloroethene	1,2-Dichlorobenzene
	1,1,2-Trichloroethane	n-Butylbenzene
	Ethylbenzene	1,2-Dibromo-3-chloropropane
	m-Xylene	1,2,4-Trichlorobenzene
	p-Xylene	Naphthalene
	o-Xylene	Hexachlorobutadiene
	1,1,2,2-Tetrachloroethane	1,2,3-Trichlorobenzene
	1,2,3-Trichloropropane	

TABLE 27

EXAMPLE PRECISION AND STATISTICAL MINIMUM QUANTITATION LIMIT (MQL) DETERMINED FOR ANALYSIS OF FORTIFIED SAND[a] (METHOD 5021)

Compound	% RSD	MQL (µg/kg)
Benzene	3.0	0.34
Bromochloromethane	3.4	0.27
Bromodichloromethane	2.4	0.21
Bromoform	3.9	0.30
Bromomethane	11.6	1.3
Carbon tetrachloride	3.6	0.32
Chlorobenzene	3.2	0.24
Chloroethane	5.6	0.51
Chloroform	3.1	0.30
Chloromethane	4.1	3.5[b]
1,2-Dibromo-3-chloropropane	5.7	0.40
1,2-Dibromoethane	3.2	0.29
Dibromomethane	2.8	0.20
1,2-Dichlorobenzene	3.3	0.27
1,3-Dichlorobenzene	3.4	0.24
1,4-Dichlorobenzene	3.7	0.30
Dichlorodifluoromethane	3.0	0.28
1,1-Dichloroethane	4.5	0.41
1,2-Dichloroethane	3.0	0.24
1,1-Dichloroethene	3.3	0.28
cis-1,2-Dichloroethene	3.2	0.27
trans-1,2-Dichloroethene	2.6	0.22
1,2-Dichloropropane	2.6	0.21
1,1-Dichloropropene	3.2	0.30
cis-1,3-Dichloropropene	3.4	0.27
Ethylbenzene	4.8	0.47
Hexachlorobutadiene	4.1	0.38
Methylene chloride	8.2	0.62[c]
Naphthalene	16.8	3.4[c]
Styrene	7.9	0.62
1,1,1,2-Tetrachloroethane	3.6	0.27
1,1,2,2-Tetrachloroethane	2.6	0.20
Tetrachloroethene	9.8	1.2[c]
Toluene	3.5	0.38
1,2,4-Trichlorobenzene	4.2	0.44
1,1,1-Trichloroethane	2.7	0.27
1,1,2-Trichloroethane	2.6	0.20
Trichloroethene	2.3	0.19

TABLE 27 (cont.)

Compound	% RSD	MQL (µg/kg)
Trichlorofluoromethane	2.7	0.31
1,2,3-Trichloropropane	1.5	0.11
Vinyl chloride	4.8	0.45
m-Xylene/p-Xylene	3.6	0.37
o-Xylene	3.6	0.33

[a] Most compounds spiked at 2 ng/g (2 µg/kg)
[b] Incorrect ionization due to methanol
[c] Compound detected in unfortified sand at >1 ng

TABLE 28

EXAMPLE RECOVERIES IN GARDEN SOIL FORTIFIED AT 20 µg/kg (ANALYSIS BY METHOD 5021)

Compound	Recovery per Replicate (ng)			Mean	RSD	Recovery
	Sample 1	Sample 2	Sample 3	(ng)		(%)
Benzene	37.6	35.2	38.4	37.1	3.7	185[a]
Bromochloromethane	20.5	19.4	20.0	20.0	2.3	100
Bromodichloromethane	21.1	20.3	22.8	21.4	4.9	107
Bromoform	23.8	23.9	25.1	24.3	2.4	121
Bromomethane	21.4	19.5	19.7	20.2	4.2	101
Carbon tetrachloride	27.5	26.6	28.6	27.6	3.0	138
Chlorobenzene	25.6	25.4	26.4	25.8	1.7	129
Chloroethane	25.0	24.4	25.3	24.9	1.5	125
Chloroform	21.9	20.9	21.7	21.5	2.0	108
Chloromethane	21.0	19.9	21.3	20.7	2.9	104[a]
1,2-Dibromo-3-chloropropane	20.8	20.8	21.0	20.9	0.5	104
1,2-Dibromoethane	20.1	19.5	20.6	20.1	2.2	100
Dibromomethane	22.2	21.0	22.8	22.0	3.4	110
1,2-Dichlorobenzene	18.0	17.7	17.1	17.6	2.1	88.0
1,3-Dichlorobenzene	21.2	21.0	20.1	20.8	2.3	104
1,4-Dichlorobenzene	20.1	20.9	19.9	20.3	2.1	102
Dichlorodifluoromethane	25.3	24.1	25.4	24.9	2.4	125
1,1-Dichloroethane	23.0	22.0	22.7	22.6	1.9	113
1,2-Dichloroethane	20.6	19.5	19.8	20.0	2.3	100
1,1-Dichloroethene	24.8	23.8	24.4	24.3	1.7	122
cis-1,2-Dichloroethene	21.6	20.0	21.6	21.1	3.6	105
trans-1,2-Dichloroethene	22.4	21.4	22.2	22.0	2.0	110
1,2-Dichloropropane	22.8	22.2	23.4	22.8	2.1	114
1,1-Dichloropropene	26.3	25.7	28.0	26.7	3.7	133
cis-1,3-Dichloropropene	20.3	19.5	21.1	20.3	3.2	102
Ethylbenzene	24.7	24.5	25.5	24.9	1.7	125
Hexachlorobutadiene	23.0	25.3	25.2	24.5	4.3	123
Methylene chloride	26.0	25.7	26.1	25.9	0.7	130[a]
Naphthalene	13.8	12.7	11.8	12.8	6.4	63.8[a]
Styrene	24.2	23.3	23.3	23.6	1.8	118
1,1,1,2-Tetrachloroethane	21.4	20.2	21.3	21.0	2.6	105
1,1,2,2-Tetrachloroethane	18.6	17.8	19.0	18.5	2.7	92.3
Tetrachloroethene	25.2	24.8	26.4	25.5	2.7	127
Toluene	28.6	27.9	30.9	29.1	4.4	146[a]
1,2,4-Trichlorobenzene	15.0	14.4	12.9	14.1	6.3	70.5
1,1,1-Trichloroethane	28.1	27.2	29.9	28.4	4.0	142
1,1,2-Trichloroethane	20.8	19.6	21.7	20.7	4.2	104

TABLE 28 (cont.)

Compound	Recovery per Replicate (ng)			Mean	RSD	Recovery
	Sample 1	Sample 2	Sample 3	(ng)		(%)
Trichloroethene	26.3	24.9	26.8	26.0	3.1	130
Trichlorofluoromethane	25.9	24.8	26.5	25.7	2.7	129
1,2,3-Trichloropropane	18.8	18.3	19.3	18.8	2.2	94.0
Vinyl chloride	24.8	23.2	23.9	24.0	2.7	120
m-Xylene/p-Xylene	24.3	23.9	25.3	24.5	2.4	123
o-Xylene	23.1	22.3	23.4	22.9	2.0	115

[a] Compound found in unfortified garden soil matrix at >5 ng.

TABLE 29

EXAMPLE MINIMUM QUANTITATION LIMITS (MQL) AND BOILING POINTS FOR VOLATILE ORGANICS (ANALYSIS BY METHOD 5041)[a]

Compound	MQL (ng)	Boiling Point (°C)
Chloromethane	58	-24
Bromomethane	26	4
Vinyl chloride	14	-13
Chloroethane	21	13
Methylene chloride	9	40
Acetone	35	56
Carbon disulfide	11	46
1,1-Dichloroethene	14	32
1,1-Dichloroethane	12	57
trans-1,2-Dichloroethene	11	48
Chloroform	11	62
1,2-Dichloroethane	13	83
1,1,1-Trichloroethane	8	74
Carbon tetrachloride	8	77
Bromodichloromethane	11	88
1,1,2,2-Tetrachloroethane**	23	146
1,2-Dichloropropane	12	95
trans-1,3-Dichloropropene	17	112
Trichloroethene	11	87
Dibromochloromethane	21	122
1,1,2-Trichloroethane	26	114
Benzene	26	80
cis-1,3-Dichloropropene	27	112
Bromoform**	26	150
Tetrachloroethene	11	121
Toluene	15	111
Chlorobenzene	15	132
Ethylbenzene**	21	136
Styrene**	46	145
Trichlorofluoromethane	17	24
Iodomethane	9	43
Acrylonitrile	13	78
Dibromomethane	14	97
1,2,3-Trichloropropane**	37	157
total Xylenes**	22	138-144

Footnotes are found on the following page.

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* The method quantitation limit (MQL) is defined in Chapter One. The quantitation limits cited above were determined according to 40 CFR, Part 136, Appendix B, using standards spiked onto clean VOST tubes. Since clean VOST tubes were used, the values cited above represent the best that the methodology can achieve. The presence of an emissions matrix will affect the ability of the methodology to perform at its optimum level. MQLs can be used to establish the lower limit of instrument quantitation, however, since they are statistical approximations of the actual method sensitivity, it is recommeded that the lowest calibration concentration be used to establish the minimum quantitation limit.

** Boiling Point greater than 130°C. Not appropriate for quantitative sampling by Method 0030.

TABLE 30

VOLATILE INTERNAL STANDARDS WITH CORRESPONDING ANALYTES ASSIGNED FOR QUANTITATION (METHOD 5041)

Bromochloromethane

Acetone
Acrylonitrile
Bromomethane
Carbon disulfide
Chloroethane
Chloroform
Chloromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,2-Dichloroethane-d_4 (surrogate)
1,1-Dichloroethene
Trichloroethene
trans-1,2-Dichloroethene
Iodomethane
Methylene chloride
Trichlorofluoromethane
Vinyl chloride

Chlorobenzene-d_5

4-Bromofluorobenzene (surrogate)
Chlorobenzene
Ethylbenzene
Styrene
1,1,2,2-Tetrachloroethane
Tetrachloroethene
Toluene
Toluene-d_8 (surrogate)
1,2,3-Trichloropropane
Xylenes

1,4-Difluorobenzene

Benzene
Bromodichloromethane
Bromoform
Carbon tetrachloride
Chlorodibromomethane
Dibromomethane
1,2-Dichloropropane
cis-1,3-Dichloropropene
trans-1,3-Dichloropropene
1,1,1-Trichloroethane
1,1,2-Trichloroethane

TABLE 31

METHOD 0040 - COMPOUNDS DEMONSTRATED TO BE APPLICABLE TO THE METHOD

Compound	Boiling Point (°C)	Condensation Point at 20°C (%)	Estimated Quantitation Limit[a] (ppm)
Dichlorodifluoromethane	-30	Gas	0.20
Vinyl chloride	-19	Gas	0.11
1,3-Butadiene	-4	Gas	0.90
1,2-Dichloro-1,1,2,2-tetrafluoroethane	4	Gas	0.14
Methyl bromide	4	Gas	0.14
Trichlorofluoromethane	24	88	0.18
1,1-Dichloroethene	31	22	0.07
Methylene chloride	40	44	0.05
1,1,2-Trichloro-trifluoroethane	48	37	0.13
Chloroform	61	21	0.04
1,1,1-Trichloroethane	75	13	0.03
Carbon tetrachloride	77	11	0.03
Benzene	80	10	0.16
Trichloroethene	87	8	0.04
1,2-Dichloropropane	96	5	0.05
Toluene	111	3	0.08
Tetrachloroethene	121	2	0.03

[a] Since this value represents a direct injection (no concentration) from the Tedlar® bag, these values are directly applicable as stack quantitation limits.

FIGURE 1
EXAMPLE GAS CHROMATOGRAM OF VOLATILE ORGANICS
(Provided Courtesy APPL, Inc.)

```
File        : M:\MAX\DATA\M050720\0720M07W.D
Operator    : RP
Acquired    : 20 Jul 05   19:50      using AcqMethod PM82602
Instrument  :    Max
Sample Name: Vol Std 07-20-05Z@10ug/L
Misc Info   : Water 10mL w/IS: 07-12-05AQ
Vial Number: 7
```

