

2017 Annual Operations Report

Groundwater Treatment Plant GM-38 Area Groundwater Remediation Naval Weapons Industrial Reserve Plant Bethpage, New York

**Contract No. N40085-16-D-2288
Contract Task Order No. 0005**

January 2018

Prepared for:



Naval Facilities Engineering Command Mid-Atlantic
9324 Virginia Avenue
Norfolk, VA 23511

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1/30/18

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Acronyms and Abbreviations

ARAR	Applicable or Relevant and Appropriate Requirement
AS	air stripper
ASE	air stripper effluent
BFE	bag filter effluent
bgs	below ground surface
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
DAR	Division of Air Resources
DCA	dichloroethane
DCE	dichloroethene
DMR	Discharge Monitoring Report
DO	dissolved oxygen
DoD	Department of Defense
DTW	depth to water
DVR	digital video recorder
ECL	Environmental Conservation Law
EB	equipment rinsate blank
ELAP	Environmental Laboratory Accreditation Program
GOCO	Government Owned Contractor Operated
gpm	gallon per minute
GWTP	groundwater treatment plant
KGS	KOMAN Government Solutions, LLC
HMI	human-machine interface
IRP	Installation Restoration Program
L	liter
lb	pound
LGAC	liquid-phase granular activated carbon
LTM	Long-Term Monitoring
mA	milliamp
MS/MSD	matrix spike/matrix spike duplicate
NAVFAC	Naval Facilities Engineering Command Mid-Atlantic
Navy	U.S. Department of the Navy
NELAC	National Environmental Accreditation Conference
NG	Northrop Grumman

NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
ORP	oxidation reduction potential
OU	operable unit
PCE	tetrachloroethene
PLC	programmable logic controller
QA/QC	quality assurance / quality control
ROD	Record of Decision
RPD	relative percent difference
SC	standard conductivity
scfm	standard cubic feet per minute
SPDES	Storm Pollution Discharge Elimination System
TB	trip blank
TCE	trichloroethene
TE	treated effluent
TIC	tentatively identified compound
TSS	total suspended solids
TtEC	Tetra Tech EC, Inc.
USEPA	U.S. Environmental Protection Agency
VC	vinyl chloride
VGAC	vapor-phase granular activated carbon
VOC	volatile organic compound

1.0 INTRODUCTION

KOMAN Government Solutions, LLC (KGS) has prepared this Annual Operations Report for the GM-38 Area Groundwater Treatment Plant (GWTP) at the Naval Weapons Industrial Reserve Plant (NWIRP) in Bethpage, New York. This report has been prepared for the U.S. Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic, under Contract No. N40085-16-D-2288, Contract Task Order No. 0005. This 2017 Annual Operations Report summarizes activities that occurred during 2017, and also further details activities that occurred during the Fourth Quarter 2017 (October 2017 through December 2017). Data was collected, and operational activities were performed by KGS in accordance with the following documents:

- *Final Operation, Maintenance & Monitoring Plan for Groundwater Treatment Plant GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by Tetra Tech EC, Inc. (TtEC) in 2010, hereafter referred to as the “Operation and Maintenance (O&M) Manual.”
- *Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), UFP-SAP for Operations, Maintenance, and Monitoring of the Groundwater Treatment Plant, GM-38 Area, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by TtEC in 2010.

The following quarterly reports, along with data collected during the Fourth Quarter (October through December), are used as a basis for this 2017 Annual Operations Report:

- *Quarterly Operations Report, First Quarter 2017, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by KGS in August 2017.
- *Quarterly Operations Report, Second Quarter 2017, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by KGS in September 2017.
- *Quarterly Operations Report, Third Quarter 2017, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by KGS in December 2017.

1.1 Background

NWIRP Bethpage is located in east central Nassau County, Long Island, New York, approximately 30 miles east of New York City (**Figure 1**) and is currently listed by New York State Department of Environmental Conservation (NYSDEC) as an “inactive hazardous waste site” (#1-30-003B). In the late 1990s, the Navy's property totaled approximately 109.5 acres and was a Government Owned Contractor-Operated (GOCO) facility that was operated by Northrop Grumman (NG) until September 1998. NWIRP Bethpage was bordered on the north, west, and south by property owned, or formerly owned, by NG that covered approximately 550 acres, and on the east by a residential neighborhood.

The GM-38 Area refers to a cluster of monitoring wells installed in the 1990s by NG. The GM-38 Area is approximately 8,500 feet south, southeast and hydraulically downgradient of NWIRP Bethpage. The GWTP is located within a utility easement with a street address of 100 Broadway, Bethpage, NY.

The “hot spot” cleanup remedy for the GM-38 Area groundwater was originally set forth in Record of Decision (ROD) documents for Operable Unit 2 (OU 2) Groundwater for the NG and NWIRP Sites (New York State Registry Site Numbers 1-30-003A & 1-30-003B, respectively) issued by NYSDEC Division of Environmental Remediation in March 2001 and for the NWIRP Bethpage Site by NAVFAC in April 2003 (Revision 1). The selected remedy was chosen in accordance with the New York State Environmental Conservation Law (ECL) and the Navy’s Installation Restoration Program (IRP). It is also consistent with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), as amended, 42 U.S.C. §§ 9601-9675.

1.2 GWTP Overview

Currently, groundwater is extracted from recovery well RW-1 (RW-3 was taken off-line in July of 2015, as described below) and treated in the GWTP. The treatment process consists of flow equalization, air stripping and vapor-phase carbon treatment, bag filtration, and liquid-phase carbon treatment. Though the GWTP was originally equipped with a pH adjustment system utilizing sodium hydroxide, it has since been determined that pH adjustment is not necessary, and the equipment has been taken off-line and sodium hydroxide sent off site for beneficial reuse. A process flow diagram is presented as **Figure 2**. The treated water is either re-injected into injection well IW-1 or discharged into the Nassau County Recharge Basin #495. Under CERCLA, the Navy is required to meet the effluent requirement in the NYSDEC’s Storm Pollution Discharge Elimination System (SPDES) Equivalent Application as an Applicable or Relevant and Appropriate Requirement (ARAR).

The GWTP was designed to operate at an average flow rate of 1,100 gallons per minute (gpm) (800 gpm from RW-1 and 300 gpm from RW-3), as measured by the average discharge flow rate. It was determined that this flow rate would be necessary to effectively contain the higher concentration of contamination in the GM-38 Area groundwater. Volatile Organic Compounds (VOCs) in the influent groundwater consist of trichloroethene (TCE), tetrachloroethene (PCE), vinyl chloride (VC), cis-1,2-dichloroethene (cis-1,2-DCE), 1,2-dichloroethane (1,2-DCA), benzene, toluene, and total xylenes.

The air stripper (AS) is a structural aluminum tower that is packed with 3.5-inch diameter polypropylene Jaeger Tripack. Groundwater is pumped to the air stripper distribution port and sprayed over the column of Jaeger Tripack at a flow rate of approximately 1,100 gpm. Previously, 100 gpm of recirculated water was also rerouted through the AS, but as of October 2010, recirculation was no longer deemed necessary to the operation of the system. An induced draft countercurrent flow of air enters the air stripper below the base of the packing material at a rate of 8,000 standard cubic feet per minute (scfm). The large surface area of the packing material allows for a mass transfer of the VOCs from the groundwater into the air stream. The VOCs in the off-gas, except for VC, are removed via two 20,000-pound(lb) vapor phase granular activated carbon (VGAC) units (VGAC-1 and VGAC-2). VC is oxidized by a 20,000- lb vessel containing zeolite impregnated with potassium permanganate (VGAC-3) into potassium chloride and carbon dioxide. The

potassium chloride remains in the pore structure of the zeolite substrate. The treated off-gas is discharged from the stack.

Water treated by the air stripper is subsequently processed through three 8,000-lb liquid phase granular activated carbon (LGAC) units in parallel prior to discharge in the recovery basin or injection well, if necessary. To date, no water has been discharged to the injection well for a sustained duration.

The GWTP is controlled by a programmable logic controller (PLC)-based digital and analog control system, with instrumentation that monitors pH, pressure, tank level, flow and differential pressure transmitters, water level in recovery wells, and motor operational status. The information in the PLC is made available to an operator via a human-machine interface (HMI) program. By using this program, the status of the GWTP can be displayed in real time and adjusted, if necessary, by the operator.

A 2014 evaluation of the GM-38 Area, conducted in order to better determine the capture zone of the recovery wells, recommended that use of recovery well RW-3 be discontinued (“*Capture Zone Evaluation and Path Forward, GM-38 Area Groundwater Treatment Plant*” [Tetra Tech 2014]). The report was sent to NYSDEC in March 2014 and recommended ceasing operation of recovery well RW-3 and increasing the pumping rate of recovery well RW-1. These system modifications would maintain the existing GWTP pumping rate of 1,000 to 1,100 gpm while maintaining the desired capture zone of the GWTP (Tetra Tech 2014). NYSDEC concurred with the implementation of this path forward and associated system modifications on 20 April 2015. On 1 July 2015, in accordance with the approved path forward, recovery well RW-3 was taken off-line. The flowrate of recovery well RW-1 was increased from approximately 800 gpm to approximately 1,000 gpm.

2.0 GWTP OPERATIONS AND MAINTENANCE

While designed to run completely automated, the GWTP requires regular visits by an operator to record and adjust operational parameters and to perform scheduled maintenance. The GWTP is equipped with telemetry that will alert an on-call operator in the event of a plant shutdown.