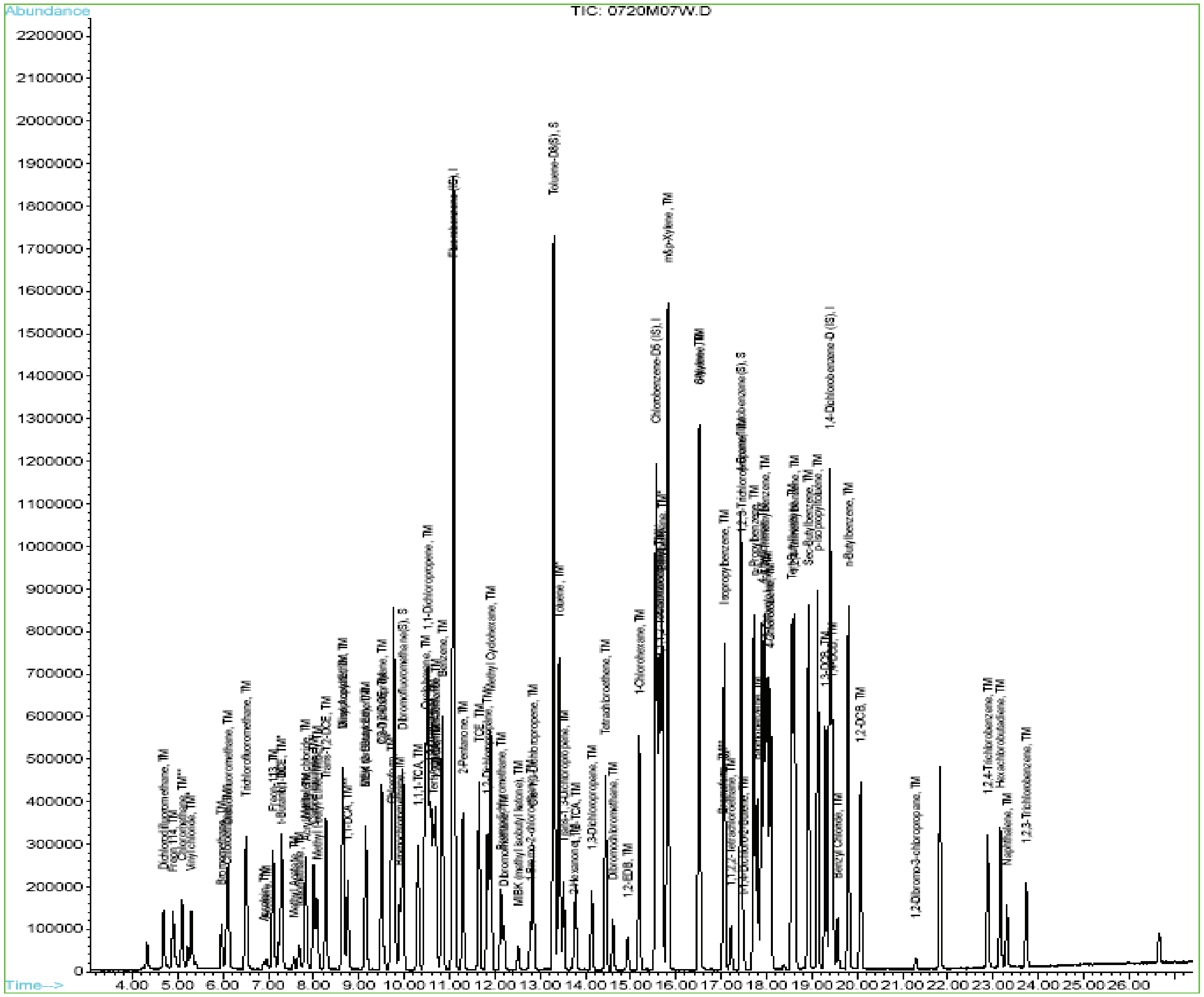
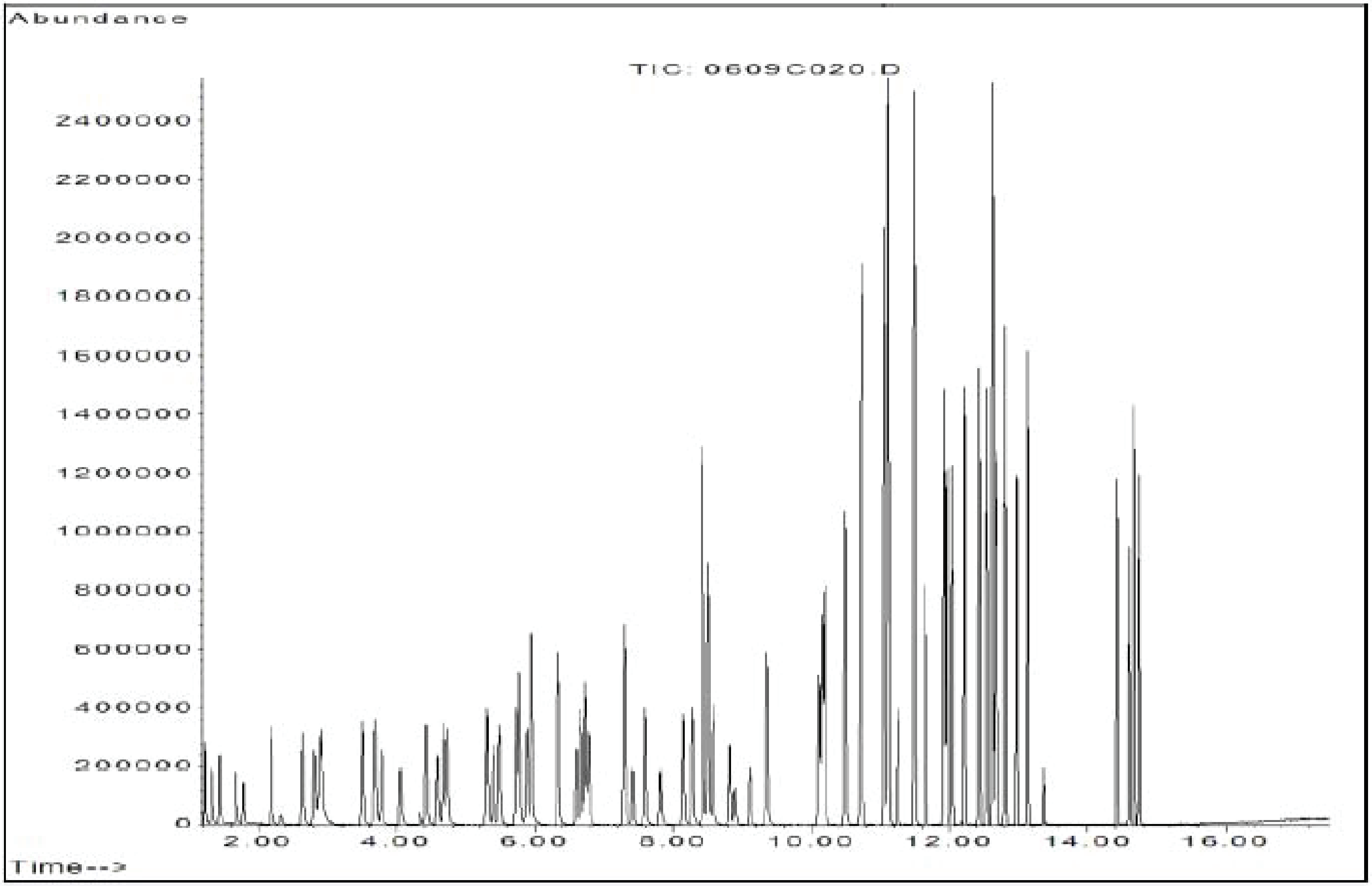


FIGURE 2
EXAMPLE GAS CHROMATOGRAM OF VOLATILE ORGANICS
(Provided Courtesy EPA Region III)



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ENVIRONMENTAL SCIENCES

Document Information

Document Number: ENV-SOP-MTJL-0104	**Revision:** 03
Document Title: Measurement of Volatile Organic Compounds and Gasoline Range Components in Ambient Air by Gas Chromatography/Mass Spectrometry (EPA TO-15 and EPA Method 18-Modified)	
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ENV-SOP-MTJL-0104

QM Approval

Name/Signature	Title	Date	Meaning/Reason
Rebecca King (010125)	Quality Analyst 2	20 Nov 2020, 10:56:26 AM	Approved

Management Approval

Name/Signature	Title	Date	Meaning/Reason
Christopher Johnson (006487)	Manager - Operations	20 Nov 2020, 09:14:31 AM	Approved
James Burns (006456)	Manager - EHS	20 Nov 2020, 09:20:41 AM	Approved

Pace Analytical®
National Center for Testing & Innovation

STANDARD OPERATING PROCEDURE

TITLE:	Measurement of Volatile Organic Compounds and Gasoline Range Components in Ambient Air by Gas Chromatography/Mass Spectrometry (EPA TO-15 and EPA Method 18-Modified)
ISSUER:	Pace National – Mt. Juliet, Tennessee

1.0 SCOPE AND APPLICATION

STATE NOTE: For samples analyzed in conjunction with the Ohio Voluntary Action Program (VAP) please utilize ENV-SOP-MTJL-0104.

CLIENT NOTE: See Attachment IV for DoD requirements.

CLIENT NOTE: For clients, whose environment laboratory quality program is administered by Environmental Standards Inc. (ESI), see controlled document QUA-25 AIR. \\FAP\NovDiskH\QAQC\Controlled Docs

1.1 This document details the procedures for analysis of volatile organic compounds (VOCs) in ambient air. The whole air samples are collected in passivated stainless steel canisters or Tedlar bags and analyzed by gas chromatography/mass spectrometry (GC/MS). The procedures describe the operational details needed to perform analysis of pressurized and sub-atmospheric air samples in the Volatiles Section of the Pace National laboratory. This procedure provides for analysis using either the SCAN or SIM modes on the Agilent GC/MS analytical systems.

1.2 The laboratory routine reporting limits for both SCAN and SIM modes are provided in the Attachment II and characteristic ions are provided in Attachment III. Reporting limits are subject to change to better meet client/project/regulatory needs or to improve laboratory method performance.

1.3 An MDL study must be completed at least annually or more frequently if major instrumentation changes occur. Method Detection Limits (MDLs) are performed based on ENV-SOP-MTJL-0016. Updated MDL records are filed and stored in a central location on the network: \\INSTSRV\Volatiles\Annual MDLs LODs and RT Studies.

1.3.1 Limit of Detection (LOD) and Limit of Quantitation (LOQ) studies are completed at the frequency required by the TNI standard per the procedure identified in the ENV-SOP-MTJL-0016, *Method Detection Limits (MDL), Limits of Detection (LOD) and Limits of Quantitation (LOQ)*. Should the procedure be utilized for DOD support; then the frequency of these studies must meet the requirements of the current DOD QSM (see Attachment IV).

2.0 METHOD SUMMARY AND DEFINITIONS

2.1 Whole air is collected into Tedlar bags or evacuated canisters using passive or pump-assisted air sampling techniques. The sample of air is drawn through a sampling device that removes particulates, regulates sampling flow rate and duration, controls sample start and end times, and monitors start and end pressures. The canisters are cleaned, evacuated and certified prior to sample collection. The available instruments may be used to collect and analyze both sub-atmospheric pressure and pressurized samples.

2.2 During analysis in the laboratory, the sample canister or Tedlar bag is attached to an autosampler where typically 1 to 400cc of the air sample is pumped out of the canister and collected on a cryogen-cooled glass bead trap. Internal standard (IS) and tuning compounds are also collected on the trap with the sample. The sample and IS compounds are then transferred to a second stage Tenax trap, effectively removing most of the water and CO2. The VOC compounds are then transferred to a third stage where they are cryogenically focused prior to injection onto the GC column. The detector used in the analysis is a quadrupole mass spectrometer.

2.3 The VOC compounds are separated *via* gas chromatography and detected using a mass spectrometer, which provides both qualitative and quantitative information. The described method is based on TO-15 in the *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air, Second Edition* (EPA/625/R-96/010b). The procedures described here are designed to meet or exceed the criteria from both of these EPA quantitative methods. The TO-14A and TO-15 methods are sufficiently similar to permit the analysis of all compounds in the TO-14A list and a subset of the TO-15 compound list using a single procedure. The compounds in Method TO-15 tend to be more polar than those in Method TO-14A, requiring special consideration to address water management. Please refer to these EPA guidance documents for additional details.

2.4 Absolute Pressure - Pressure measured with reference to absolute zero pressure expressed in psia. An absolute pressure value of zero is indicative of an evacuated system (vacuum).

2.5 Gauge Pressure - Pressure measured with reference to the surrounding atmospheric pressure expressed in units of psi. A gauge pressure value of zero is equal to atmospheric pressure.

2.6 Dynamic Calibration - Calibration of the analytical system with gas standard concentrations at similar concentrations, in a form identical and through the same analytical path as in the real samples.

2.7 Dynamic Dilution – Preparation of calibration mixtures in which concentrated standard gas are continually blended with zero air in a manifold and introduced at the inlet of the analytical system or a receiving canister.

2.8 Sub-atmospheric Sampling - Collection of ambient air into an evacuated canister with a final canister pressure below atmospheric pressure. This is the normal practice when collecting air with passive sampling devices since the sample collection must be stopped prior to completely filling the canister.

2.9 GC/MS Scan Mode – A GC/MS system in Full Scan mode will monitor a range of masses know as mass to charge ratio (abbreviated m/z). A typical mass scan range will cover from 35-500 m/z four times per second and will detect compound fragments within that range over a set time period. The Full Scan mode is quite useful when identifying unknown compounds in a sample and providing confirmation of results from GC using other types of detectors.

2.10 GC/MS SIM Mode – (Gas Chromatography/Mass Spectroscopy- Selective Ion Monitoring) Operation of a GC/MS in SIM mode allows for detection of specific analytes with increased sensitivity relative to full scan mode. In SIM mode the MS gathers data for masses of interest rather than looking for all masses over a wide range. Because the instrument is set to look for only masses of interest it can be specific for particular analytes of interest. Typically two to four ions are monitored per compound and the ratios of those ions are unique to the analyte of interest. In order to increase sensitivity, the mass scan rate and dwell times (the time spent looking at each mass) are adjusted. When properly setup and calibrated, GC/MS SIM can increase sensitivity by a factor of 10 to 100 times that of GC/MS Full Scan.

2.11 See the current Quality Assurance Manual for definitions associated with other terms found in this document.

3.0 HEALTH AND SAFETY

3.1 The toxicity or carcinogenicity of each reagent used in the laboratory has not been fully established. Each chemical should be regarded as a potential health hazard and exposure to these compounds must be as low as reasonably achievable. A reference file of safety data sheets (SDSs) is made available on Pace National's intranet to all personnel. Use hazardous reagents in a fume hood whenever possible and if eye or skin contact occurs, flush with large volumes of water. Always wear safety glasses or a shield for eye protection, protective clothing and observe proper mixing protocols.

3.2 Glycol ethers are suspected carcinogens. All solvent handling should be done in a hood while using proper protective equipment to minimize exposure to liquid and vapor. Minimum personal protection includes the use of laboratory safety glasses, a lab coat or apron, and protective gloves.

3.3 The following analytes have been tentatively classified as known or suspected, human or mammalian carcinogens: benzene, carbon tetrachloride, 1,4-dichlorobenzene, 1-2dichlorethane, hexachlorobutadiene, 1,2,2,2-tetrachloroethane, 1,1,2-trichloroethane, chloroform, 1,2-dibromoethane, tetrachloroethene, trichloroethene, and vinyl chloride. Pure standard materials and stock standard solutions of these compounds must be handled in a hood. A NIOSH/MESA approved toxic gas respirator should be worn when the analyst handles high concentrations of these toxic compounds.

4.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

4.1 All samples must have been collected using a sampling plan that addresses the considerations of this method.

4.2 The sampling process begins with the preparation of the canisters or purchase of Tedlar bags used to collect the sample. The canisters are provided by the laboratory and are prepared based on the sample requests received on a weekly basis. Please refer to ENV-SOP-MTJL-0108 for canister cleaning and certification information.

STATE NOTE: When analyzing samples from MN and AZ, samples should not be collected in Tedlar bags. Samples received from these states in Tedlar bags must be qualified as having an improper container.

CLIENT NOTE: When analyzing samples from Environmental Standards clients, samples should not be collected in Tedlar bags. Samples received from these clients in Tedlar bags must be transferred to a summa canister or bottle vac and qualified as having an improper container.

4.3 Sample Collection

4.3.1 Samples are collected with either a passive critical orifice sampler or an active pump sampler with a mass flow controller. The canisters and sampling unit must be certified clean prior to collecting samples. All sampling procedures are the responsibility of the client.

4.4 Sample Storage

4.4.1 Under conditions of normal usage for sampling ambient air, most VOCs can be recovered from summa canisters near their original concentrations after storage times of up to thirty days from the date of collection to analysis.

STATE NOTE: When analyzing samples from MN and NJ, canister samples must be analyzed within 14 days from the time of collection.

The holding time for Tedlar bags is generally five (5) days from collection to analysis. Shorter hold times may apply depending on regulatory agency requirements.

STATE NOTE: Samples received in a Tedlar bag from FL and AZ have a three (3) day holding time from collection.

CLIENT NOTE: Samples received in a Tedlar bag from Environmental Standards clients have a three (3) day holding time from collection. Samples can be transferred to a summa canister or bottle vac in which the holding times extends to thirty (30) days from collection.

4.4.2 Air samples are maintained in the AIR laboratory where they are secure and at ambient temperature.

4.5 Sample Preparation

4.5.1 Each canister or Tedlar bag must be visually inspected for damaged or missing parts. This includes but is not limited to valves and loose stems. Any problems found are to be communicated with the Project Manager via e-mail so that the proper instructions on how to proceed are communicated from the client to the laboratory.

4.5.2 The canister pressure is checked upon arrival into the lab. That pressure is compared to the client pressures when available. The pressure must read +/- 4"Hg from clients final sample pressure reading. If the canister pressure does not meet the criteria, the TSR is informed and communicates the information to the client requesting their guidance.

The pressure is documented on the canister label as well as in the Air Tracking software program.

Note: If there is no final vacuum documented by the client and the canister reads zero or if the field documentation of the summa pressure does not indicate zero, but the summa is received at zero, then Project Mangers will be notified via e-mail of the situation to communicate with the client for guidance.

4.5.3 Connect each sample canister or Tedlar bag to an autosampler position, but leave the valve closed

4.5.4 Flush and leak check each of the autosampler positions using the SmartLab software for the autosampler.

4.5.5 Once the autopositions are leak tight, open the valves on the canisters or Tedlar bags.

4.5.6 The internal standard and surrogate compounds are automatically added to each sample by the sample concentrator

5.0 INTERFERENCES

5.1 Moisture and carbon dioxide are two of the primary interferences encountered in whole air measurements due to the normally high concentration of these compounds in ambient air. The sample concentrator unit used to isolate the volatile organic compounds from whole air is designed to effectively remove water and carbon dioxide prior to sample introduction into the gas chromatograph. Elevated levels of water or carbon dioxide may severely restrict the sample size that can be measured. Compendium Method TO-15 provides guidance for water management systems as it pertains to the analysis of polar organic compounds.

5.2 Contamination may occur in the sampling and concentrator systems if the equipment is improperly cleaned before each use. All sampling and analysis equipment contacting the sample must be thoroughly cleaned and tested on a regular basis.

5.3 The potential for overlap of eluting compounds in the chromatography is significant when dealing with such an extensive compound list from two air analysis methods. The potential for encountering interferences is significantly reduced by using cryogenic focusing, a smaller ID capillary column and a mass spectrometer detector. Cryogen focusing and the small ID capillary column used in this method give enhanced compound separation such that overlapping compounds are minimized. The mass spectrometer can effectively resolve many of the remaining overlapped compounds based on the mass spectra of the compounds.

6.0 EQUIPMENT AND SUPPLIES

The operation, cleaning and scheduled maintenance procedures prescribed by the equipment manufacturer are followed as provided in the Operator's Manuals. Maintenance contracts, provided by the manufacture, are purchased for the Gas Chromatograph/Mass Spectrometer Systems. Documentation of cleaning, maintenance or system modification is recorded in a maintenance logbook that accompanies each instrument system.

6.1 Sample Containers

6.1.1 6L Restek Silcocan canister with fused silica lining in the can and valve

6.1.2 6L Entech Silonite canister with fused silica lining in the can and valve

6.1.3 1L Entech Silonite canister with fused silica lining in the can and valve

6.1.4 1L Restek Silcocan canister with fused silica lining in the can and valve

6.1.5 1L Tedlar bags

6.1.6 1.4L Entech Silonite canister with fused silica lining in the can and MicroQT

6.2 IsoTemp Forced-Air Oven

6.3 Gas Chromatograph/Mass Spectrometer System

6.3.1 Agilent 6890 Gas Chromatograph or equivalent

6.3.2 Agilent 5973 Quadrupole Detector or equivalent

6.3.3 Entech 7200 Preconcentrator or equivalent

6.3.4 Entech 7016CA Autosampler or equivalent

6.3.5 Entech 7032A-LB Tedlar Bag Autosampler or equivalent

6.3.6 IBM-compatible Pentium personal computer

6.3.7 Agilent Computer Software

6.3.8 LIMS Network Software

6.3.9 J&W Scientific DB-5MS, 60m x 0.25mm ID capillary column, 0.25µm film thickness or equivalent

6.3.10 Compendium Method TO-15 Calibration Standard Cylinder with dedicated regulator and transfer line

6.4 Equipment Cleaning and Certification Procedures

The equipment used for sample collection and analysis must be clean and certified before use. For information regarding the canister cleaning and certification process, see ENV-SOP-MTJL-0108, *Canister Cleaning, Certification and Storage*.

7.0 REAGENTS AND STANDARDS

Working with volatile compounds presents a number of challenges not normally confronted in the handling of most other chemicals. Volatile compounds may escape from sample containers or, when present in the laboratory environment, can contaminate analytical equipment.

Sources of the reagents and chemicals are given, but may change based on availability, quality and cost. The use of a different source is acceptable without modification of the procedures provided the products are equivalent.

All reagents and standards must be recorded in the appropriate preparation log and assigned a unique number. See ENV-SOP-MTJL-0041, *Standards Logger – Tree Operation.*

7.1 Laboratory Reagent Water: DI water VOC free or equivalent

7.2 Helium, Nitrogen and Air: Ultra-high purity grade in gas cylinders of Nitrogen and breathing grade Air. Helium is used as the carrier gas in the GC/MS.

7.3 Internal Standard, Surrogate, and Tuning Standard

7.3.1 1ppmv Internal Standard and Tune Standard Mixture

7.3.1.1 The internal standard and tune standard mixture is purchased in a 3395L (2A) cylinder from Spectra Gases at a concentration of 1ppmv. The internal standard compounds are:

Bromochloromethane
1,4-Difluorobenzene
Chlorobenzene-d_5
1,4-Bromofluorobenzene

The compounds in this mixture are typically prepared in nitrogen at a final cylinder pressure of approximately 2000psig. The standard mixture is certified by Spectra Gases for one year from preparation.

7.3.1.2 The mass spectrometer tune standard and surrogate compound is 4-bromofluorobenzene.

7.3.2 Preparation

7.3.2.1 Inject 1800cc of 1ppmv standard into a 15L Canister for TO-15 (routine scan) or 300cc of 1ppmv standard for SIM.

7.3.2.2 Using an airtight syringe, add 0.20mL of laboratory reagent water (VOC free).

7.3.2.3 Bring to a final volume of 20psig with nitrogen.

7.3.2.4 Final concentration equals 20ppbv per component.

7.3.2.5 Place canister on autosampler.

7.3.2.6 Autosampler will inject 50cc of standard per sample.

7.3.2.7 50cc of injected standard will result in a concentration of 4ppbv per component for TO-15 or 1.25ppbv per component for SIM.

7.4 Calibration Standards

7.4.1 The TO-15 calibration standard is purchased as a custom mix in a 3395L (2A) cylinder from Spectra Gases at a concentration of 0.100ppmv, production number 1475123 or equivalent. The compounds in this mixture are balanced with nitrogen at a final cylinder pressure of 2000psig. The standard mixture is certified by Spectra Gases for 12 months from preparation.

7.4.2 Preparation of Calibration Curve

7.4.2.1 Prepare an intermediate standard(s) using the Dynamic Diluter. Bring summa to a final volume of 20psig.

Dynamic Diluter Software Settings		
Final Concentration (ppbv)	**Nitrogen (cc)**	**Standard (cc)**
0.5	3980	20
5	950	50
25	150	50

7.4.2.2 Using the standard mix prepared in 7.4.2.1, prepare the following calibration concentrations for routine SCAN analysis:

Standard Level (ppbv)*	Volume of 2.5ppbv Standard Used (cc)	Volume of 25ppbv Standard Used (cc)
0.19	15	-
0.3125	25	-
0.625	50	-

Standard Level (ppbv)*	Volume of 2.5ppbv Standard Used (cc)	Volume of 25ppbv Standard Used (cc)
1.25	100	-
2.5	200	-
3.75	300	-
10	-	80
25	-	200
50	-	400
100	-	800

All compounds are calibrated with these concentrations except for: m&p Xylene = 0.31, 0.625, 1.25, 2.5, 5.0, 7.5, 10, 20, 40, 100; and TPH:

TPH Calibration Standards								
Std. Vol (cc):	50	100	200	300	400	800	1600 (400)	4000 (800)
Final Conc. (ppm):	34.02	67.5	135	202.5	270	540	1350	2700

For GC/MS SIM analysis for the compounds identified in Attachment II(b), reduce the Standard Levels and the volume of standards in the above table by 10x as presented in the following table:

Standard Level (ppbv)*	Volume of 0.5ppbv Standard Used (cc)	Volume of 25ppbv Standard Used (cc)
0.019	15	-
0.03125	25	-
0.0625	50	-
0.125	100	-
0.25	200	-
0.375	300	-
0.5	400	-
1	-	16
5	-	80
10	-	160

7.4.2.3 The low standard must be at or below the RL.

7.4.2.4 The daily initial calibration verification standard analyzed in lieu of a full initial calibration to verify the on-going stability of the existing calibration curve is prepared using the process for the 3.75ppbv calibration standard for SCAN analysis and 0.50ppbv for SIM analysis.

7.5 Laboratory Control Standard - Stock

7.5.1 0.100ppmv TO-15 Calibration Standard Mixture

7.5.1.1 The TO-15 calibration standard is purchased as a custom mix in a 3395L (2A) cylinder from Spectra Gases at a concentration of 0.100ppmv, production #1433041 or equivalent.

7.5.1.2 The compounds in this mixture are balance with nitrogen at a final cylinder pressure of 2000psig.

7.5.1.3 The standard mixture is certified by Spectra Gases for 12 months from preparation.

7.5.2 Prepare an intermediate standard for GC/MS Scan analysis using the Dynamic Diluter. Bring to a final volume of 20psig with nitrogen.

Dynamic Diluter Software Settings		
Final Concentration (ppbv)	Nitrogen (cc)	Standard (cc)
0.5	3980	20
5	950	50
25	150	50

7.5.3 Second Source LCS is available upon the request of the client.

8.0 PROCEDURE

Suggested instrument conditions are presented below. Specific instrument conditions may vary slightly, depending on analysis being performed.

8.1 INSTRUMENT OPERATIONS

8.1.1 Entech Concentrator and Autosampler Settings (typical):

Line Temp	100°C
Bulk Head 1	30°C
Bulk Head 2	30°C
Module 1 Trap	-150°C
Module 1 Preheat	20°C
Module 1 Desorb	20°C
Module 1 Bake	130°C
Module 1 Bake Time	5 min
Module 2 Trap	-30°C
Module 2 Preheat	off

Module 2 Desorb	180°C
Module 2 Bake	190°C
Module 2 Desorb Tim	3.5 min
Module 3 Trap	-180°C
Module 3 Inject	2 min
Module 3 Bake Time	2 min
Module 3 Event	3
Module 3 Wait Time	25 min
Pressure Comp Factor	14
Loop Flush	30 seconds

8.1.2 Agilent GC/MS Conditions (typical):

Initial temperature = 35°C
Hold time= 3 min.
Ramp rate = 8°C/min. to 200°C
Ramp rate = 30° C/min to 230°C
Final time = 25.63 min

8.1.3 GC/MS instrument file names are generated using the following naming convention **MMDD_##.D**

where:

M Month: (01 = January, 02 = February, 03 = March, 04 = April, 05 = May, 06 = June, 07 = July, 08 =August, 09 = September, 10 = October, 11 = November, 12 = December)

DD Day: (01-31)

##: Sequential sample numbers from 01-99.

8.1.4 Pre-Analysis Checklist for the GC/MS Run Sequence

8.1.4.1 Check the autosampler program.

8.1.4.2 Check the quantity of internal standard.

8.1.4.3 Check the air cylinder pressure.

8.1.4.4 Check the Entech 7200 or equivalent concentrator settings.

8.1.4.5 Check the LIMS lab comments for any special instructions.

8.1.4.6 Setup the acquisition sequence in the instrument log and in the computer acquisition program.

8.1.4.7 Check the acquisition parameters in the computer program.

8.1.4.8 Arrange the canisters on the autosampler.

8.1.4.9 Double check the order of the sample cylinders to ensure that it is consistent with the computer acquisition and the instrument log.

8.1.4.10 Flush and pressure test the cylinder connections on the autosampler.

8.1.4.11 Open the valves on the sample cylinders.

8.1.5 Analytical Sequence

The analysis sequence should be similar to the following:

8.1.5.1 BFB tune check (the nitrogen blank and tune check or CCV and tune check can be analyzed together), every 24 hours

8.1.5.2 3.75ppbv Initial Calibration Verification Standard every 24 hours for SCAN mode or 0.50ppb

8.1.5.3 Replicate laboratory control samples (LCS and LCSD)

8.1.5.4 Daily method blank

8.2 GC/MS Tuning: The GC/MS system must be checked to ensure that acceptable performance criteria are achieved for the tuning compound bromofluorobenzene (BFB) at the beginning of each day and every 24 hours thereafter for as long as analysis are to be performed. This performance test must be successfully completed before any samples are analyzed.

8.2.1 The tune analysis must meet the criteria listed in EPA Method TO-15 for a 25-ng injection of BFB (4-bromofluorobenzene).

- Once the data is acquired, either select the mass spectrum at the peak apex for evaluation, or use an averaged mass spectrum (e.g., three highest abundance spectra, or across entire BFB peak). Background subtraction is conducted using a single scan prior to the elution of BFB. No part of the BFB peak or any other discrete peak should be subtracted.
- If the criteria are not achieved, the operator must retune the mass spectrometer, either automatically or manually, and the test must be repeated until all criteria are achieved.