2.1 Routine Maintenance Activities

Routine maintenance activities at the GWTP were performed during the operator's visits. These activities include general site inspections, collection of operational data (water and vapor flowrates, differential pressures across the AS, carbon units, bag filter units and blower discharge pressures, tank levels and totalizer readings), measurement of water levels in the recovery wells, adjustment of pump signal settings, collection of vapor and process water samples, changing out of bag filters, switching of lead/lag pump assignments, and preventive maintenance of system equipment.

In addition, the following maintenance tasks were performed at the GWTP during 2017:

- On 26 January, 6 March, 5 May, 19 May, 8 June, 27 June, 13 July, 11 September, 7 October and 26 November bag filters were changed out.
- On 4 and 26 January, the system was shut down to backwash the three LGAC units.
- On 24 February, the annual backflow preventer inspection was performed. Results were submitted to Bethpage Water District and New York State Department of Health (NYSDOH), as required.
- On 19 April, Air stripper pumps and LGAC feed pumps were rotated.
- On 1 August, the motors for the air stripper pumps and LGAC feed pumps were rotated.
- On 25 October, the motors for the air stripper pumps and LGAC feed pumps were greased and rotated.

2.2 Non-routine Maintenance / Site Activities

The following non-routine activities at the GWTP were performed during 2017:

- On 2 February, the overhead lights were replaced near the bag filter platform and the southeast corner of the plant.
- On 8 February, Wire-to-Water was onsite to troubleshoot low air pressure condition since the pressure sensor was recording inaccurate readings. The pressure sensor was cleaned and reassembled.

- On 20 February, NG requested a tour of the facility to address concerns raised by the Town and the residents regarding NG's proposed treatment plant. Approximately six residents, four NG representatives, and two Navy representatives were present.
- On 28 February, F&M Mechanical was onsite to troubleshoot a reduction in the influent flowrate. A 12-inch diameter valve was leaking at the flange seals resulting in a reduced flowrate. All bolts were retightened, and a new gasket was installed.
- On 28 March, the wye strainers were disassembled and cleaned to improve the plant influent flowrates. The system was turned off to conduct the maintenance work and allow for the liquid gasket on the flange to cure overnight. After system restart, influent flowrate was significantly improved.
- On 2 June, recovery well RW-3 was operated for 1 hour to maintain the integrity of the well for potential future use.
- On 29 June, all fire extinguishers at GM-38 were replaced.
- On 12 July, the system went off-line, for approximately 1.5 hours, due to power outage caused by a thunderstorm. A blown fuse was replaced in the Verbatim electronic communication system.
- On 6 August, the system went off-line due to an apparent lightning strike which also damaged the level transducer at well RW1 resulting in inaccurate water level measurements. The GWTP remained off-line for 9 hours until it was restarted in the morning on 7 August. Well RW1 was placed in "manual" mode at a reduced flow rate of 800 gpm until a replacement level transducer could be fabricated and installed on 17 August.
- On 30 August, Wire-to-Water was on site to troubleshoot a discrepancy in the measurements reported by the plant instrumentation and those shown on the HMI output screen. Wire-to-Water diagnosed the problem as a defective analog input card on the PLC and three damaged intrinsic safety barriers in the control panel. The GWTP continued to operate until the replacement parts were installed.
- On 12-13 September, the Fall Semi-Annual Long-Term Monitoring sampling event was conducted at eight monitoring wells and one recovery well (RW3).
- On 19 September, Wire-to-Water was on site to install the replacement PLC analog input card and the three intrinsic safety barriers. The system was off-line for approximately 5 hours.
- On 22 September, recovery well RW-3 operated for 3 hours to maintain the integrity of the well.
- On 5 October, Wire-to-Water was on site to evaluate a faulty system alarm call out. The electrician recalibrated the probe signal to the PLC to resolve the issue.

- On 25 October, carbon in the two 20,000-lb VGAC vessels was changed out. The GWTP was down for approximately 11.5 hours. In addition, the air stripper intake filter elements were replaced which increased air stripper removal efficiency.
- On 1 November, F&M Mechanical was on site to replace the defective digital video recorder (DVR) used for recording the camera feed.
- On 8 November, a new level probe was installed at injection well IW1. This was performed in preparation for the planned scarification of the Nassau County Recharge Basin #495 during which the Navy will temporary divert the effluent from the GWTP to the injection well (IW-1).
- On 29 November, F&M Mechanical was on site to clean the roof gutters.

3.0 GWTP MONITORING

The intent of the GWTP is to remove contaminant mass and reduce elevated VOC levels to levels similar to those in the surrounding aquifer. It is anticipated that GWTP operation will minimize contaminant impacts on water supply wells and currently unaffected portions of the groundwater aquifer. The GWTP is not intended to remediate groundwater contamination in the local aquifer to non-detectable levels (TtEC 2010). Various process samples (water and vapor) are collected on a monthly basis to monitor GWTP efficiency and to ensure compliance with Federal and State effluent discharge and air emission requirements. In addition, groundwater samples are collected semi-annually to monitor water quality and determine the effectiveness of the remediation activities and monitor the hydraulic containment and capture of impacted groundwater by the recovery wells.

3.1 Process Water Quality Monitoring

Processed groundwater is analyzed to comply with calculations submitted by the Navy and documented in the NYSDEC Water Division SPDES Equivalent Application for the effluent limitations and monitoring requirements. These results are also submitted to NYSDEC on a monthly basis in the form of a Discharge Monitoring Report (DMR). The current effluent discharge limitations and monitoring requirements, effective 1 September 2017, were included in a Memorandum from NYSDEC dated 18 August 2017. Discharge limits were established for two additional VOCs: chloroform and trichlorotrifluoroethane (Freon[®] 113). NYSDEC is also requesting that the Navy monitor and report for 1,4-dioxane. All three were added to the current permit equivalent. A copy of the previous effluent limitation and monitoring constituents and the reporting forms; including the current requirements contained in the 18 August 2017 Memorandum, are included in **Appendix A**.

3.1.1 Fourth Quarter 2017 Summary

Monthly aqueous samples are collected from the active recovery well, RW-1, and the treated effluent (TE) discharge line. In addition, various intermediary process system samples are collected monthly, consisting of air stripper effluent (ASE), bag filter effluent (BFE), and effluent of each of the three LGAC units (LC1, LC2, and LC3). Sampling frequency of now inactive recovery well, RW-3, was reduced from monthly to semi-annually. The analytical results of monthly process water samples collected during the Fourth Quarter are presented in **Table 1**. The data demonstrates that all permitted constituents were in compliance with regulatory requirements during the Fourth Quarter. **Table 1** also summarizes the average monthly flowrates in gallons per minute along with the total volume of water processed during each month of the Fourth Quarter.

Monthly DMRs for the Fourth Quarter (October - December 2017) are included in **Appendix A**. DMRs for January – September 2017 are included in previously submitted quarterly operations reports as indicated in Section 1.0.

3.1.2 2017 Annual Summary

Flow Totals

Annual flow volumes and system operation for 2017 are summarized in **Table 2**. The total volume of groundwater treated in 2017 based on effluent flow totals was 518,610,066 gallons. The GWTP operated with an average uptime of 98.9% at an average effluent flowrate of 1,000 gpm.

Mass Removal

Mass removal was calculated based on monthly influent concentrations combined with monthly influent flow totals. During 2017, approximately 592.7 pounds (lbs) of VOCs were removed by the GWTP, for an average monthly mass removal rate of approximately 49.4 lbs per month. Mass removal calculations are presented in **Table 3**.

3.2 Air Quality Monitoring

Treated off-gas discharged at the stack of the GWTP is subject to emissions limitations. Original discharge goals were derived from calculations submitted by the Navy and documented in the NYSDEC Division of Air Resources (DAR) Equivalent Application in July 2009. In November 2011, the Navy submitted an evaluation proposing revised discharge goals, which NYSDEC concurred with in October 2013. A copy of this documentation is included as **Appendix B**.

3.2.1 Fourth Quarter 2017 Summary

While only sampling of the stack emissions is required for NYSDEC compliance, process vapor samples are also collected using 6-L summa canisters at various locations to monitor for breakthrough of the VGAC units. The analytical results of monthly influent and effluent vapor samples as well as midfluent samples (VC12 and VC13) collected during the Fourth Quarter are presented in **Table 4**. Air emissions calculations using the stack vapor concentrations along with discharge flowrates are presented in **Table 5**. The calculations demonstrate that all constituents were within the regulatory requirements during the Fourth Quarter based on the calculated emission rates.

3.2.2 2017 Annual Summary

Table 6 summarizes annual air emissions based on monthly emissions during the 12-month period. During 2017, total annual air emissions of permitted constituents consisted of 1.6 lbs of TCE, 0.54 lbs of vinyl chloride, 34.4 lbs of 1,2-DCE, and 0.6 lbs of PCE, well below the discharge goals approved by NYSDEC in October 2013.

3.3 Groundwater Quality Monitoring

The groundwater monitoring well system at the GM-38 Groundwater Remediation Area consists of fourteen monitoring wells, three recovery wells (RW-1, RW-2, RW-3) and one injection well (IW-1). Though RW-2 was installed in 2005, a pump was never installed in this well and the well is not operated as a recovery well due to concerns expressed by the Bethpage Water District. As mentioned above, RW-3 was taken off-line on 1 July 2015. Well locations are depicted on **Figure 3**.