Table 8 - BFB m/z Abundance Criteria

Mass	m/z Abundance Criteria
50	8-40 % of mass 95
75	30-66 % of mass 95
95	Base peak, 100 %
96	5-9 % of mass 95
173	<2 % of mass 174
174	50-120 % of mass 95
175	4-9 % of mass 174
176	93-101 % of mass 174
177	5-9 % of mass 176

8.2.2 The internal standard and surrogate mixture are added automatically by the sample concentrator and contain BFB. Analysis of a nitrogen blank will serve as a GC/MS performance test. The standard mixture is added at a rate of 50cc per sample.

8.3 Initial Calibration

8.3.1 Calibration Standards

- Each instrument is calibrated according to the procedures specified within EPA Method TO-15.
- Clarification of the calibration requirements and practices of this laboratory are discussed below. Calculations can be found in section 9.
- Refer to the EPA method protocols for additional detail.

- Initial calibration of the GC/MS is performed before sample analysis, with the assistance of the preconcentrator calibration system.
- The preconcentrator draws standard gas from cylinders purchased at a concentration of 0.1ppmv.
- The standard gas flow into the preconcentrator is regulated by a mass flow controller or electronic flow controller that is set through the system software.
- See section 9.1 for calculation of RSD for calibration response factors and for linear fit equations. See section 10.6 for required acceptance criteria for the initial calibration.

STATE NOTE: When analyzing samples from Minnesota, the reporting limit must be verified with each calibration or at least monthly. Verification can be performed by re-quantitation of the low calibration standards using the newly updated calibration curve or by analyze a separate reporting level standard following calibration curve update. This standard must recover ±40% of the expected concentration. If the criterion is not met, a higher level standard may be re-quantitated or analyzed; however the reporting limit must be amended to reflect the increased concentration of the standard utilized. Analytes known to be poor performers are dealt with on a case-by-case basis.

8.3.2 Reference Spectra: A reference mass spectrum library must be generated for all the target compounds.

8.3.2.1 The reference spectra can be extracted the calibration data, provided that the target compounds do not co-elute.
8.3.2.2 In the case of co-elution, an individual compound standard analyzed using the same method conditions will be required to produce the reference mass spectra.
8.3.2.3 The reference spectra will be used for qualitative and quantitative analysis as described later in this section

8.3.3 Internal Standard Retention Time and Internal Standard Response

8.3.3.1 The internal standard responses and retention times of each standard and sample analyzed are evaluated after data acquisition.
8.3.3.2 See section 10.11 for internal standard acceptance criteria.

8.4 ROUTINE CONTINUING CALIBRATION

Daily verification of the calibration curve can be used in lieu of a full initial calibration.

8.4.1 For routine analysis, a single point initial calibration verification sample or ICV is evaluated daily to insure on-going calibration stability. See section 10.7 for required acceptance criteria.

8.5 Blank Analysis

8.5.1 Daily method blank - Analyze a summa canister containing ultra high purity nitrogen after the calibration standard and before the samples to demonstrate that the analytical system is clean and will not impart target analytes to the field samples. This sample serves as the method blank for the analytical sequence. See acceptance criteria in section 10.8 for the method blank.

8.5.2 A blank check may also be interspersed throughout the analytical sequence to demonstrate that there is no carryover contamination from previous high concentration samples.

8.5.3 Nitrogen filled blanks are also used when cleaning canisters to verify the cleanliness prior to use for sampling. See ENV-SOP-MTJL-0107, *Cleaning, Certification and Storage of Air Sampling Equipment*. These canisters can be used as the daily method blank.

8.6 Sample Analysis

8.6.1 Sample Introduction

8.6.1.1 Sample canisters are connected to the 7016CA/D autosampler inlet ports and the canister valves are opened. Entech 7032A-LB Autosampler is only used for Tedlar Bags.

8.6.1.2 The sample information is recorded into the sequence log for that system, including such information as sample name, laboratory identification number, analysis file name, calibration method used, canister number, dilution factor, and volume of sample loaded.

8.6.1.3 While the GC oven is cooling, the pre-concentrator collects the specified volume of a single sample (up to 400cc) out of the specified sample container (canister or Tedlar bag) along with 50cc of the BFB/internal standard (IS)/Surrogate mixture and concentrates the sample volume a 3-stage trapping system.

8.6.1.4 The trapped sample is then thermally desorbed onto the head of the GC column, and the GC begins the temperature program.

8.6.2 Quantitative Compound Identification – Individual Target Analytes

8.6.2.1 IS peak areas for each analysis completed in the 24-hour GC/MS analysis period must be compared to the mean area response for each IS in the most recent calibration. See section 10.11 for acceptance criteria for internal standards.

8.6.2.2 The ID of each compound in the sample must be verified by retention time and relative abundances of the primary and secondary ions. See Attachment II for characteristic masses.

8.6.2.3 Each compound spectrum is compared against a reference spectrum from the spectral library.

8.6.3 Quantitative Compound Identification – TPH

8.6.3.1 Quantitation is performed using an internal standard method.

8.6.3.1.1 The concentration of volatile petroleum products in the sample is determined from a summation of the total response within a specified range.

8.6.3.1.2 The retention time window must, at a minimum, include the area immediately prior to MTBE through the conclusion of the 1,2,4-Trimethylbenzene peak and must be verified daily, using the initial calibration verification standard.

8.6.3.1.3 No area other than that relating to the internal standard or surrogate may be subtracted from the retention time window in calculating results.

8.6.3.1.4 For the calculation of response factors for total petroleum hydrocarbons, see the equations in section 9.0.

8.6.3.2 Integration must be “baseline to baseline” as opposed to “valley to valley”.

8.6.3.2.1 Baseline to baseline is defined here as a flat baseline drawn parallel to the x-axis of the chromatogram that includes all responses within the retention time window.

8.6.3.2.2 The correct baseline coincides with a horizontal line drawn through the lowest point in the chromatogram before the end of the window, or before the solvent front.

8.6.3.2.3 Baseline to baseline integration does not include the solvent peak.

8.6.3.2.4 Placement of the baseline is determined for each sample.

8.6.4 Any manual integration performed must be documented with the exception of TPH. When manual integration is performed on a peak, the “before” and “after” integrations must be printed out and included in the data package. All manual integrations performed must be done so in accordance to ENV-SOP-MTJL-0024, *Manual Integration*.

8.6.5 Sample Dilutions

If any target analytes are detected that exceed the upper calibration range of the instrument, the sample is re-analyzed at a dilution if enough sample permits.

Autosampler Dilution:

- Dilutions on summa canisters can be performed one of three ways, depending on the degree of dilution needed.
- First, a smaller sample volume can be analyzed using the capabilities of the Entech autosampler. For example, for a standard sample volume of 200cc, if 20cc were analyzed, that would be equivalent to a 10 fold dilution.
- The smallest sample volume that can be accurately analyzed using the autosampler method is 1cc (or a 200x).

Pressurized Manual Dilution:

- Sometimes, a 200X dilution is not sufficient to bring the concentration of a target analyte within the calibration range. In those cases, the sample canister is pressurized resulting in a dilution of the target analytes present.
- The act of introducing more pure air into the canister performs a dilution.
- The canister can then be analyzed at 200cc or diluted using a lesser autosampler volume if necessary.

Secondary Manual Dilution:

- In extreme cases, the canister may need to be diluted into a second evacuated canister.
- This is accomplished by using a gas tight syringe to remove an aliquot of sample (1-10mL) from the initial canister then injecting it into a clean evacuated second canister.
- The second canister is then analyzed and quantified taking into account the dilution based on the amount of sample injected and the total volume of the canister utilized.

Tedlar Bag Dilutions/1L Glass Bottle Vac:

- Dilutions on Tedlar bags or 1L bottle vacs can be performed in much the same manner as summa canisters using either the autosampler dilution or the secondary manual dilution using a second Tedlar bag or 1L bottle vac and filling it with ultra-pure helium then adding an aliquot of field sample using a gas tight syringe.

8.6.6 Qualitative Compound Identification

Qualitative identification of each compound is based on retention time and comparison of the sample mass spectrum with characteristic ions in the reference mass spectrum. The characteristic ions from the reference mass spectrum are defined to be the three ions of greatest intensity or any ions over 30% relative intensity. Compounds are identified as present when the following criteria are met:

8.6.6.1 The characteristic ions of a compound maximize in the same scan or within one scan of each other.

8.6.6.2 The retention time of the compound is within ±0.2 seconds of the retention time of the standard component.

8.6.6.3 The relative intensities of the characteristic ions agree within 30% of the relative intensities of these ions in the reference spectrum. The presence of co-eluting compounds may alter the relative intensities and complicate the compound identification. Examination of extracted ion current profiles can aid in the selection of spectra and in qualitative identification of compounds.

8.6.6.4 Structural isomers that produce similar mass spectra and are sufficiently resolved are identified as individual isomers. If the height of the valley between two close eluting isomers is more than 25% of the sum of the two peak heights, then the structural isomers must be identified as isomeric pairs.

8.6.6.5 A library search must be performed for unknown chromatographic peaks when the total ion chromatogram of the sample contains unknown peaks larger than the internal standard peaks. A tentative identification can be assigned provided that relative intensities of major ions in the library reference spectrum are present in the sample spectrum and the relative intensities agree within 20%. Molecular ions must also be present.

8.7 Post-Analysis Checklist

The results of each analytical run must be examined promptly upon completion. The instruments are designed to create an electronic file for each sample analyzed. The following items must be checked following each batch analysis:

8.7.1 Check all tunes for compliance with tuning requirements.

8.7.2 Check to make sure the internal standards are in the retention time window and their mass spectra are correct.

8.7.3 Review the method blank for acceptance criteria.

8.7.4 Review the LCS/LCSD pair for acceptable recovery and precision as listed in section 10.

8.8 For acceptance criteria and corrective actions regarding calibration, QC and sample analysis, refer to sections 10.0 & 11.0.

8.9 TIC's – Tentatively Identified Compounds

Periodically, clients may request additional identification of compounds that are not normally calibrated. This identification is limited to the compounds in the current mass spectral library employed by Pace National.

For samples containing components not associated with the calibration standards, a library search may be made for the purpose of tentative identification. The necessity to perform this type of identification is determined by the type of analyses being conducted. At the client request, when serving the role of QA (or referee) laboratory, tentatively identified compounds (TICs) must always be reported. Guidelines for making tentative identification are:

(1) Relative intensities of major ions in the reference spectrum (ions >10% of the most abundant ion) should be present in the sample spectrum.

(2) The relative intensities of the major ions should agree within 15% to be consistent with target compound list identification. (Example: For an ion with an abundance of 50% in the standard spectrum the corresponding sample ion abundance must be between 20 and 80%).

(3) Molecular ions present in the reference spectrum should be present in the sample spectrum.

(4) Ions present in the sample spectrum but not in the reference spectrum should be reviewed for possible background contamination or presence of co-eluting compounds.

(5) Ions present in the reference spectrum but not in the sample spectrum must be reviewed for possible subtraction from the sample spectrum because of background contamination or co-eluting peaks. Data system library reduction programs can sometimes create these discrepancies.

Computer generated library search routines must not use normalization routines that would misrepresent the library or unknown spectra when compared to each other. Only after visual comparison of sample with the nearest library searches does the mass spectral interpretation specialist assign a tentative identification.

Routinely, Pace National employs a minimum Q value of 85% for tentative identifications and a minimum concentration of 10ppb. Peaks below a Q value of 85% but above 10ppb may be reported as “Unknown”. Any identified peaks below 10ppb are removed as these could result from baseline noise or other interferences, not necessarily attributable to the field sample or reliably quantifiable using GCMS technology. Additionally, any peaks that are attributable to instrument contamination (e.g., siloxanes) are also removed.

If multiple TICs, with same exact name, exist for a sample, the LIMS will only display the TIC with the highest quality match per sample.

TIC names assigned as “Unknown” may initially have the same name as another “Unknown” until parsed and displayed in LIMS where it is given a hyphen and incremental number which then becomes a unique TIC (e.g., Unknown-1).

When reporting “Total TIC” for any client sample, only concentrations per above requirements will be used to sum the Total TIC concentration.

8.10 SIM – Selected Ion Monitoring

8.10.1 SIM may be useful for applications requiring quantitation limits below the normal range of electron impact quadrupole mass spectrometry and is an allowable option for this method. Using the primary m/z for quantitation and at least one secondary m/z for confirmation, set up the collection groups based on their chromatographic RTs. The selected m/z values should include any mass defect noted in the target analyte mass spectra acquired on the instrument, usually less than 0.2 amu. The dwell time for each ion may be automatically calculated by the instrument software or may be calculated based on the peak widths of the analytes of interest, the number of spectra needed to be acquired across each peak, and the number of concurrent ions that need to be acquired in each segment. When fewer m/z values are monitored in each segment, the acquisition time for each m/z can be increased, thereby increasing the sensitivity of the system. The total cycle time for the MS should be short enough that at least five, but preferably ten or more, spectra are acquired per chromatographic peak.

8.10.1.1 Monitor at least two ions for each target analyte and use the mid-point of the calibration curve to establish proper ion ratios for each compound. The ratios of primary and secondary ions are the only qualitative tools available in SIM runs (other than RT), which increases their importance in proper identification. When interferences are expected or observed in a given matrix, acquiring multiple secondary ions may aid in qualitative identification.

8.10.1.2 Verify that all monitored ions are correctly integrated in order to achieve proper ion ratios. Update the primary/secondary ion ratios and reference mass spectra after each ICAL using a mid-range ICAL standard.

9.0 DATA ANALYSIS AND CALCULATIONS

9.1 TPH Calculations: The total area must be measured, from the beginning to the end marker, will be used in conjunction with the concentration to calculate the response factor.

$$\text{RF} = \frac{(\text{Total TPH Area})\text{x}(\text{Concentration of Internal Standard})}{(\text{Area of Internal Standard})\text{x}(\text{Concentration of Total TPH})}$$

$$\text{Total Sample TPH} = \frac{(\text{Area of Sample})\text{x}(\text{Concentration of Internal Standard})}{(\text{Area of Internal Standard})\text{x}(\text{Avg. RF of Total TPH})}$$

9.2 Sample Concentration: Target compound concentrations in units of ppbv are calculated using the RRFs obtained in the initial calibration. The abundance of the primary ion is used for quantitation unless there is an interference with the primary ion; in case of interference with the primary ion, a secondary ion can be used.

$$C_t = \frac{(A_t)\,(C_{is})\,(DF)}{(A_{is})\,(MRRF)}$$

Where:
A_t = area count of the primary ion for the target compound to be measured
A_{is} = area count of the primary ion for the ISTD
C_t = concentration of the target compound (ppbv)
C_{is} = concentration of the internal standard (ppbv)
MRRF = mean RRF from initial calibration
DF = dilution factor. DF = 1, if no dilution.

9.3 Concentration Conversions

$$\text{ppmv} = \text{ppbv}/1000$$

$$\text{mg/m}^3 = \frac{(\text{compound molecular weight})(\text{ppmv})}{(\text{molar volume})}$$

$$\mu\text{g/m}^3 = \frac{(\text{compound molecular weight})(\text{ppbv})}{(\text{molar volume})}$$

$$\mu\text{g/L} = \frac{(\mu\text{g/m}^3)}{1000}$$

$$\mu\text{g} = \frac{\mu\text{g/L}}{\text{sample size analyzed}}$$

$$ng = \mu g \times 1000$$

9.4 See the current Quality Assurance Manual for equations associated with common calculations.

10.0 QUALITY CONTROL AND METHOD PERFORMANCE

10.1 All analysts must meet the qualifications specified in ENV-SOP-MTJL-0015, *Technical Training and Personnel Qualifications* before approval to perform this method. Analysts must complete an initial demonstration of proficiency before being approved to perform this method. Continuing proficiency must be demonstrated using proficiency testing, laboratory control sample analysis and/or MDL studies. Method performance is assessed per analyst. Updated method performance records are filed and stored in a central location within the department.

10.2 Use the designated Run log to record batch order and standards/reagents used during analysis. See ENV-SOP-MTJL-0014, *Data Handling and Reporting*.

10.3 Batches are defined as sets of 1 - 20 samples. Batch analysis must include the following: 1 method blank, 1 Laboratory Control Sample (LCS) and 1 Laboratory Control Sample Duplicate (LCSD). All batch information must be maintained in the preparation documentation assigned to the department.

10.4 Detector Tuning - The BFB must be analyzed daily prior to any calibration or field sample analysis (once/24 hours). The acceptance criteria must meet the specifications found in Table 8.

10.5 Retention Time - Evaluation of retention time windows to ensure that all compounds are detected within their respective time windows. The retention time of the target analytes in each calibration standard must agree within +/-0.06 RRT Units. Late-eluting compounds usually have much better agreement.

10.6 Initial Calibration - There must be an initial calibration of the GC/MS system as described in Section 8.3. A calibration curve of at least five (5) points must be established that brackets the expected range of sample concentrations and remains within the analytical range of the instrument. The Relative Standard Deviation (RSD) for any one of the compounds must be <30% for sample analysis to proceed with two compounds being allowed to be <40%. If the RSD for any analyte is beyond the required criteria, any of the curve fits listed below may be used for calibration if the correlation coefficient is $\geq$0.990. Establishment of a successful calibration curve occurs when analysis of continuing calibration standards indicate that a new calibration curve is required or when there has been a major change, repair, or maintenance performed on the instrument. The recalibration period does not exceed three (3) months. The most appropriate curve fitting mode is used from among the following choices below (given in order of preference):

- Average Response Factor
- Linear – No Weighting
- Linear – 1/x Weighting
- Linear – 1/x^2 Weighting
- Quadratic

When second order (quadratic) curves are evaluated, acceptability must include an assessment of a graphic representation of the curve to confirm that this fit type is not being used to mask detector saturation and that the curve (which defines a parabola) does not result in two concentration for one response. High order polynomial curves (i.e., third-order and greater) are not allowed at Pace National.

10.7 ICV - On the days that an initial calibration of the instrument is not needed, a mid-level standard is analyzed daily to verify the stability of the original calibration curve. The deviations of the response factor for the target analytes in this standard must be <30% from those of the initial calibration curve. The GC/MS system must meet the calibration criteria each 24 hours of instrument operation as described in Section 8.3. If the Percent Difference for the compounds in the single point initial calibration verification sample are <30%, then analysis of field samples may continue.

10.8 Method Blank – One each day of analysis, a nitrogen filled summa (method blank) must be analyzed before the samples in the analytical batch. The method blank must be analyzed following the BFB tune and calibration verification standard (ICV) and prior to any field sample analysis. This method blank verifies that the instrument is free from target analytes prior to the analysis of field samples. The acceptance criteria for target analytes in the method blank is < the MDL.

10.9 LCS/LCSD - On days of field sample analysis, an LCS/LCSD pair must be analyzed. The recoveries for the target analytes must be within 70-130% for accuracy and the RPD must be <25% for most commonly analyzed target in this method. Marginal excedence limits for these analytes are 60-140%. Some analytes that are routinely quantitated by this method do not respond well due to various factors. These analytes are considered poor performers in the analytical sequence and utilize control limits based on historical data that may be updated per laboratory policy. The analytes noted in this method as poor performing are included in the table below. See LIMS for the current acceptance limits of these poor performing compounds.

Poor Performing Compound Name
1,2,4-TRICHLOROBENZENE
1,4-DIOXANE
2-PROPANOL
4-METHYL-2-PENTANONE (MIBK)
BENZYL CHLORIDE
DICHLORODIFLUOROMETHANE
ETHANOL
HEXACHLORO-1,3-BUTADIENE
METHYL BUTYL KETONE
NAPHTHALENE
PROPENE
TETRAHYDROFURAN
TERT-BUTYL ALCOHOL
2-METHYLNAPHTHALENE

10.10 Surrogate (1,4-Bromofluorobenzene) - The surrogate is automatically added to each standard, QC and field sample by the autosampler. The surrogate must recovery within 60-140% of the expected value.

10.11 Internal Standards - In each QC and field sample, the autosampler automatically adds internal standard, along with the surrogate. The internal standard area response for each QC and field sample must be ±40% of the mean area response for each of the ISTDs in the multipoint calibration. The retention time of the ISTD compounds in each QC and field sample must also be within ±0.06RRT units of the same internal standard in the multipoint calibration.

10.12 Manual Integration – All manual integrations must comply with the requirements found in ENV-SOP-MTJL-0024, *Manual Integration Procedure*. Before and after integrations must be available for review by the secondary data reviewer.

10.13 Reporting Limit Verification (RLV) – RL checks are evaluated but are currently applicable to Minnesota samples only. See State Note in Section 8.3.1 above for details.

10.14 Any sample analyte responses that are beyond the linear range of the calibration curve must be diluted and re-analyzed.

10.15 For corrective actions, see section 11.0.

11.0 DATA VALIDATION AND CORRECTIVE ACTION

11.1 BFB Instrument Tune - If the acceptance criteria are not met, the analyst can attempt a second tune injection. If the second tune also fails, the analyst must perform corrective action. Corrective actions can include: instrument autotuning, source cleaning, manual adjustment of the mass spectrometer parameters. Analysis of field sample cannot occur until a successful tune is achieved.

11.2 Initial Calibration - If a calibration curve does not meet the acceptance criteria, review the points of the curve to determine if an individual point requires reanalysis, if so, re-analyze the suspect point and re-process the curve. If all calibration points analyzed appear acceptable and the calibration still does not pass criteria, perform instrument maintenance, if suspected as the cause, prepare new calibration standards, and repeat the calibration curve.

11.3 Initial Calibration Verification - If this criterion is not met, the ICV can be re-analyzed once. If the re-analysis continues to fail the acceptance criteria, the full calibration curve must be re-analyzed. Instrument maintenance may be necessary prior to re-calibration.

11.4 LCS/LCSD - If these criteria are not met, repeat the LCS and/or LCSD analysis once and if the criteria is still not met then a new standard is prepped and analyzed. If the failure persists, re-calibrate the instrument and re-analyze the LCS/LCSD and any additional sample injections that may have occurred with the previous failing LCS/LCSD pair.

11.5 Surrogate Recovery - If the acceptance criteria are not met, re-analyze any failing sample, method blank and/or LCS/LCSD sample. If the failure occurs in the method blank or LCS/LCSD sample, re-analyze once. If the failure persists, corrective action is needed. Corrective action can include instrument maintenance and/or re-calibration. Failures of method blanks and LCS/LCSD samples are routinely noted and addressed prior to the analysis of field samples; however if the failure occurs in the method blank or LCS/LCSD sample during an analytical sequence, then any samples analyzed in conjunction with the failure must be re-analyzed. If the failure occurs in the field sample, unless gross contamination or high target analyte levels are present, all re-analyses should be performed at the same dilution as the original analysis to determine the cause of the original failure. If the failure persists in the re-analysis, flag the data with explanation to the client.

11.6 Method Blank Analysis - If the method blank does not meet criteria, the analysis must be repeated with a different nitrogen filled canister. If the method blank is still not valid, the pre-concentrator/GC/MS system must be checked for leaks and/or contamination. Canister cleaning batch nitrogen blanks can be used for clean method blanks since one canister of each cleaned batch must be analyzed by GC/MS for the batch to be certified as clean. An acceptable method blank must be achieved prior to any field sample analysis.

NOTE: Tedlar bags have, in some cases, been shown to contain analytes above the values listed on the certificates of cleanliness. This has not been experienced at Pace National; however should a new manufacturer be chosen as the supplier of Tedlar bags, a method blank Tedlar may be necessary to demonstrate acceptable cleanliness.

11.7 Internal Standard Recovery - If the area response for any ISTD changes by more than ± 40% between the sample and the most recent calibration, the GC/MS system must be inspected for malfunction and corrections made as appropriate. When corrections are made, an initial calibration verification sample must be analyzed to determine whether the multipoint calibration remains valid. If acceptance criteria are not met, recalibration is necessary. Re-analysis of all samples analyzed while the GC/MS system was malfunctioning is necessary.

11.8 Reporting Limit Verification (RLV) – RL checks are evaluated but are currently applicable to Minnesota samples only. See State Note in Section 8.3.1 above for details.

11.9 All data must undergo a primary review by the analyst. The analyst must check the performance of the initial calibration and continuing calibrations to ensure that they meet the criteria of the method. The analyst should review any sample that has quantifiable compounds and make sure that they have been confirmed, if needed. The analyst must also verify that reported results are derived from quantitation between the MDL and the highest standard of the initial calibration curve. All calculations must be checked (any dilutions, re-analyses, etc.). Data must be checked for the presence or absence of appropriate flags. Comments should be noted when data is flagged.

11.10 All data must undergo a second analyst review. The analyst checking the data must check the performance of the initial calibration and calibration verifications to ensure that they meet the criteria of the method.

11.10.1 The analyst should look at any sample that has quantifiable compounds and check the integration.

11.10.2 All surrogate recoveries must be checked to see if they are within limits.

11.10.3 Method Blanks must be clean of all interfering peaks.

11.10.4 Quality control criteria should be checked for the ISTDs, LCS, and LCSD.

11.10.5 Data must be checked for the presence or absence of appropriate flags. Comments should be noted when data is flagged.

11.10.6 See ENV-SOP-MTJL-0014, *Data Handling and Reporting*.

11.10.7 See ENV-SOP-MTJL-0018, *Corrective and Preventive Action*.

11.11 LCS/LCSD: The laboratory control sample and laboratory control sample duplicate, recoveries must be evaluated against the limits listed in this procedure. The LCS/LCSD are spiked with the same list of compounds for which the instrument is calibrated. Due to the large number of compounds analyzed using these methods, it is statistically likely that accuracy and precision failures will occur.

LCS or LCSD samples that do not pass the acceptable QC criteria must be re-analyzed. LCS/LCSD failures must meet the marginal excedence criteria below. Allowable marginal excedence outliers are based on the number of compounds being analyzed and must be random events.

Upper and lower marginal excedence (ME) limits are established by ± 4 times the standard deviation of historical accuracy data.

Number of allowable marginal excedences:

90+ analytes,	5 analytes allowed in the ME limit
71 – 90 analytes,	4 analytes allowed in the ME limit.
51 – 70 analytes,	3 analytes allowed in the ME limit.
31 – 50 analytes,	2 analytes allowed in the ME limit.
11 – 30 analytes,	1 analyte allowed in the ME limit.
< 11 analytes,	no analyte allowed in the ME limit.

STATE NOTE: For South Carolina, marginal exceedances do not apply. All outliers in QC require corrective action when possible and the data must be flagged when necessary.

12.0 POLLUTION PREVENTION AND WASTE MANAGEMENT

12.1 The EPA requires that laboratory waste management practice to be conducted consistent with all applicable federal and state laws and regulations. Excess reagents, samples and method process wastes must be characterized and disposed of in an acceptable manner. See *ENV-SOP-MTJL-0051, Waste Management Plan.*

12.2 See ENV-SOP-MTJL-0046, *Environmental Sustainability & Pollution Prevention*.

13.0 METHOD MODIFICATIONS/CLARIFICATIONS

13.1 Modifications to this method are noted in the body of the text as state notes. Compliance analyses performed in conjunction with specific state requirements must be performed as noted within the specific state(s) note listed.

13.2 Provisions have been added to this procedure for the analysis of gasoline range organics and additional analytes from those listed specifically in the EPA TO-14A and TO-15 Compendium Methods. Sufficient supporting data is maintained by the laboratory to demonstrate accurate identification and adequate sensitivity for quantitation of these analytes using this procedure.

13.3 Adjustments to the concentrations of standards/spiking solutions, standards providers, and quality control are subject to change to better meet client/project/regulatory needs or to improve laboratory method performance.

14.0 REFERENCES

14.1 *Ambient Air*: Method TO-14A, Second Edition, U.S. Environmental Protection Agency, Research Triangle Park, NC, EPA 600/625/R-96/010b, January 1999.

14.2 *Compendium of Method for the Determination of Toxic Organic Compounds in Ambient Air*: Method TO-15, Second Edition, U.S. Environmental Protection Agency, Research Triangle Park, NC, EPA 600/625/R-96/010b, January 1999.

14.3 Entech 7100 Operators Manual, Version 2.0, Entech Instruments Inc., Simi Valley, CA, 1999.

14.4 Entech 3100 Operators Manual, Version 1.0, Entech Instruments Inc., Simi Valley, CA, 1999.

14.5 Method 18 – Measurement of Gaseous Organic Compound Emissions by Gas Chromatography, 40 CFR 60, Appendix A-6.

14.6 Markes Unity-xr User Manual, QUI-1119, Version 1.0 – July 2016, Markes International Ltd.

14.7 Markes CIA Advantage Operator Manual, QUI-1078, Version 1.1 – Markes International Ltd.

Attachment I: Revision History

Current Version (Pace National):

Date	Description of Revisions
11/20/2020	Revised header. Added Section 8.10 and all subsections.