Depths to water (DTW) measurements are collected from twelve of the monitoring wells on a quarterly basis. Prior to 2014, water quality samples were collected from eight of the monitoring wells on a

quarterly basis; beginning in 2014, the sample collection frequency was reduced to semi-annually, with sample collection generally in the March and September time-frame. The monitoring network includes well clusters located near the recovery and injection wells as described below and as shown on **Figure 3**. In addition, two wells, GM-38D and GM-38D2, located at the corner of Arthur Avenue and Broadway, are monitored by others.

Semi-annual groundwater samples are collected from eight monitoring wells (RW1-MW1, RW1-MW3, RW2-MW1, RW3-MW1, RW3-MW2, RW3-MW3, RW3-MW4, and TP-01) and one recovery well (RW-3). Samples are collected from monitoring wells using bladder pumps in accordance with the U.S. Environmental Protection Agency (USEPA) low-flow sampling methodologies. Samples are collected from recovery well RW-3 using the dedicated extraction pump following a 3-well volume purge. No groundwater samples were collected from the monitoring wells or RW-3 during the Fourth Quarter.

Descriptions of monitoring well locations are as follows:

Recovery Well 1 (RW-1) Monitoring Wells

The RW-1 cluster consists of three monitoring wells screened between 395 and 435 feet below ground surface (bgs). RW1-MW1 is located approximately 140 feet northwest of RW-1 and RW1-MW2 is located approximately 50 feet north of RW-1. RW1-MW3 is located approximately 400 feet northeast of RW-1, on the eastern side of Seaford Oyster Bay Expressway. All three wells are hydraulically monitored while only RW1-MW1 and RW1-MW3 are also monitored for water quality.

Recovery Well 2 (RW-2) Monitoring Wells

The RW-2 cluster consists of three monitoring wells screened between 470 and 510 feet bgs. RW2-MW1 is located approximately 60 feet northwest of RW-2, RW2-MW2 is located approximately 20 feet west of RW-2, and RW2-MW3 is located approximately 100 feet west of RW-2. All three wells are hydraulically monitored while only RW2-MW1 is monitored for water quality.

Recovery Well 3 (RW-3) Monitoring Wells

The RW-3 cluster consists of four monitoring wells. RW3-MW2 and RW3-MW4 are screened between 475 and 495 feet bgs. RW3-MW1 and RW3-MW3 are screened between 330 and 350 feet bgs and 320 and 340 feet bgs, respectively. RW3-MW1 and RW3-MW2 are located approximately 500 feet west of the GM-38 cluster, at the intersection of Arthur Avenue and Leroy Avenue. RW3-MW3 and RW3-MW4 are located approximately 400 feet north of the intersection of Arthur Avenue and Broadway. All four wells are both hydraulically monitored and monitored for water quality.

TP-01

TP-01 is screened between 450 and 470 feet bgs and is located approximately 25 feet north of the GWTP building, inside the fenced area. It is hydraulically monitored to observe the change in water levels due to the influence from the pumping rates at the neighboring public water supply well field near the hot spot area and is also monitored for water quality.

Injection Well 1 (IW-1) Monitoring Well

There is one monitoring well associated with injection well IW-1. IW1-MW1 is screened between 20 and 150 feet bgs, is located approximately 20 feet south of IW-1, and is only hydraulically monitored on a quarterly basis.

3.3.1 Groundwater Quality Results

As mentioned above, no groundwater samples were collected from the monitoring wells or RW-3 during the Fourth Quarter 2017. Samples are collected monthly from recovery wells RW-1, results of which are summarized in **Table 1**.

Quarterly groundwater level monitoring of the twelve monitoring wells was performed on 19 December. Results are summarized in **Table 7**. A copy of the field log is included in **Appendix C**.

3.3.2 Groundwater Concentration Trends

Historical groundwater analytical results through the Fourth Quarter are presented in **Table 8**. As mentioned previously, no monitoring wells were sampled in the Fourth Quarter, as sampling occurs on a semi-annual basis. Groundwater analytical results of select VOCs (cis-1,2-DCE, PCE, TCE, and VC) for the 2017 monitoring events are presented graphically as **Figure 4**.

Additionally, concentration trends of select VOCs (cis-1,2-DCE, TCE, and PCE, as well as VC for RW-1) over time for each recovery well (RW-1 sampled monthly and RW-3 previously sampled monthly, now sampled semi-annually) and the eight monitoring wells sampled during the 2017 semi-annual monitoring events are presented in **Figures 5 through 14** and discussed below.

Figure 5 presents concentrations detected at recovery well RW-1. Concentrations of TCE have decreased from initial concentrations in early 2010 (maximum value of 747 µg/L detected in April 2010), remaining below 300 µg/L since the latter half of 2012 and decreasing to a low of 95 µg/L during the September 2017 sampling event. Concentrations of cis-1,2-DCE have followed a similar trend, decreasing from a high of 160 µg/L in February 2010 to a low of 6.5 µg/L in August 2017. PCE concentrations have also exhibited decreasing trends over time, with concentrations decreasing from 180 µg/L in April 2010 to a low of 21 µg/L during the September 2017 sampling event. Concentrations of VC have decreased below initial concentrations in 2010. After reaching a maximum concentration of 61 µg/L in February 2010, VC concentrations have remained below 5.0 µg/L since the final quarter of 2011 and below 1.0 µg/L since June 2013.

Figure 6 presents concentrations detected at recovery well RW-3, including the most recent data collected in the Third Quarter 2017. Concentrations of TCE have decreased from initial concentrations in February 2010 (660 µg/L), remaining below 300 µg/L from the latter half of 2012 through the Third Quarter 2015, with a low of 160 µg/L detected in December 2013. In March 2016, the TCE concentration increased to 371 µg/L; however, in June 2016, the TCE concentrations decreased to 210 µg/L. TCE concentrations have since remained stable as indicated by the September 2017 result (220 µg/L). Concentrations of cis-1,2-DCE have remained consistently below 3.0 µg/L since September 2013. PCE has been detected at low levels during only a few sampling events, with concentrations consistently below 1.0 µg/L since September 2009. Vinyl chloride has not been detected during any sampling event.

Figure 7 presents concentrations detected at RW1-MW1, including the most recent data collected in the Third Quarter 2017. The concentration of TCE in the Third Quarter 2017 (110 µg/L) was higher than initial concentrations observed in May 2005 (53.6 µg/L) but less than the highest concentration observed to date (175 µg/L in September 2013). The concentration of cis-1,2-DCE in the Third Quarter 2017 (9.8 µg/L) was below the initial concentration observed in May 2005 (78.6 µg/L), below the maximum concentration observed in May 2009 (180 µg/L), and was the lowest concentration observed to date at this location. PCE has remained below 1.0 µg/L since initial concentrations observed in May 2005.

Figure 8 presents concentrations detected at RW1-MW3, including the most recent data collected in the Third Quarter 2017. Cis-1,2-DCE and PCE have consistently remained below 1.0 µg/L. Concentrations of TCE in the Third Quarter 2017 (2.8 µg/L) have also remained low, and ranged from 0.58 µg/L in July 2010 to a maximum of 4.5 µg/L in March 2016.

Figure 9 presents concentrations detected at RW2-MW1, including the most recent data collected in the Third Quarter 2017. The concentration of TCE in the Third Quarter 2017 (8.6 µg/L) was less than the initial concentration observed in May 2005 (37.6 µg/L) and below the maximum concentration observed in March 2016 (43.9 µg/L). The concentration of cis-1,2-DCE observed in the Third Quarter 2017 (2.6 µg/L) was above the initial concentration observed in May 2005 (non-detect), but below the maximum observed to date (15.3 µg/L in March 2016). PCE has not been detected during any sampling event.

Figure 10 presents concentrations detected at RW3-MW1, including the most recent data collected in the Third Quarter 2017. The concentration of TCE in the Third Quarter 2017 (22 µg/L) represents the lowest concentration observed to date at this location. Concentrations of cis-1,2-DCE have remained consistently below 1.0 µg/L and have not been detected since March 2015. Concentrations of PCE have remained consistently near or below 2.0 µg/L, with a concentration of 1.6 µg/L in the Third Quarter 2017.

Figure 11 presents concentrations detected at RW3-MW2, including the most recent data collected in the Third Quarter 2017. The TCE concentration observed in the Third Quarter 2017 (140 µg/L) was below initial concentrations observed in January 2010 (160 µg/L) and below the maximum concentration observed in April 2010 (211 µg/L). Concentrations of cis-1,2-DCE in the Third Quarter 2017 (1.3 µg/L) have consistently remained below 2.0 µg/L. PCE has only been detected during a few sampling events, including in the Third Quarter 2017 (0.43 µg/L), with concentrations ranging from 0.28 µg/L in August 2012 to 0.66 µg/L in March 2016.

Figure 12 presents concentrations detected at RW3-MW3, including the most recent data collected in the Third Quarter 2017. The TCE concentration observed in the Third Quarter 2017 (100 µg/L) represents the lowest concentration observed to date at this location. Concentrations of cis-1,2-DCE have remained near or below 2.0 µg/L and PCE has remained below 1.0 µg/L since concentrations were first observed in May 2005.