Superseded Versions (ESC Lab Sciences SOP#330367):

Version	Date	Description of Revisions
0	3/26/04	Origination
1	3/24/05	
2	6/15/05	
3	12/5/05	
4	4/21/06	
5	4/30/07	Corrected format errors and sequential numbering, expanded on process discussion in response to Ohio VAP review.
6	2/3/09	Technical and Quality Review and update. Inclusion of sections 12.1-12.2 & 13.1; Clarification of holding times; Addition of State Notes for Ohio VAP and MN; Ohio VAP approval 2/3/09.
7	7/13/11	Technical and Quality Review and update. Revised sections 7.3.2, 7.4, Table 7.4, 7.5, 8.1 through 8.5, 9.1 through 9.5, 11.6 through 11.11, 12.1 and 13.2; Added sections 1.2, 2.9 through 2.23, 10.4 through 10.14, 13.3 and Attachments II and III.
8	9/19/11	Technical and Quality Review and update. Revised sections 8.7.4 and 10.9
9	11/17/11	Technical and Quality Review and update. Revised sections 7.3.1, 7.4.2, 8.3.1, 8.3.3, 8.4, 8.6.2, 8.6.3, 8.6.4, 8.7, 10.5, 10.8, 10.14, 11.5, and 11.7; Added sections 7.4.2.4, 8.1.4, 8.1.5, and 8.5; Removed sections 8.2.3, 8.2.6, 8.4, and 8.6; Reconciled Ohio VAP approval with changes from Rev. 7, 8 and 9 - 11/17/11.
10	1/29/13	Technical and Quality Review and update. Revised sections 4.2 (including state note), 8.2.1, and 10.9; Added state note in section 1.0 and sections 1.3.1, 2.24, 2.25, and 6.3.4.
	3/19/14	Reviewed with no changes per D. Ramey/D. Marlin
11	11/6/14	Technical and Quality Review and update. Revised Attachments II and II and Table 7.4, Revised sections 1.1, 1.2, 4.5.3, 7.4.2.2, 7.4.2.4, 8.1.5.2, 10.9 and 11.4; Added sections 2.26, 2.27, 4.5.4, and 7.5.3.
12	11/25/2015	Technical and quality review and update. Header and signature block re-formatting. Revised Sections 1.3.1, 4.4.2, 4.5.4, 6.1.4, 7.1, 7.2, 7.3.1.1, 7.4.1, Table 7.4, 7.5.4, 8.0, 8.1.5.1, 8.2.2, 8.5, 8.6.5, 8.7.5, 8.7.6, 10.8, 11.6, 11.9.8, 12.2, Attachment IIa, and Attachment IIIa. Removed Sections 7.3.1.2 and 7.3.1.3. Added Attachment IV.

STANDARD OPERATING PROCEDURE
TITLE: Measurement of Volatile Organic Compounds and Gasoline Range Components in Ambient Air by Gas Chromatography/Mass Spectrometry (EPA TO-15 and EPA Method 18-Modified)
ISSUER: Pace National – Mt. Juliet, Tennessee

Version	Date	Description of Revisions
13	11/9/2016	Technical and quality review and update. Header and signature block re-formatting. Revised Sections 2.9, 2.10, 2.11, 7.3.1.1, 7.3.2.1, 7.3.2.2, 7.3.2.7, 7.4.1, 7.4.2.1.1, 7.4.2.1.4, 7.5.1.3, 7.5.2.1, 7.5.2.2, 7.5.2.4, 8.1.4.5, 8.1.5.3, 8.3.1, 8.5, 8.6.1, 8.6.2, 8.6.4, 8.6.5, 8.7.5, 10.3, 10.6, 10.8, 11.7, 11.10, 11.11.1, and Attachment IV Table 2. Deleted Sections 2.9 through 2.25, 7.3.2.5, 7.5.3 and all subsections, 9.1, 9.2, 9.4, and 9.5. Added Section 9.4.
14	4/10/2017	Technical and quality review and update. Revised SOP title and Sections 1.3, 4.5.2, 4.5.3, 7.3.1.1, 7.4.2.2, 8.1.4.9, 8.1.5.1, 8.1.5.3, 8.2, 8.6.5, 10.9, 10.10, and 10.11. Deleted Section 4.5.2 and 8.1.4.1. Added Section 6.3.7, 6.3.8, 14.5, 14.6, and 14.7.
15	11/30/2017	Update in response to A2LA audit finding CAR2872. Revised Sections 1.0, 1.3, 3.1, and Attachment IV Table 4.

Superseded Versions (Pace National):

Date	Description of Revisions
1/19/2019	Technical and quality review and update. Deleted header, footer and signature bar. Revised sections 1.0, 1.1, 1.3, 1.3.1, 3.1, 4.2, 4.3, 4.4, 4.4.1, 4.5, 4.5.1, 4.5.2, 4.5.3, 6.1, 6.1.1, 6.1.2, 6.1.3, 6.1.4 ,6.1.5, 6.3, 6.3.9, 6.3.12, 6.4, 7.0, 7.1, 7.3.2.2, 7.4.1, 7.4.2.2, 7.5, 7.5.1, 7.5.1.1, 7.5.2, 8.1.4, 8.1.4.4, 8.1.5, 8.1.5.1, 8.1.5.2, 8.2.1, 8.2.2, 8.3, 8.6, 8.6.4, 8.7, 8.9, 10.1, 10.2, 10.3, 10.6, 10.9, 10.10, 10.12, 11.6, 12.1, 12.2 and 14.7. Deleted Table 7.4. Deleted sections 7.4.2.1, 7.4.2.1.1, 7.4.2.1.2, 7.4.2.1.3, 7.4.2.1.4, 7.5.1.2, 7.5.2.1, 7.5.2.2, 7.5.2.3, 7.5.2.4, 8.7.5, 8.7.6, 11.9.2, 11.11, 11.11.1, 11.11.2 and renumbered as necessary. Added sections 7.4.2.1, 8.9, 10.13, 11.8 and renumbered as necessary. Added State Note to section 8.3.1. Added sub-section numbers to sections 8.3.2, 8.3.3, 8.4, 8.5, 8.6.1, 8.6.2, 8.6.3.1 and 8.6.3.2. Revised sections 8.5.1, 8.5.3, 8.6.1.3, 11.10.6 and 11.10.7. Revised Attachments I, IIa and IIIa.
12/23/2019	Added corporate header and footer. Added Client Note in Sections 4.2 and 4.4.1. Deleted Section 4.5.1, 6.3.3, 6.3.7, 6.3.8, and renumbered as appropriate. Added Section 6.1.6. Revised Sections 4.5.2, 6.0, 7.4.2.2, 8.6.1.1, and 8.6.5.

STANDARD OPERATING PROCEDURE
TITLE: Measurement of Volatile Organic Compounds and Gasoline Range Components in Ambient Air by Gas Chromatography/Mass Spectrometry (EPA TO-15 and EPA Method 18-Modified)
ISSUER: Pace National – Mt. Juliet, Tennessee

Attachment IIa: Routine Analytes and Reporting Limits for Scan Mode (*See section 13.3)

Compound*	RL ppbv*
1,1,1-Trichloroethane	0.2
1,1,2,2-Tetrachloroethane	0.2
1,1,2-Trichloroethane	0.2
1,1,2-Trichlorotrifluoroethane	0.2
1,1-Dichloroethane	0.2
1,1-Dichloroethylene	0.2
1,2,4-Trichlorobenzene	0.63
1,2,4-Trimethylbenzene	0.2
1,2-Dibromoethane	0.2
1,2-Dichlorobenzene	0.2
1,2-Dichloroethane	0.2
1,2-Dichloropropane	0.2
1,2-Dichlorotetrafluoroethane	0.2
1,3,5-Trimethylbenzene	0.2
1,3-Butadiene	2.0
1,3-Dichlorobenzene	0.2
1,4-dichlorobenzene	0.2
1,4-Dioxane	0.2
2,2,4-Trimethylpentane	0.2
2-Butanone	1.25
2-Chlorotoluene	0.2
2-propanol	1.25
4-Ethyltoluene	0.2
4-Methyl-2-Pentanone	1.25
Acetone	1.25
Allyl Chloride	0.2
Benzene	0.2
Benzyl Chloride	0.2
Bromodichloromethane	0.2
Bromoform	0.6
Bromomethane	0.2
Carbon Disulfide	0.2
Carbon Tetrachloride	0.2
Chlorobenzene	0.2
Chloroethane	0.2
Chloroform	0.2
n-Propylbenzene	0.2
sec-Butylbenzene	0.2
1,2,3-Trimethylbenzene	0.2
Tert-butyl alcohol	1.25
Dicyclopentadiene	0.2
Ethyl Acetate	0.2
Butane	0.2
Acrolein	0.31
2-Methylnaphthalene	1.0
Acetonitrile	0.2

Compound*	RL ppbv*
Chloromethane	0.2
cis-1,2-Dichloroethene	0.2
cis-1,3-Dichloropropene	0.2
Cyclohexane	0.2
Dibromochloromethane	0.2
Dichlorodifluoromethane	0.2
Ethanol	0.63
Ethylbenzene	0.2
Heptane	0.2
Hexachloro-1,3-Butadiene	0.63
Isopropyl benzene	0.2
m&p-Xylene	0.4
Methyl Butyl Ketone	1.25
Methyl Methacrylate	0.2
Methylene Chloride	0.2
MTBE	0.2
Naphthalene	0.63
n-Hexane	0.2
o-Xylene	0.2
Propene	2
Styrene	0.2
Tetrachloroethylene	0.2
Tetrahydrofuran	0.2
Toluene	0.2
TPH	50
Trans-1,2-Dichloroethene	0.2
trans-1,3-Dichloropropene	0.2
Trichloroethylene	0.2
Trichlorofluoromethane	0.2
Vinyl Acetate	0.2
Vinyl Bromide	0.2
Vinyl Chloride	0.2
1,4-Bromofluorobenzene (surrogate)	0.2
1,4-Difluorobenzene (internal standard)	0.2
Bromochloromethane (internal standard)	0.2
Chlorobenzene-d5 (internal standard)	0.2
tert-Butylbenzene	0.2
n-Butylbenzene	0.2
1,1-Difluoroethane	0.2
Tert-Amyl Ethyl Ether	0.2
Chlorodifluoromethane	0.2
Methyl Cyclohexane	0.2
Pentane	0.2
Acrylonitrile	0.2
Bromoethane	0.2
Nonane	0.2

Attachment IIb: Routine Analytes and Reporting Limits for SIM Mode (**See section 13.3)*

Compound*	RL ppbv*
1,1,1-Trichloroethane	0.02
1,1,2,2-Tetrachloroethane	0.02
1,1,2-Trichloroethane	0.03
1,1-Dichloroethane	0.02
1,1-Dichloroethylene	0.02
1,2-Dibromoethane	0.02
1,2-Dichloropropane	0.03
1,4-Dichlorobenzene	0.02
Benzene	0.02
Carbon Tetrachloride	0.02
Chloroethane	0.04
Chloroform	0.02
Chloromethane	0.03

Compound*	RL ppbv*
cis-1,2-Dichloroethene	0.02
cis-1,3-Dichloropropene	0.03
Ethylbenzene	0.03
Tetrachloroethylene	0.02
trans-1,2-Dichloroethene	0.02
trans-1,3-Dichloropropene	0.03
Trichloroethylene	0.02
Vinyl Acetate	0.02
Vinyl Chloride	0.02
1,4-Bromofluorobenzene (surrogate)	0.02
1,4-Difluorobenzene (ISTD)	0.02
Bromochloromethane (ISTD)	0.02
Chlorobenzene-d5 (ISTD)	0.02

Attachment IIIa: Characteristic Ions for SCAN mode

Compound	1° Ion	2° Ion	Compound	1° Ion	2° Ion
1,1,1-Trichloroethane	97	99, 61	Chloromethane	50	52
1,1,2,2-Tetrachloroethane	83	85	cis-1,2-Dichloroethene	96	61, 98
1,1,2-Trichloroethane	97	83, 61	cis-1,3-Dichloropropene	75	39, 77
1,1,2-Trichlorotrifluoroethane	101	151, 85	Cyclohexane	56	84, 41
1,1-Dichloroethane	63	65	Dibromochloromethane	129	127, 131
1,1-Dichloroethylene	96	98, 61	Dichlorodifluoromethane	85	87, 101
1,2,4-Trichlorobenzene	105	122	Ethanol	31	45, 27, 46
1,2,4-Trimethylbenzene	105	120	Ethylbenzene	91	106
1,2-Dibromoethane	107	109	Heptane	43	71, 57
1,2-Dichlorobenzene	146	148, 111	Hexachloro-1,3-Butadiene	225	227, 223
1,2-Dichloroethane	62	64	Isopropyl benzene	105	120
1,2-Dichloropropane	63	62, 41	m&p-Xylene	91	106
1,2-Dichlorotetrafluoroethane	85	135, 87	Methyl Butyl Ketone	43	58, 57, 100
1,3,5-Trimethylbenzene	105	120	Methyl Methacrylate	41	69, 100
1,3-Butadiene	54	53, 39	Methylene Chloride	84	49
1,3-Dichlorobenzene	146	148, 111	MTBE	73	57
1,4-Dichlorobenzene	146	148, 111	Naphthalene	128	-
1,4-Dioxane	88	58	n-Hexane	57	41, 43
2,2,4-Trimethylpentane	57	41, 56	o-Xylene	91	106
2-Butanone	43	72	Propene	41	39, 42
2-Chlorotoluene	91	126	Styrene	104	78, 103
2-propanol	45	43	Tetrachloroethylene	166	164, 131
4-Ethyltoluene	105	120	Tetrahydrofuran	42	41, 72, 71
4-Methyl-2-Pentanone	43	58, 100	Toluene	91	92
Acetone	43	58	TPH	NA	NA
Allyl Chloride	76	41, 78	trans-1,2-Dichloroethene	96	98, 61
Benzene	78	77, 50	trans-1,3-Dichloropropene	75	39, 77
Benzyl Chloride	91	126	Trichloroethylene	130	132, 95
Bromodichloromethane	83	85, 129	Trichlorofluoromethane	101	103, 105
Bromoform	173	171, 175, 252	Vinyl Acetate	43	86
Bromomethane	94	96	Vinyl Bromide	106	108
Carbon Disulfide	76	44, 78	Vinyl Chloride	62	64
Carbon Tetrachloride	117	119	1,4-Bromofluorobenzene (surr.)	95	174, 176
Chlorobenzene	112	77, 114	1,4-Difluorobenzene (ISTD)	114	-
Chloroethane	64	66	Bromochloromethane (ISTD)	51	131
Chloroform	83	85	Chlorobenzene-d5 (ISTD)	117	-
n-Propylbenzene	91	120	tert-Butylbenzene	119	91, 134
sec-Butylbenzene	105	134	n-Butylbenzene	91	92, 134
1,2,3-Trimethylbenzene	105	120	Tert-butyl alcohol	59	-
Dicyclopentadiene	66	132	Tert-amyl ethyl ether	73	55, 87, 43
1,1-Difluoroethane	51	-	chlorodifluoromethane	51	67
Ethyl acetate	43	45, 70	Methyl Cyclohexane	83	55, 41
Butane	43	58	Pentane	43	57, 72
Acrolein	56	55	Acrylonitrile	53	52, 51
2-Methylnaphthalene	142	141, 115	Bromoethane	108	110