Figure 13 presents concentrations detected at RW3-MW4, including the most recent data collected in the Third Quarter 2017. TCE concentrations have decreased since the initial sampling event in January 2010 (21 µg/L), with a concentration of 5.4 µg/L observed in the Third Quarter 2017. PCE has only been

detected during two sampling events: in September 2015 at a concentration of 0.31 J $\mu\text{g/L}$ and March 2016 at a concentration of 0.46 J $\mu\text{g/L}$. Cis-1,2-DCE was detected during the initial sampling event in January 2010 (0.46 $\mu\text{g/L}$) and during the most recent Third Quarter 2017 event (0.21 $\mu\text{g/L}$).

Figure 14 presents concentrations detected at TP-01, including the most recent data collected in the Third Quarter 2017. The TCE concentration observed in the Third Quarter 2017 (54 $\mu\text{g/L}$) was less than initial concentrations observed in January 2010 (65 $\mu\text{g/L}$) and below the maximum concentration observed in March 2016 (62 $\mu\text{g/L}$). Concentrations of cis-1,2-DCE have generally decreased over time, from an initial value of 190 $\mu\text{g/L}$ to 11 $\mu\text{g/L}$ in the Third Quarter 2017. PCE concentrations have ranged from 6.0 $\mu\text{g/L}$ in June 2012 to non-detectable levels in the Third Quarter 2017.

4.0 CONCLUSIONS AND RECOMMENDATIONS

The intent of the groundwater treatment system at GM-38 is to remove mass and reduce elevated VOC concentrations to levels similar to those in the surrounding aquifer, and in doing so minimize the impacts on downgradient water supply wells and currently unaffected portions of the aquifer. Based on the removal of VOCs by the GWTP and decreasing contaminant concentration trends observed in the recovery wells and several of the monitoring wells, progress toward these goals is apparent. Based on the concentrations in the groundwater wells, the GWTP should continue to be operated. The groundwater sampling frequency for the eight monitoring wells has been reduced to semi-annually in accordance with the O&M Manual. Water levels for the 14 monitoring wells will continue to be monitored on a quarterly basis.

5.0 REFERENCES

KGS. Quarterly Operations Report, First Quarter 2017, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York. August.

KGS. Quarterly Operations Report, Second Quarter 2017, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York. September.

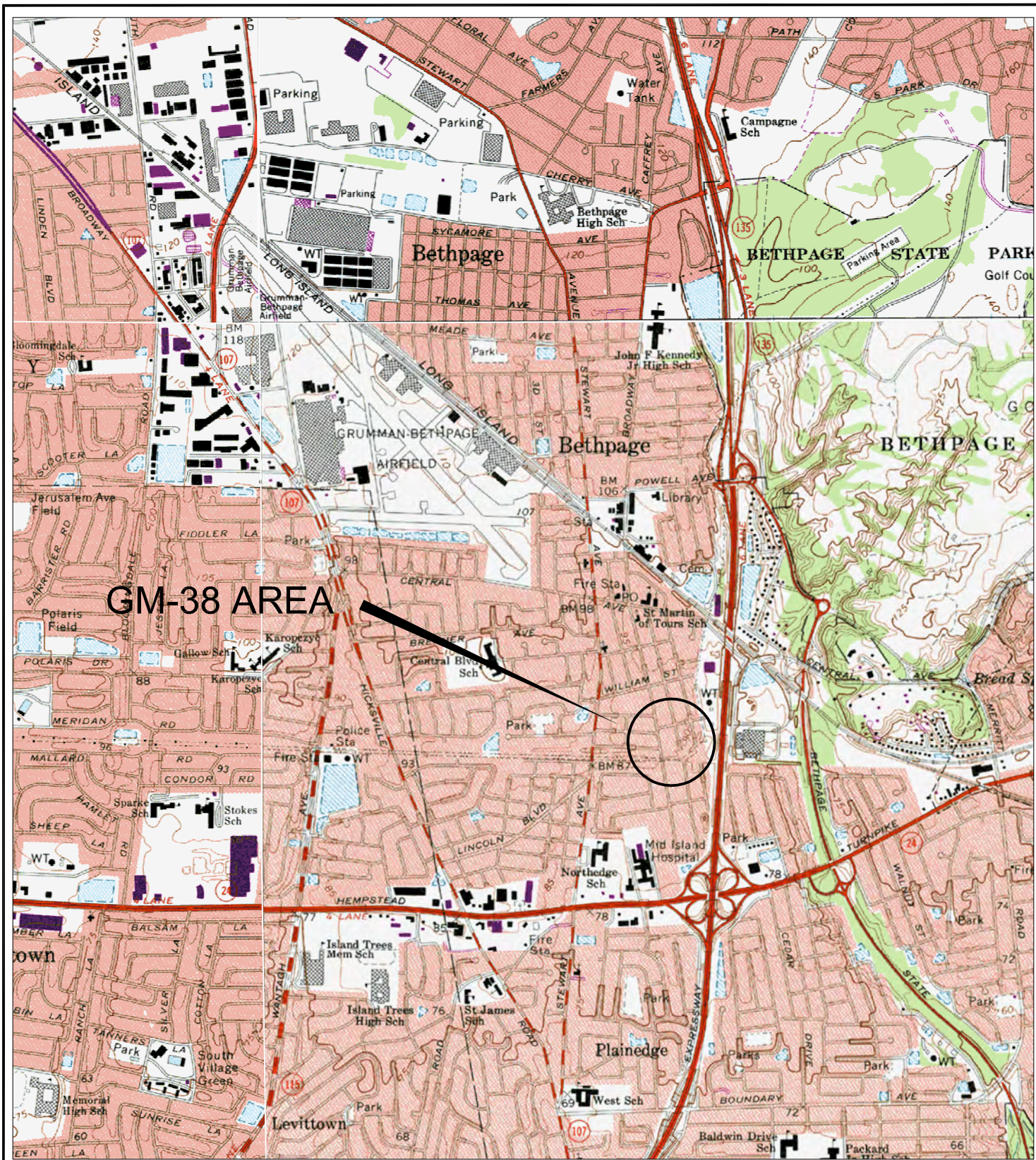
KGS. Quarterly Operations Report, Third Quarter 2017, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York. December.

Tetra Tech, Inc. (Tetra Tech). 2014. Capture Zone Evaluation and Path Forward, GM-38 Area Groundwater Treatment Plant, Naval Weapons Industrial Reserve Plant, Bethpage, New York. March.

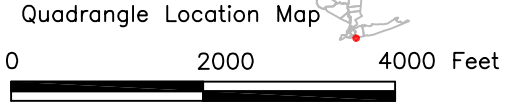
Tetra Tech EC, Inc. (TtEC). 2010. *Final Operation, Maintenance & Monitoring Plan for Groundwater Treatment Plant GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York.* April.

Tetra Tech EC, Inc. (TtEC). 2010a. *Final Sampling and Analysis Plan (Field Sampling Plan and Quality Assurance Project Plan), UFP-SAP for Operations, Maintenance, and Monitoring of the Groundwater Treatment Plant, GM-38 Area, Naval Weapons Industrial Reserve Plant, Bethpage, New York.* September.

FIGURES



GM-38 AREA

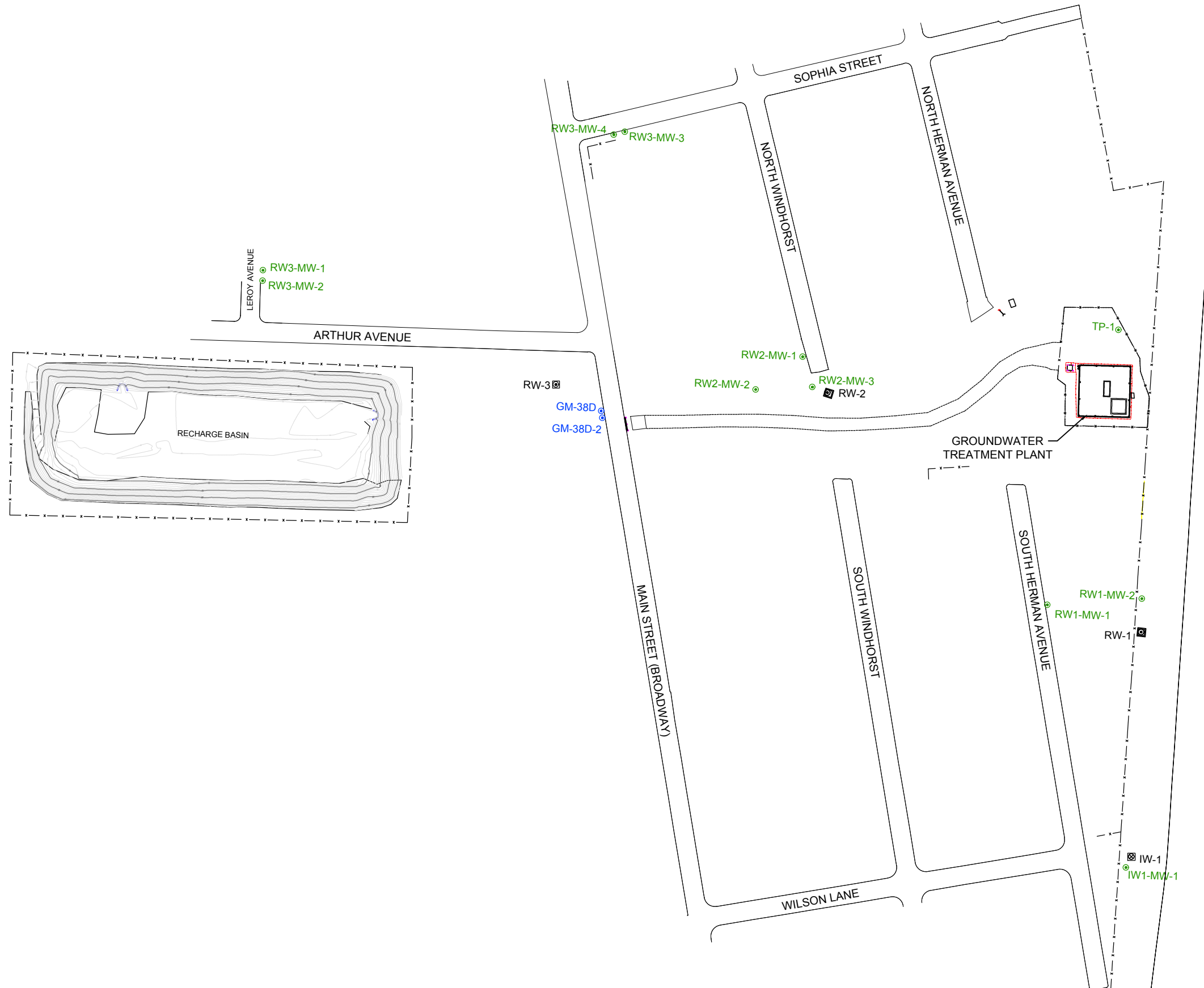


U.S. Navy RAC Engineering Field Activity, Northeast GM-38 Area (Offsite) NWIRP Bethpage Bethpage, NY
Figure 1 Site Location Map

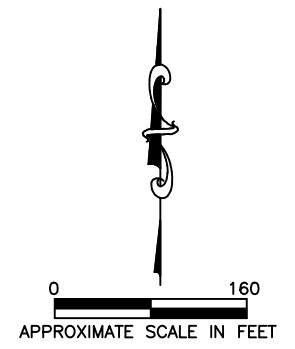
Source: U.S.G.S. Topographic Maps (7.5 Minute)
Amityville, Freeport, Hicksville, Huntington, NY Quadrangles

Legend

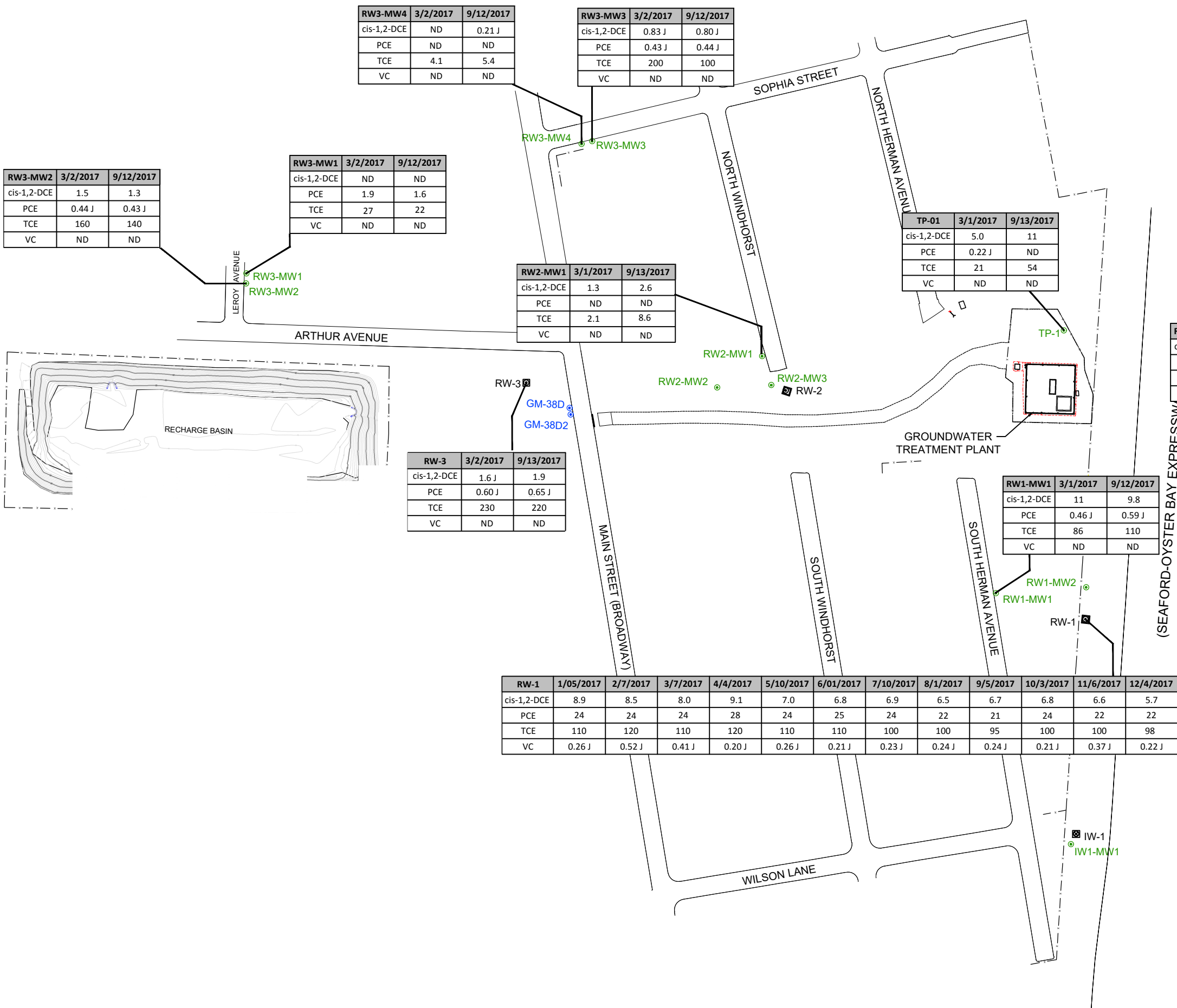
- Monitoring Well (Monitored by Navy)
- Monitoring Well (Monitored by Northrop Grumman)
- ⊠ Recovery Well
- ⊠ Injection Well



(SEAFORD-OYSTER BAY EXPRESSWAY - RTE 135)



SITE MAP			
NWIRP BETHPAGE GM-38 AREA BETHPAGE, NEW YORK			
KOMAN Government Solutions, LLC 180 Gordon Drive, Suite 110, Exton, PA 19341			
SCALE	DATE	FIGURE	
SEE BARSCALE	01/15/2018	3	



RW3-MW4	3/2/2017	9/12/2017
cis-1,2-DCE	ND	0.21 J
PCE	ND	ND
TCE	4.1	5.4
VC	ND	ND

RW3-MW3	3/2/2017	9/12/2017
cis-1,2-DCE	0.83 J	0.80 J
PCE	0.43 J	0.44 J
TCE	200	100
VC	ND	ND

RW3-MW2	3/2/2017	9/12/2017
cis-1,2-DCE	1.5	1.3
PCE	0.44 J	0.43 J
TCE	160	140
VC	ND	ND

RW3-MW1	3/2/2017	9/12/2017
cis-1,2-DCE	ND	ND
PCE	1.9	1.6
TCE	27	22
VC	ND	ND

RW2-MW1	3/1/2017	9/13/2017
cis-1,2-DCE	1.3	2.6
PCE	ND	ND
TCE	2.1	8.6
VC	ND	ND

TP-01	3/1/2017	9/13/2017
cis-1,2-DCE	5.0	11
PCE	0.22 J	ND
TCE	21	54
VC	ND	ND

RW1-MW3	3/1/2017	9/13/2017
cis-1,2-DCE	0.29 J	0.37 J
PCE	ND	0.22 J
TCE	2.1	2.8
VC	ND	ND

RW-3	3/2/2017	9/13/2017
cis-1,2-DCE	1.6 J	1.9
PCE	0.60 J	0.65 J
TCE	230	220
VC	ND	ND

RW1-MW1	3/1/2017	9/12/2017
cis-1,2-DCE	11	9.8
PCE	0.46 J	0.59 J
TCE	86	110
VC	ND	ND

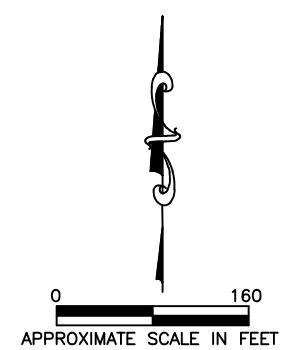
RW-1	1/05/2017	2/7/2017	3/7/2017	4/4/2017	5/10/2017	6/01/2017	7/10/2017	8/1/2017	9/5/2017	10/3/2017	11/6/2017	12/4/2017
cis-1,2-DCE	8.9	8.5	8.0	9.1	7.0	6.8	6.9	6.5	6.7	6.8	6.6	5.7
PCE	24	24	24	28	24	25	24	22	21	24	22	22
TCE	110	120	110	120	110	110	100	100	95	100	100	98
VC	0.26 J	0.52 J	0.41 J	0.20 J	0.26 J	0.21 J	0.23 J	0.24 J	0.24 J	0.21 J	0.37 J	0.22 J

Legend

- Monitoring Well (Monitored by Navy)
- Monitoring Well (Monitored by Northrop Grumman)
- ⊠ Recovery Well
- ⊞ Injection Well
- J Estimated value
- ND Not Detected above laboratory method detection limit
- NS Not Sampled
- DCE Dichloroethene
- PCE Tetrachloroethane
- TCE Trichloroethane
- VC Vinyl Chloride

Notes:
All concentrations reported in µg/L.