Compound	1° Ion	2° Ion	Compound	1° Ion	2° Ion
Acetonitrile	41	40, 39	Nonane	43	57, 71, 128

Attachment IIIb: Characteristic Ions for SIM mode

Compound	1° Ion	2° Ion	Compound	1° Ion	2° Ion
1,1,1-Trichloroethane	97	99, 61	cis-1,2-Dichloroethene	96	61, 98
1,1,2,2-Tetrachloroethane	83	85	cis-1,3-Dichloropropene	75	39, 77
1,1,2-Trichloroethane	97	83, 61	Ethylbenzene	91	106
1,1-Dichloroethane	63	65	Tetrachloroethylene	166	164, 131
1,1-Dichloroethylene	96	98, 61	trans-1,2-Dichloroethene	96	98, 61
1,2-Dibromoethane	107	109	trans-1,3-Dichloropropene	75	39, 77
1,2-Dichloropropane	63	62, 41	Trichloroethylene	130	132, 95
1,4-Dichlorobenzene	146	148, 111	Vinyl Acetate	43	86
Benzene	78	77, 50	Vinyl Chloride	62	64
Carbon Tetrachloride	117	119	1,4-Bromofluorobenzene (surr.)	95	174, 176
Chloroethane	64	66	1,4-Difluorobenzene (ISTD)	114	-
Chloroform	83	85	Bromochloromethane (ISTD)	51	131
Chloromethane	50	52	Chlorobenzene-d5 (ISTD)	117	-

Attachment IV: DoD Requirements

1.0 Equipment/Instrument Maintenance

Instrument maintenance must be performed routinely to optimize instrument performance and improve chromatography. Commonly performed maintenance includes baking traps and columns, cleaning inlet, replacing valves, etc. A new calibration curve must be analyzed following any major maintenance performed on the analytical system.

2.0 Computer Hardware and Software

Software name and version: MSD Chemstation E.02.01.1177 or equivalent

3.0 Troubleshooting

Table 1. GCMS Troubleshooting Guide

Problem	Cause	Treatment
Peaks broaden and tail	Poor column installation causing dead volume in the injector	Reinstall column in injector. Check seal at ferrule. Check insertion depth. Ensure a good column cut.
	Solvent flashing in hot injector	Reduce injection speed on hot injectors and if possible reduce injector temperature
	Injector not being purged properly after splitless injection	For splitless injection, the vent flow should be 70 ml/min, and the injector should be switched to the split mode 0.5_1.5 min after injection.
Tailing sample peaks for active components	Active sites in the injector insert or liner	Change or clean the injector insert
	Active sites or degraded phase in column	Remove the front 15 cm of the column and reinstall. If retention times are changing or cutting the column does not help, replace the column.
	Injector not hot enough for higher boiling compounds	Increase the injector temperature and lower the injection speed. Check that the graphite ferrule is free of cracks and the septum support is tight.
Low response and tailing of high boiling point compounds	Injector is not hot enough to vaporize high boilers	Increase injector temperature
	Interface/ion source not getting to adequate temperature	Change the manifold heater
Leading sample peaks	Column overload due to excess amount of component injected	Dilute the sample or do split injection
	Degradation of stationary phase	Change the column
	Carrier gas velocity too low	Increase carrier gas flow rate
Poor chromatographic resolution	Column temperature or program not optimized	Modify method by changing temperature ramp segment slopes

Table 1. GCMS Troubleshooting Guide

Problem	Cause	Treatment
	Carrier gas flow rate not optimized	Decrease carrier gas linear velocity
	Stationary phase has degraded	Replace the column
Peak splitting, especially low boilers	Sample is flashing in the injector simulating two injections	Lower injector temperature
Retention times shift in chromatogram	Unstable carrier gas flow controller/regulator	Check pneumatics for leaks. Replace flow controller/ regulator if necessary.
	Column contamination or degradation	Condition or replace column
	Leaks at septum or column to injector connection	Replace septum regularly and check that the septum nut and the capillary column nut are tight
Cannot reach operating vacuum	Analyzer contaminated by diffusion pump oil	Shut down and clean mass spec
	Major air leak around column fitting into interface	Replace column ferrule and reseat compression fitting
No tuning peaks	Cal gas valve not open	Open cal gas valve
	Calibration gas solenoid valve stuck open. All PFTBA has evaporated.	Have solenoid replaced. Put fresh PFTBA in the cal gas vial.
Analysis sensitivity has decreased	Background has increased	Check column bleed, septum bleed, pump oil, and ion source contamination
	Detector needs replacement	Replace detector
	Defective syringe	Try a new or proven syringe
	"Blown" septum or other massive leaks at the inlet or with carrier gas flow. Poor peak shapes usually result from bad leaks.	Find and fix leaks and adjust gas flow.
	Purge flow or split ratio too high	Adjust gas flow rates

4.0 <u>Other Requirements</u>

4.1 All hardcopy laboratory notebooks must be reviewed by the Supervisor, or their designee, on a monthly basis.

4.2 If not self-explanatory (e.g., a typo or transposed number), corrections to technical and quality records shall also include a justification for the change.

4.3 A storage blank must be stored with all volatile organic samples, regardless of suspected concentration levels.

4.4 A person performing a manual integration must sign and date each manually integrated chromatogram and record the rationale for performing manual integration. Electronic signatures are acceptable.

4.5 The results of calibration and verification of support equipment must be within the specifications required of the application for which this equipment is used or the equipment must be removed from service until repaired. Calibration and verification records, including those of established correction factors, must be maintained. In the absence of method-specific requirements, the minimum requirements are as follows:

Table 2. Support Equipment Checks

Performance Check	Frequency	Acceptance Criteria
Balance calibration check [Using two standard weights that bracket the expected mass]	Daily prior to use	Top-loading balance: ±2% or ±0.02g, whichever is greater Analytical balance: ±0.1% or ±0.5 mg, whichever is greater
Verification of standard mass [Using weights traceable to the International System of Units (SI) through a NMI	Every 5 years	Certificate of Calibration from ISO/IEC 17025 accredited calibration laboratory
Monitoring of refrigerator/freezer temperatures	Daily (i.e. 7 days per week) [use MIN/MAX thermometers or data loggers equipped with notification of out of control event capabilities if personnel not available to record daily]	Refrigerators: 0˚C to 6˚C Freezers: ≤-10˚C
Thermometer verification check [Using a thermometer traceable to the SI through an NMI] [Performed at two temperatures that bracket the target temperature(s). Assume linearity between the two bracketing temperatures.] [If only a single temperature is used, at the temperature of use]	Liquid in glass: Before first use and annually Electronic: Before first use and quarterly	Apply correction factors or replace thermometer
Volumetric labware	Class B: By lot before first use Class A and B: Upon evidence of deterioration	Bias: Mean within ±2% of nominal volume Precision: RSD ≤1% of nominal volume (based on 10 replicate measurements)
Non-volumetric labware [Applicable only when used for measuring initial sample volume and final extract/ digestates volume]	By lot before first use or upon evidence of deterioration	Bias: Mean within ±3% of nominal volume Precision: RSD ≤3% of nominal volume (based on 10 replicate measurements)
Mechanical volumetric pipette	Quarterly	Bias: Mean within ±2% of nominal volume Precision: RSD ≤1% of nominal volume (based on minimum of 3 replicate measurements) [Note: for variable volume pipettes, the nominal volume is the volume of use]

Table 2. Support Equipment Checks

Performance Check	Frequency	Acceptance Criteria
Glass microliter syringe	Upon receipt and upon evidence of deterioration	General Certificate of Bias & Precision upon receipt Replace if deterioration is evident
Drying oven temperature check	Daily prior to and after use	Within ±5% of set temperature
Water purification system	Daily prior to use	See method blank criteria given in Section 4.20 of this addendum

4.6 The expiration date of the prepared standard shall not exceed the expiration date of the primary standard. All containers must bear a preparation date.

4.7 To avoid preparing non-representative samples, the laboratory shall not “target” within a relatively small mass range (e.g., 1.00 ± 0.01g) because such targeting will produce non-representative subsamples if the sample has high heterogeneity. The laboratory shall not manipulate the sample material so the sample aliquot weighs exactly 1.00g ± 0.01g, as an example.

4.8 In the absence of project-specific requirements, the minimum standard data qualifiers to be used are:

U Analyte was not detected and is reported as less than the LOD or as defined by the customer. The LOD has been adjusted for any dilution or concentration of the sample.

J The reported result is an estimated value (e.g., matrix interference was observed or the analyte was detected at a concentration outside the quantitation range).

B Blank contamination. The recorded result is associated with a contaminated blank.

N Non-target analyte. The analyte is a tentatively identified compound using mass spectrometry or any non-customer requested compounds that are tentatively identified.

Q One or more quality control criteria failed (e.g., LCS recovery, surrogate spike recovery, or CCV recovery).

Additional data qualifiers may be used, or different letters or symbols to denote the qualifiers listed above, as long as they are appropriately defined and their use is consistent with project-specific requirements (e.g., QSM 5.0, the contract, and project-planning documents).

4.9 If the time of the sample collection is not provided, assume the most conservative time of day. For the purpose of batch processing, the start and stop dates and times of the batch preparation shall be recorded.

4.10 Each preparation method listed on the scope of accreditation must have quarterly LOD/LOQ verifications. However, not all possible combinations of preparation and cleanup techniques are required to have LOD/LOQ verifications. If LOD/LOQ verifications are not performed on all combinations, the laboratory must base the LOD/LOQ verifications on the worst case basis (preparation method with all applicable cleanup steps).

4.11 After each MDL determination, the laboratory must establish the LOD by spiking a quality system matrix at a concentration of at least 2 times but no greater than four times the MDL. This spike concentration establishes the LOD and the concentration at which the LOD shall be verified. It is specific to each suite of analyte, matrix, and method (including sample preparation). The following requirements apply to the initial LOD establishment and to the LOD verifications:

- The apparent signal to noise (S/N) ratio at the LOD must be at least three and the results must meet all method requirements for analyte identification (e.g., ion abundance, second column confirmation, or pattern recognition). For data systems that do not provide a measure of noise, the signal produced by the verification sample must produce a result that is at least three standard deviations greater than the mean method blank concentration. This is initially estimated based on a minimum of four method blank analyses and later established with a minimum of 20 method blank results.
- If the LOD verification fails, then the laboratory must repeat the MDL determination and LOD verification or perform and pass two consecutive LOD verifications at a higher spike concentration and set the LOD at the higher concentration.
- The laboratory shall maintain documentation for all MDL determinations and LOD verifications.
- The DL and LOD must be reported for all analyte-matrix-methods suites, unless it is not applicable to the test or specifically excluded by project requirements.

4.12 The LOD shall be verified quarterly. In situations where methods are setup and used on an infrequent basis, the laboratory may choose to perform LOD verifications on a one per batch basis. All verification data will be in compliance, reported, and available for review.

4.13 For DoD, at a minimum, the LOQ shall be verified quarterly. In situations where methods are setup and used on an infrequent basis, the laboratory may choose to perform LOQ verifications on a one per batch basis.

4.14 All initial instrument calibrations must be verified with a standard obtained from a second manufacturer prior to analyzing any samples. The use of a standard from a second lot obtained from the same manufacturer (independently prepared from different source materials) is acceptable for use as a second source standard. The concentration of the second source standard shall be at or near the midpoint of the calibration range. The acceptance criteria for the initial calibration verification must be at least as stringent as those for the continuing calibration verification.

4.15 Exclusion of calibration points without documented scientifically valid technical justification is not permitted.

4.16 The concentration of the CCV standard shall be greater than the low calibration standard and less than or equal to the midpoint of the calibration range.

4.17 All CCVs analyzed must be evaluated and reported. If a CCV fails, reanalysis or corrective actions must be taken.

- If a CCV fails, the laboratory can immediately analyze two additional consecutive CCVs (immediately is defined as starting a consecutive pair within one hour; no samples can be run between the failed CCV and the two additional CCVs). This approach allows for spurious failures of analytes to be reported without reanalysis of samples. Any corrective actions that change the dynamics of the system (e.g., clip column, clean injection port, run blanks) requires that all samples since the last acceptable CCV be reanalyzed.

- Both of these CCVs must meet acceptance criteria in order for the samples to be reported without reanalysis.
- If either of these two CCVs fail or if the laboratory cannot immediately analyze two CCVs, the associated samples cannot be reported and must be reanalyzed.
- Corrective action(s) and recalibration must occur if the above scenario fails. All affected samples since the last acceptable CCV must be reanalyzed.
- Flagging of data for a failed CCV is only appropriate when the affected samples cannot be reanalyzed. The laboratory must notify the client prior to reporting data associated with a failed CCV.

4.18 The results of all MS/MSDs must be evaluated using the same acceptance criteria used for the DoD LCS limits (see Addendum Table 3) or project limits, if specified. If the specific analyte(s) are not available in the Addendum Table 3, the laboratory shall use their LCS in-house limits (see the LIMS) as a means of evaluating MS/MSDs. The MS and MSD must be spiked with all reported analytes.

4.19 Surrogate spike results shall be compared with DoD LCS limits (see Addendum Table 3) or acceptance criteria specified by the client. If these criteria are not available, the laboratory shall compare the results with its in-house statistically established LCS criteria (see the LIMS).

4.20 The method blank shall be considered to be contaminated if:

- The concentration of any target analyte (chemical of concern) in the blank exceeds 1/2 the LOQ and is greater than 1/10th the amount measured in any associated sample, or 1/0th the regulatory limit, whichever is greater;
- The concentration of any common laboratory contaminant in the blank exceeds the LOQ;
- If a method blank is contaminated as described above, then the laboratory shall reprocess affected samples in a subsequent preparation batch, except when sample results are below the LOD. If insufficient sample volume remains for reprocessing, the results shall be reported with appropriate data qualifiers.