Monitoring wells were sampled on a semi-annual basis. Recovery well RW-1 was sampled on a monthly basis. Recovery well RW-3, previously an active extraction well sampled on a monthly basis, was taken off-line on 7/1/15. RW-3 is now sampled semi-annually, in conjunction with the semi-annual LTM events.



**2017 GROUNDWATER ANALYTICAL MAP
SELECT VOC CONCENTRATIONS**

**NWIRP BETHPAGE GM-38 AREA
BETHPAGE, NEW YORK**

KOMAN Government Solutions, LLC
180 Gordon Drive, Suite 110, Exton, PA 19341

SCALE	DATE	FIGURE	
SEE BARSCALE	1/25/2018	4	

Figure 5
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW1

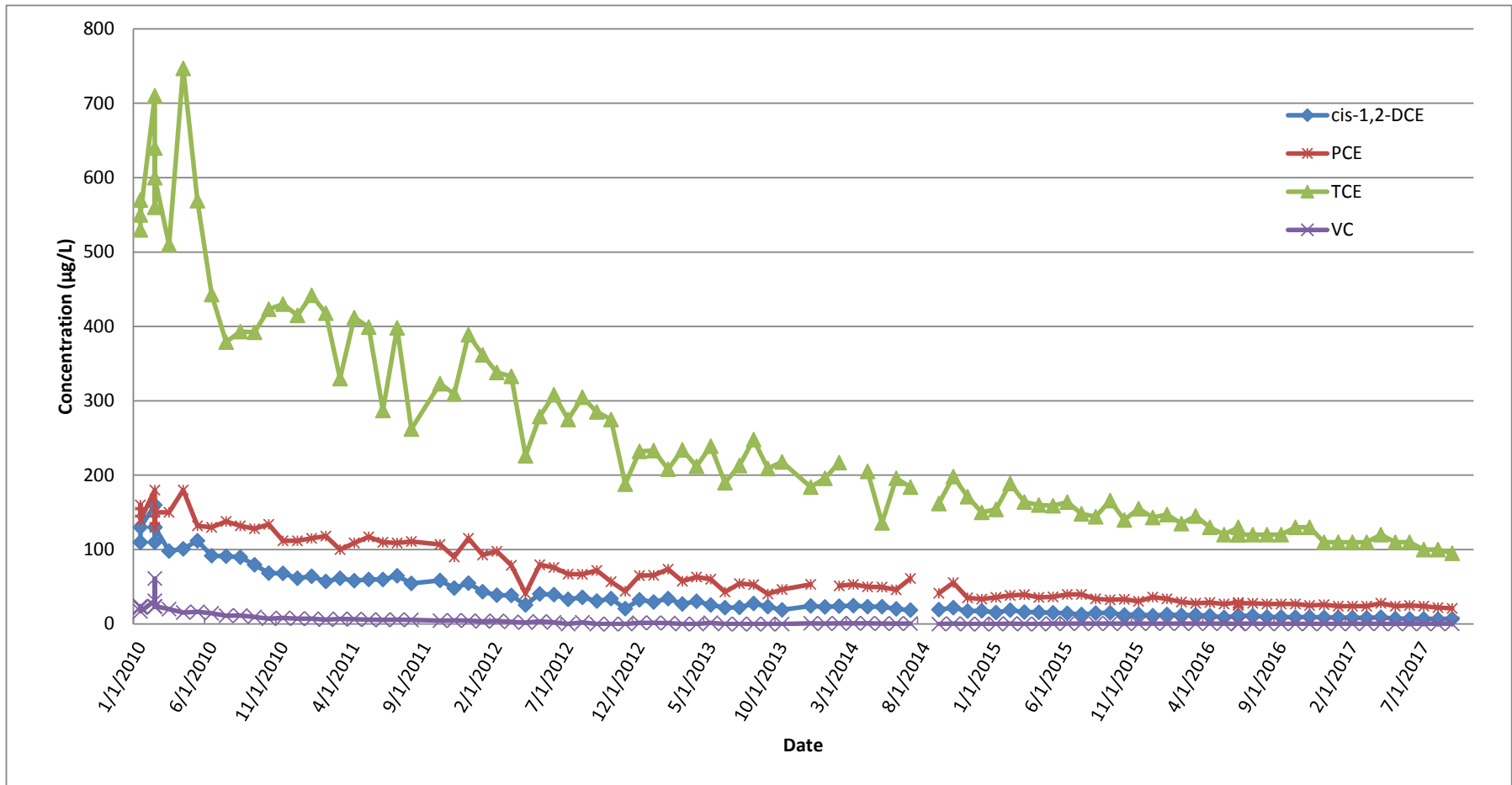


Figure 6
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW3

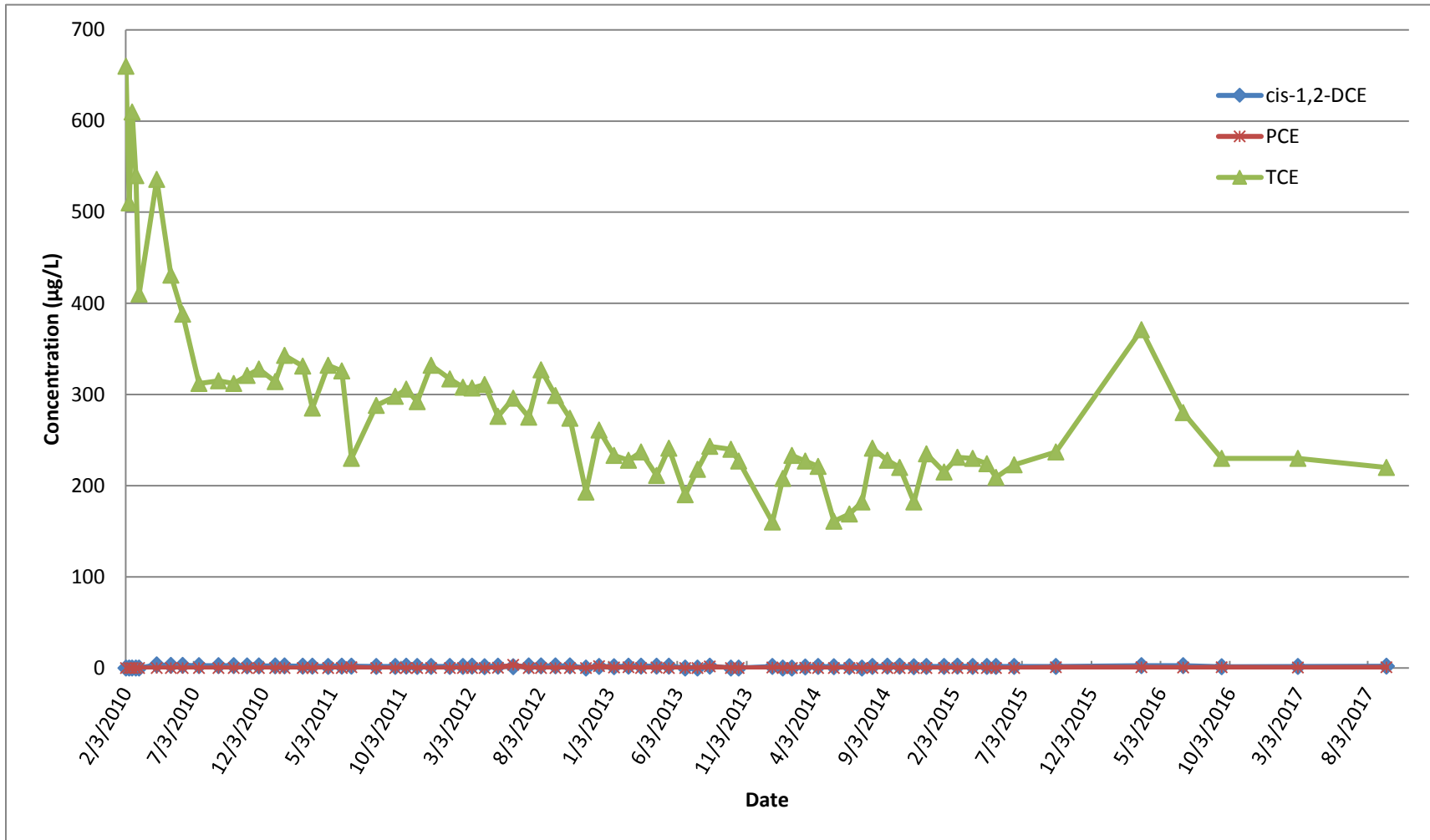


Figure 7
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW1-MW1

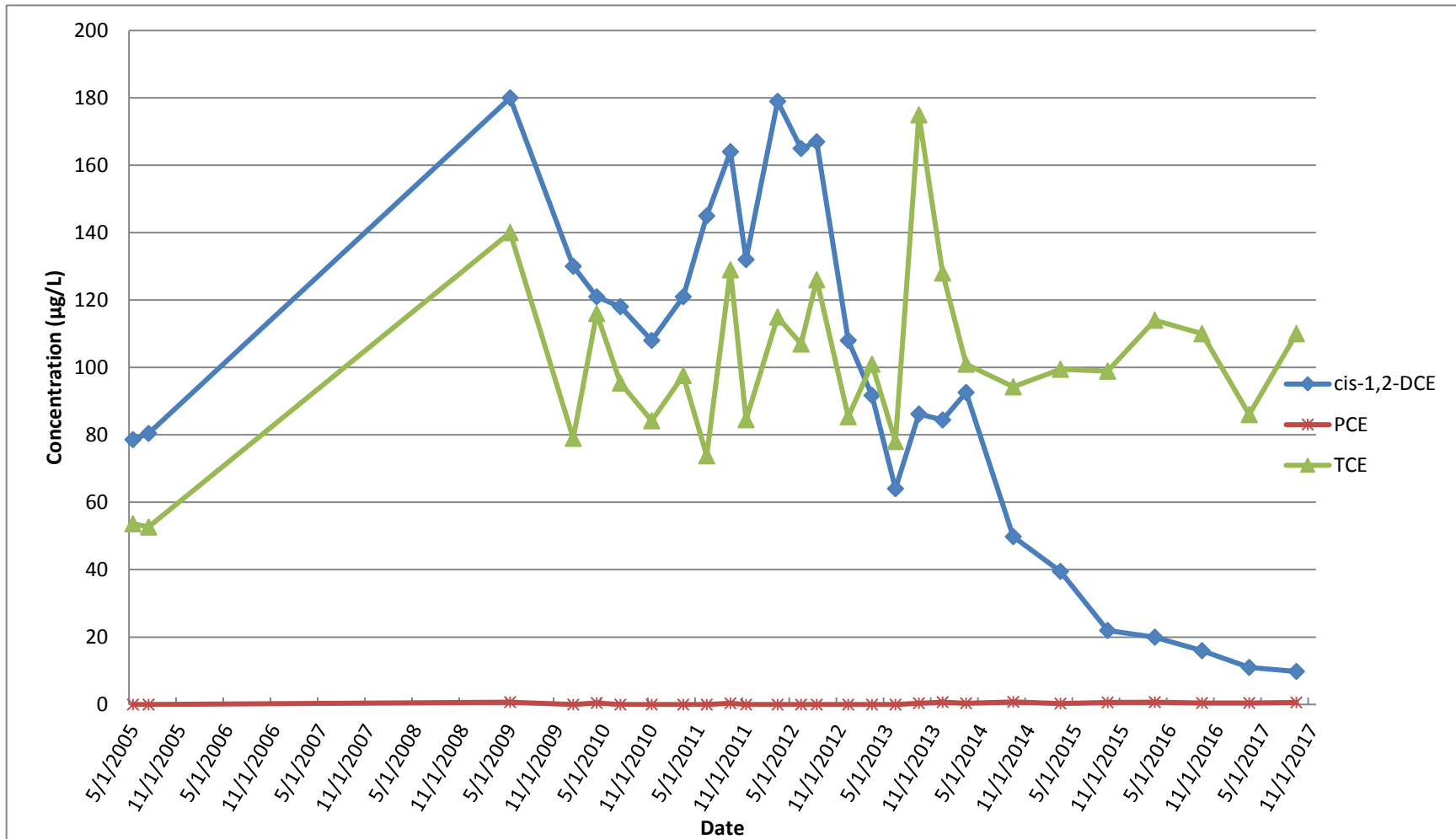


Figure 8
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW1-MW3