4.21 Sporadic Marginal Exceedances are not allowed for target analytes (chemicals of concern as identified by a project) without project-specific approval. Target analytes are considered those few analytes that are critical for the success of a project (such as risk drivers) where sporadic marginal exceedances cannot be allowed. Laboratories should consult with clients whenever long lists of analytes are requested for analysis to determine if marginal exceedances will not be allowed.

4.22 DoD considers the same analyte exceeding the LCS control limit two (2) out of three (3) consecutive LCS to be indicative of non-random behavior, which requires corrective action and reanalysis of the LCS.

Table 3. LCS Control Limits – Method TO-15 Gas Matrix

CAS ID	Analyte	N Records	Mean	Standard Deviation	Lower Control Limit	Upper Control Limit
630-20-6	1,1,1,2-Tetrachloroethane	1344	97.9	10.5	67	129
71-55-6	1,1,1-Trichloroethane	5436	96.7	9.5	68	125
79-34-5	1,1,2,2-Tetrachloroethane	5273	95.9	10.4	65	127
79-00-5	1,1,2-Trichloroethane	5332	95.9	7.7	73	119
76-13-1	1,1,2-Trifluoro-1,2,2-trichloroethane [Freon-113]	5351	96.1	10	66	126
75-34-3	1,1-Dichloroethane	5422	97	9.7	68	126
75-35-4	1,1-Dichloroethene	3503	97.3	11.9	61	133
96-18-4	1,2,3-Trichloropropane	465	99.6	8	76	124
120-82-1	1,2,4-Trichlorobenzene	4545	98.5	14.5	55	142
95-63-6	1,2,4-Trimethylbenzene	4699	99.2	11.1	66	132
106-93-4	1,2-Dibromoethane	4655	98.2	7.9	74	122
76-14-2	1,2-Dichloro-1,1,2,2-tetrafluoroethane	4572	92.4	9.7	63	121
95-50-1	1,2-Dichlorobenzene	4739	95.7	11	63	129
107-06-2	1,2-Dichloroethane	5467	96.8	10.5	65	128
78-87-5	1,2-Dichloropropane	4729	95.7	8.9	69	123
108-67-8	1,3,5-Trimethylbenzene	4679	98.3	10.4	67	130
106-99-0	1,3-Butadiene	3167	99.8	11.4	66	134
541-73-1	1,3-Dichlorobenzene	4737	97.1	10.9	65	130
142-28-9	1,3-Dichloropropane	165	105.2	14.4	62	148
542-75-6	1,3-Dichloropropene	560	100.7	8.1	77	125
106-46-7	1,4-Dichlorobenzene	4719	95.8	11.8	60	131
123-91-1	1,4-Dioxane	2656	96.5	8.6	71	122
540-84-1	2,2,4-Trimethylpentane [Isooctane]	3008	94.3	8.8	68	121
78-93-3	2-Butanone [MEK]	4635	98.4	10.4	67	130
95-49-8	2-Chlorotoluene	1092	101.9	9.2	74	130
591-78-6	2-Hexanone	4600	95.4	11	62	128
67-63-0	2-Propanol [Isopropyl alcohol]	3069	88.4	12.3	52	125
622-96-8	4-Ethyltoluene	4673	97.9	10.3	67	129
108-10-1	4-Methyl-2-pentanone [MIBK]	4646	98.5	10.5	67	130
67-64-1	Acetone	4600	92.7	11.6	58	128
75-05-8	Acetonitrile	1999	97.3	11.6	63	132
107-02-8	Acrolein [Propenal]	2469	93.8	10.6	62	126
107-13-1	Acrylonitrile	2105	103.7	10.9	71	137
107-05-1	Allyl chloride	2980	101.1	10.1	71	131
98-83-9	alpha-Methylstyrene	1976	97.3	10.2	67	128
71-43-2	Benzene	5436	93.8	8.4	69	119
100-44-7	Benzyl chloride	4419	98.7	16.2	50	147
75-27-4	Bromodichloromethane	4682	99.9	9.3	72	128
75-25-2	Bromoform	4638	102.3	12.1	66	139
74-83-9	Bromomethane	2657	98.6	11.8	63	134
106-97-8	Butane	587	96.2	10.9	64	129
75-15-0	Carbon disulfide	4756	95.6	12.7	57	134

Table 3. LCS Control Limits – Method TO-15 Gas Matrix

CAS ID	Analyte	N Records	Mean	Standard Deviation	Lower Control Limit	Upper Control Limit
56-23-5	Carbon tetrachloride	4202	99.6	10.7	68	132
108-90-7	Chlorobenzene	4652	94.5	8	70	119
124-48-1	Chlorodibromomethane	4628	99.9	10	70	130
75-45-6	Chlorodifluoromethane	559	102.1	14.3	59	145
75-00-3	Chloroethane	5370	94.7	10.6	63	127
67-66-3	Chloroform	5481	95.3	9.3	68	123
74-87-3	Chloromethane	4540	95.2	12.2	59	132
156-59-2	cis-1,2-Dichloroethene	5320	95.6	8.4	70	121
10061-01-5	cis-1,3-Dichloropropene	4691	98.8	9.7	70	128
110-82-7	Cyclohexane	3178	93.5	7.7	70	117
124-18-5	Decane	1982	93.8	7.9	70	118
75-71-8	Dichlorodifluoromethane [Freon-12]	5307	93.6	11.5	59	128
108-20-3	Diisopropyl ether	2309	93.5	8	70	117
64-17-5	Ethanol	2981	91.8	11.1	59	125
141-78-6	Ethyl acetate	2835	96.4	10.5	65	128
100-41-4	Ethylbenzene	5420	96.8	9	70	124
142-82-5	Heptane	3163	95.7	8.9	69	123
87-68-3	Hexachlorobutadiene	4551	96.7	13.7	56	138
110-54-3	Hexane	3150	91.6	9.5	63	120
98-82-8	Isopropylbenzene	3022	95.6	9.3	68	124
179601-23-1	m/p-Xylene [3/4-Xylene]	5019	97.3	12.3	61	134
80-62-6	Methyl methacrylate	3037	98.9	9.7	70	128
1634-04-4	Methyl tert-butyl ether [MTBE]	4681	95.5	10	66	126
75-09-2	Methylene chloride	5314	88.8	8.9	62	115
71-36-3	n-Butyl alcohol	1981	97.5	11.7	62	133
104-51-8	n-Butylbenzene	2656	97.7	10.6	66	130
112-40-3	n-Dodecane	1932	104.4	14.1	62	147
103-65-1	n-Propylbenzene	2570	95.7	9	69	123
91-20-3	Naphthalene	2439	97.5	13.4	57	138
111-84-2	Nonane	2617	95.4	10.8	63	128
95-47-6	o-Xylene	5334	96.3	9.7	67	125
111-65-9	Octane	2514	95	8.7	69	121
99-87-6	p-Isopropyltoluene [p-Cymene]	2694	98.1	10.5	67	130
109-66-0	Pentane	712	96.7	11.3	63	131
115-07-1	Propene	3193	96.6	13.3	57	136
135-98-8	sec-Butylbenzene	2665	96.4	9.6	68	125
100-42-5	Styrene	4735	100.1	9	73	127
75-65-0	tert-Butyl alcohol	2997	86.8	20.9	24	150
98-06-6	tert-Butylbenzene	2710	94.3	9.8	65	124
127-18-4	Tetrachloroethene	5432	95.2	9.7	66	124
109-99-9	Tetrahydrofuran	3192	93.7	9.8	64	123
108-88-3	Toluene	5406	92.7	8.8	66	119
156-60-5	trans-1,2-Dichloroethene	5411	95.5	9.5	67	124

Table 3. LCS Control Limits – Method TO-15 Gas Matrix

CAS ID	Analyte	N Records	Mean	Standard Deviation	Lower Control Limit	Upper Control Limit
10061-02-6	trans-1,3-Dichloropropene	4621	104	9.6	75	133
79-01-6	Trichloroethene	5478	96.7	8.7	71	123
75-69-4	Trichlorofluoromethane [Freon-11]	5376	93.7	10.6	62	126
1120-21-4	Undecane	1976	96.1	9	69	123
108-05-4	Vinyl acetate	4599	97.4	13.7	56	139
593-60-2	Vinyl bromide	1054	98.4	9.2	71	126
75-01-4	Vinyl chloride	5445	95.1	10.4	64	127

Table 4. Quality Control Requirements – GC/MS Analysis of Air Samples

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Canister Cleanliness Check	Each canister prior to shipment.	No reported analytes detected > ½ LOQ.	Correct problem, then repeat cleaning of canister and recertify.	Flagging is not appropriate.	Applicable only when laboratory supplies sampling canisters to client.
Tune Check	Prior to ICAL and prior to each 24-hour period of sample analysis.	Specific ion abundance criteria of BFB from method.	Retune instrument and verify.	Flagging is not appropriate.	No samples shall be analyzed without a valid tune.
Initial calibration (ICAL) for all analytes	At instrument set-up, prior to sample analysis	Calculated %RSD for the RRF of each analyte in the calibration must be less than 30%; Or Linear least squares regression for each analyte: r2 ≥ 0.99; Or Non-linear least squares regression (quadratic) for each analyte: r2 ≥ 0.99.	Correct problem then repeat ICAL.	Flagging is not appropriate.	Minimum 5 levels for linear and 6 levels for quadratic with one calibration point at the same concentration as the daily CCV. The lowest calibration standard concentration at or below the LOQ. No samples shall be analyzed until ICAL has passed.
Retention Time window position establishment	Once per ICAL and at the beginning of the analytical sequence.	Position shall be set using the midpoint standard of the ICAL curve when ICAL s performed. On days when ICAL is not performed, the initial CCV is used.	NA.	NA.	Calculated for each analyte.

Table 4. Quality Control Requirements – GC/MS Analysis of Air Samples

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Evaluation of Relative Retention Times(RRT)	With each sample.	RRT of each reported analyte within ± 0.06 RRT units of the mean RRT of the calibration standards. RRTs may be updated based on the daily CCV	Correct problem, then rerun ICAL.	NA	RRTs shall be compared with the most recently updated RRTs. After maintenance is performed which may affect retention times, RRTs may be updated based on the daily CCV.
Initial Calibration Verification (ICV)	Once after each ICAL, analysis of a second source standard prior to sample analysis	All reported analytes within ± 30% of true value.	Correct problem. Rerun ICV. If that fails, repeat ICAL.	Flagging is not appropriate.	No samples shall be analyzed until calibration has been verified with a second source.
Continuing Calibration Verification (CCV)	Daily before sample analysis; after every 24 hours of analysis time; and at the end of the analytical batch run.	Concentration the same as the mid-point calibration standard (or lower). All reported analytes and surrogates within ± 30% of true value.	Immediately analyze two additional consecutive CCVs. If both pass, samples may be reported without reanalysis. If either fails or if two consecutive CCVs cannot be run, perform corrective action(s) until a passing CCV is attained, and r then reanalyze all affected samples since the last acceptable CCV. Alternatively, perform an ICAL (including appropriate instrument QC) if necessary; then reanalyze all associated samples since the last acceptable CCV	If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply Q-flag to all results for the specific analyte(s) in all samples since last acceptable calibration verification.	Results may not be reported without a valid CCV. Flagging is only appropriate in cases where the samples cannot be reanalyzed. If the specific version of a method requires additional evaluation (e.g., average RFs) these additional requirements must also be met.

Table 4. Quality Control Requirements – GC/MS Analysis of Air Samples

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Internal standards (IS)	Every field sample, standard and QC sample.	**<u>ICAL Standards</u>** The area response for each internal standard must be within 40% of the mean area response of the calibration standards for each internal standard. The retention time shift for each internal standard at each calibration level must be within 20 seconds of the mean retention time of the calibration standards for each internal standard. **<u>Field Samples, Blanks & QC</u>** RT of each IS must be within +/-0.33 minutes of the most recent initial calibration.	Inspect mass spectrometer and GC for malfunctions and correct problem. Reanalysis of samples analyzed while system was malfunctioning is mandatory.	If corrective action fails in field samples, data must be qualified and explained in the case narrative. Apply Q-flag to analytes associated with the non-compliant IS. Flagging is not appropriate for failed standards.	Must include at a minimum bromochloromethane, Chlorobenzene-d5, and 1, 4-difluorobenzene.

Table 4. Quality Control Requirements – GC/MS Analysis of Air Samples

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Method Blank (MB)	One per analytical batch (after the first CCV), prior to analysis of any field samples.	No analytes detected > ½ LOQ or > 1/10 the amount measured in any sample or 1/10 the regulatory limit, whichever is greater. Common contaminants must not be detected > LOQ.	Conduct investigation to determine the source of the contamination and take appropriate corrective actions. Rerun MB and all associated samples. If required, reprep and reanalyze MB and all QC samples and field samples processed with the contaminated blank.	If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply B-flag to all results for the specific analyte(s) in all samples in the associated preparatory batch. Flagging is only appropriate in cases where the samples cannot be reanalyzed	The MB is a certified clean canister of the same type as the sample that has not left the laboratory. The blank has been pressurized with humidified zero air and carried through the same analytical procedures as a field sample. Results may not be reported without a valid method blank. If a TIC search is required for any samples, then a TIC search is also required for the associated Method Blank.

Table 4. Quality Control Requirements – GC/MS Analysis of Air Samples

QC Check	Minimum Frequency	Acceptance Criteria	Corrective Action	Flagging Criteria	Comments
Laboratory Control Sample (LCS)	One per preparatory batch.	One canister standard is analyzed two times in the analytical run. A laboratory must use the limits in Table 3 for batch control if project limits are not specified. If the analyte(s) are not listed, use in-house LCS limits (see the LIMS) if project limits are not specified. RPD between the LCS and LCS Replicate for each target analyte must be < 30%.	Correct problem, then reprep and reanalyze the LCS and all samples in the associated analytical batch for failed analytes, if sufficient sample material is available	If reanalysis cannot be performed, data must be qualified and explained in the case narrative. Apply Q-flag to specific analyte(s) in all samples in the associated preparatory batch.	Must contain all surrogates and all analytes to be reported. Results may not be reported without a valid LCS. Flagging is only appropriate in cases where the samples cannot be reanalyzed. If the daily CCV is prepared in a canister, then the initial and closing CCVs can serve as the LCS and LCS Replicate as well. Both the CCV and LCS acceptance criteria would apply.

Arcadis U.S., Inc.
50 Milestone Road
East Windsor
New Jersey 08520
Phone: 609 860 0590
www.arcadis.com