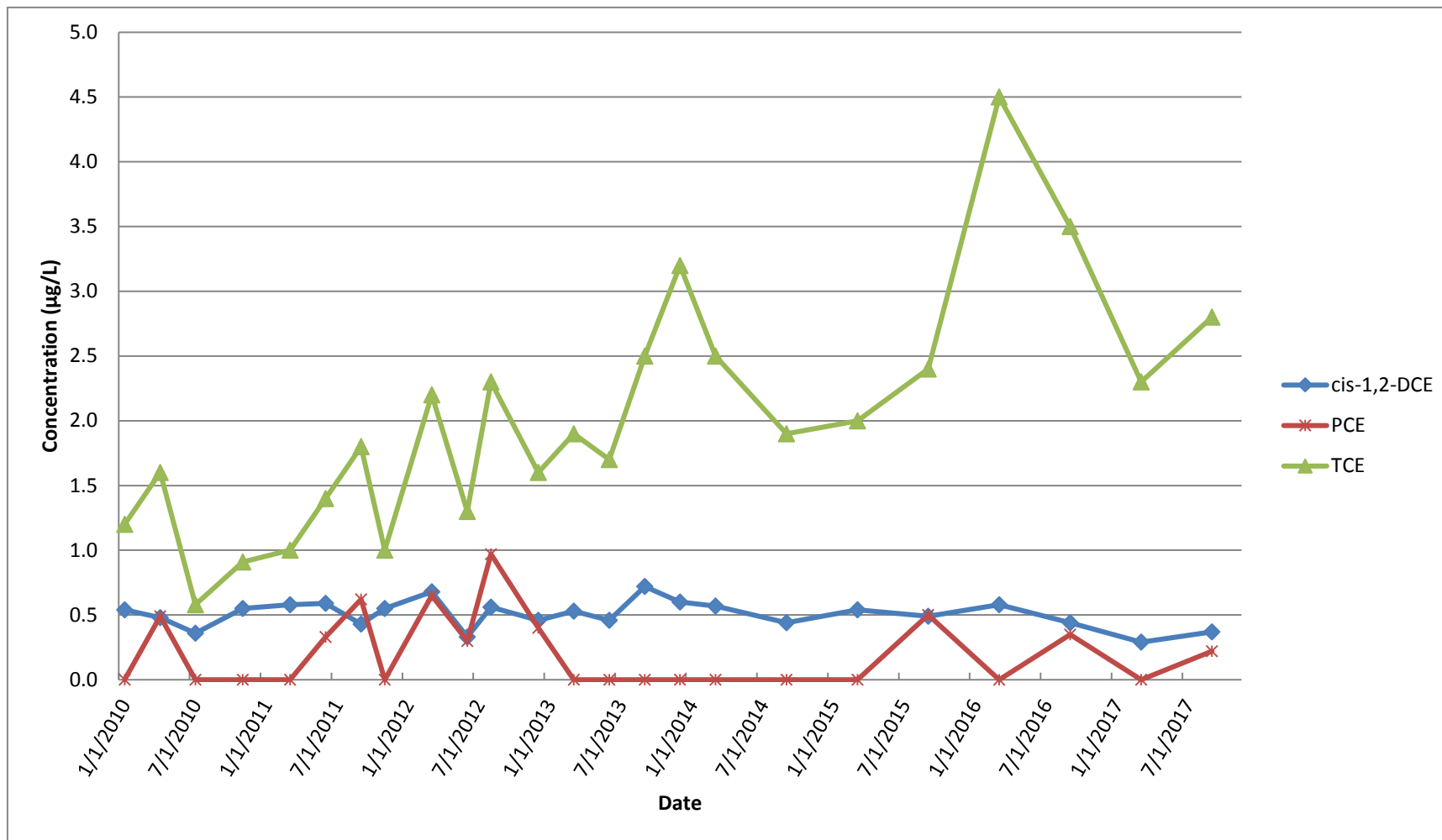


Figure 9
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW2-MW1

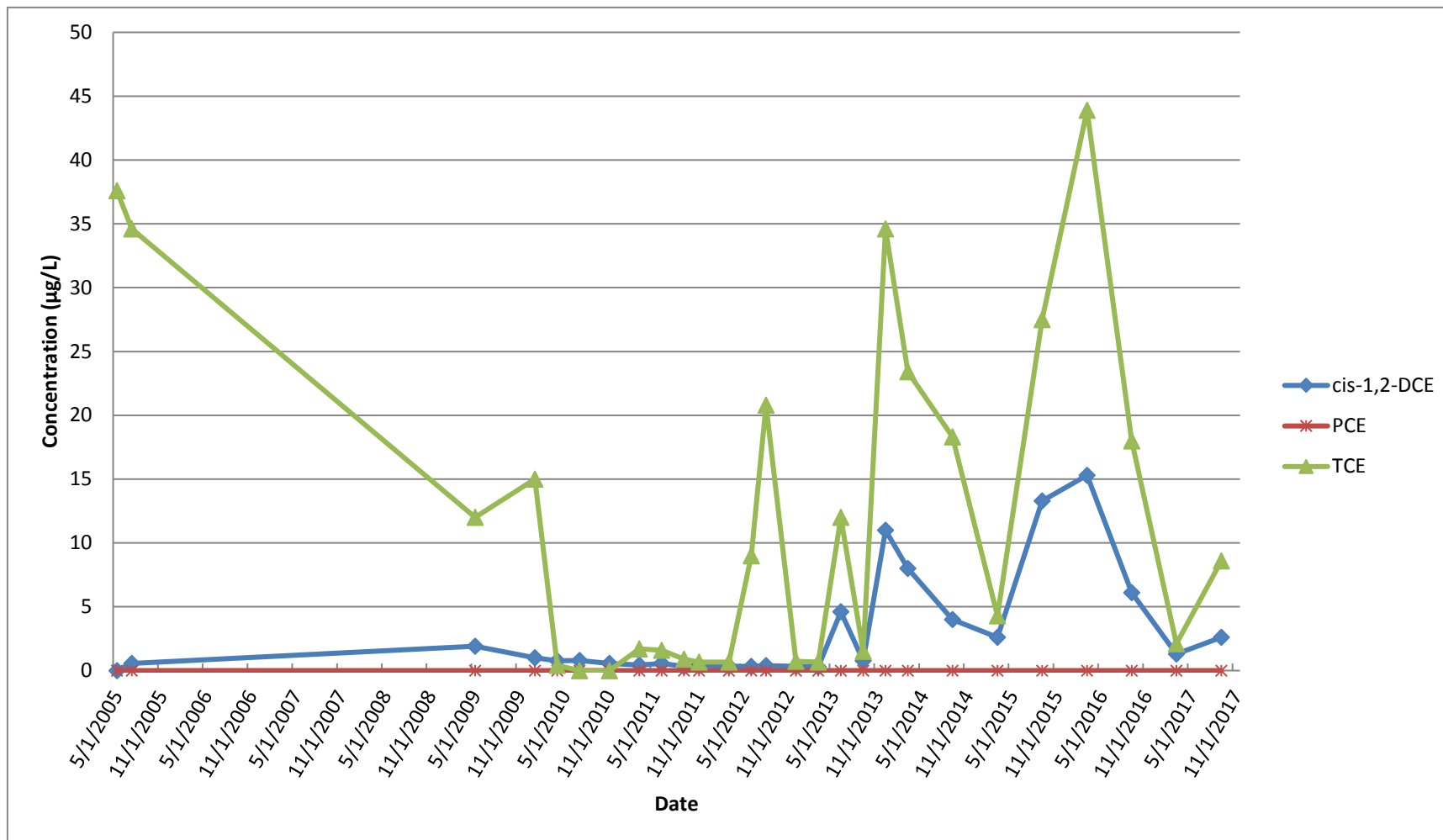


Figure 10
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW3-MW1

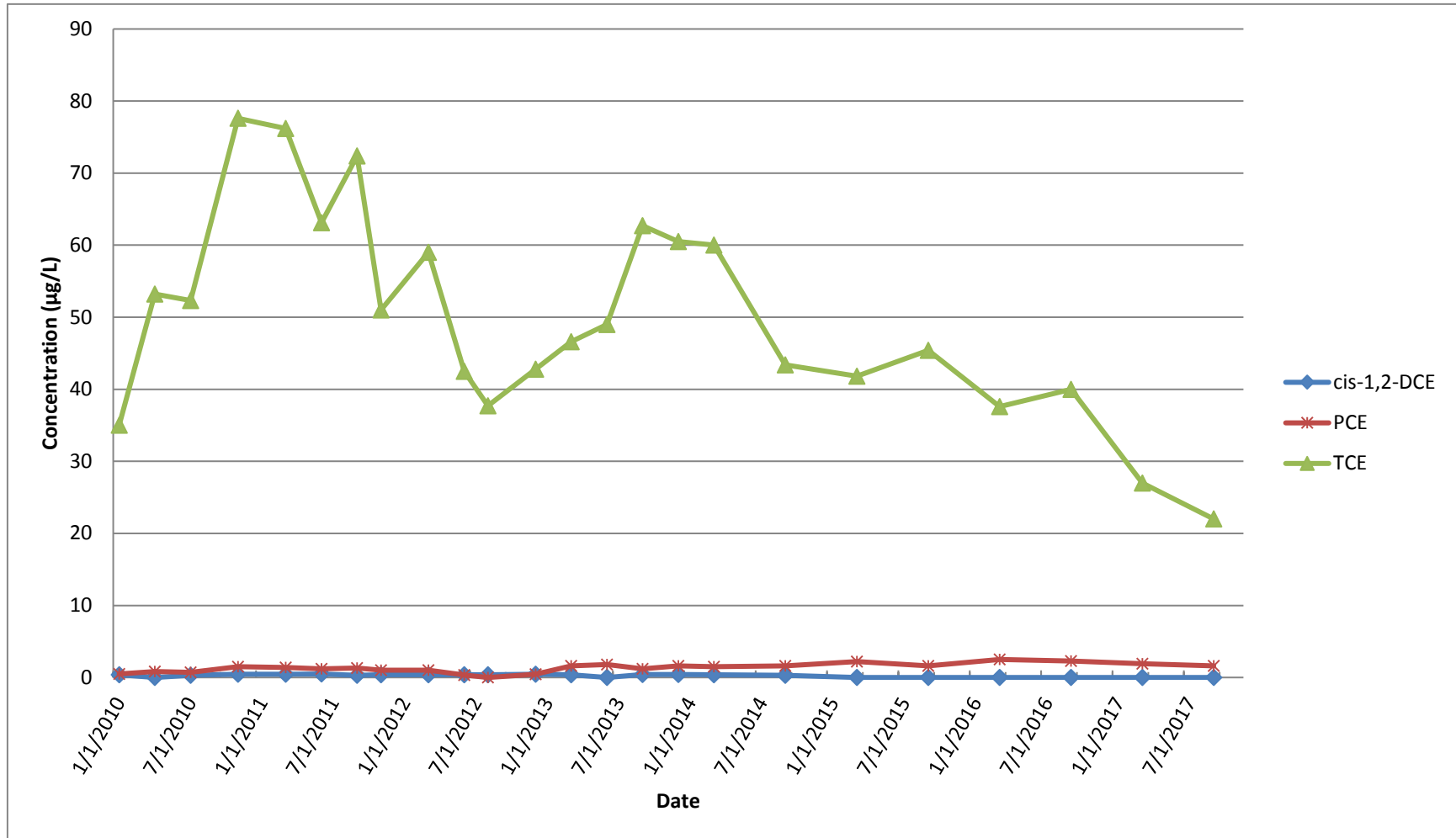


Figure 11
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW3-MW2

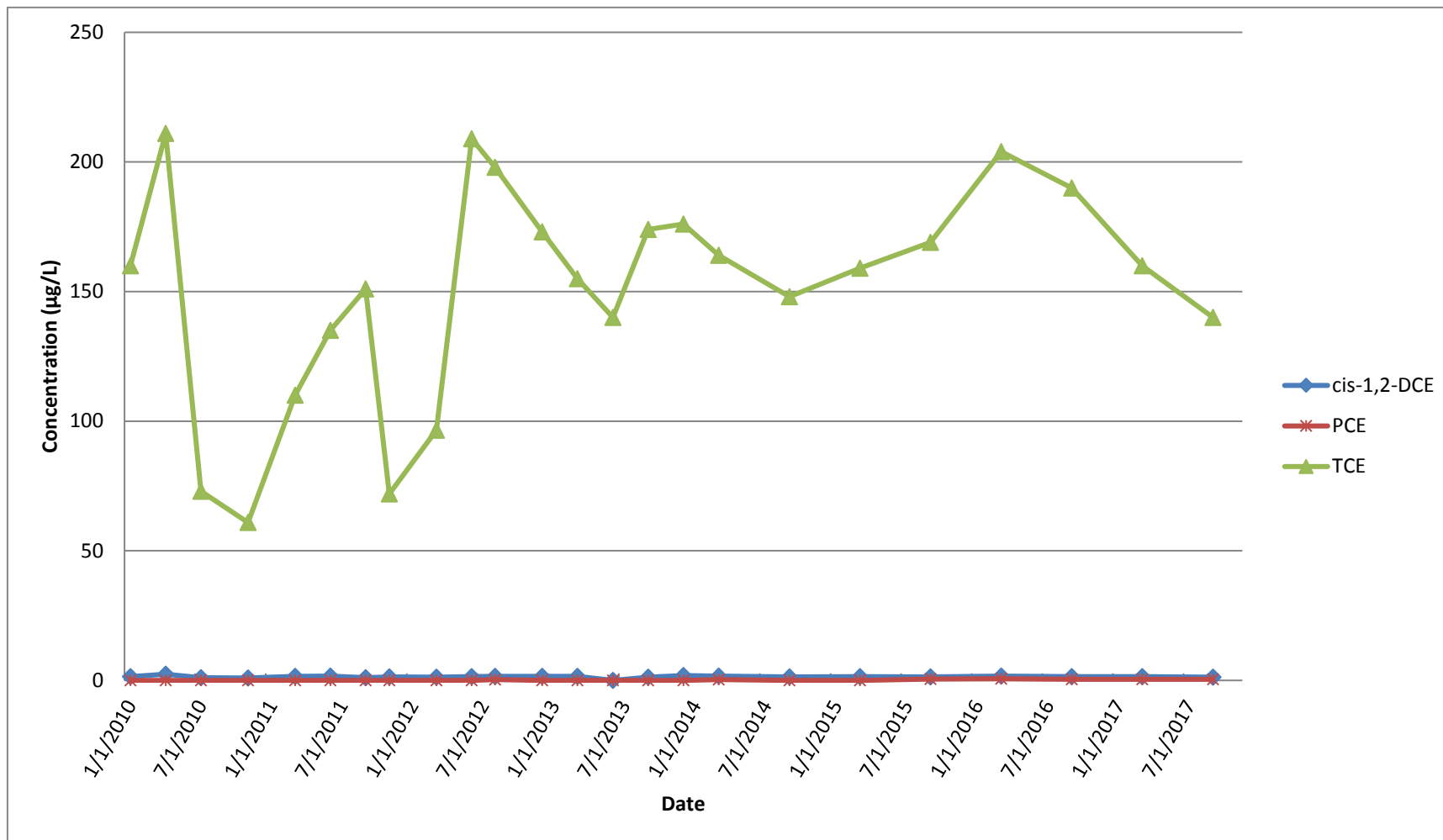


Figure 12
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW3-MW3

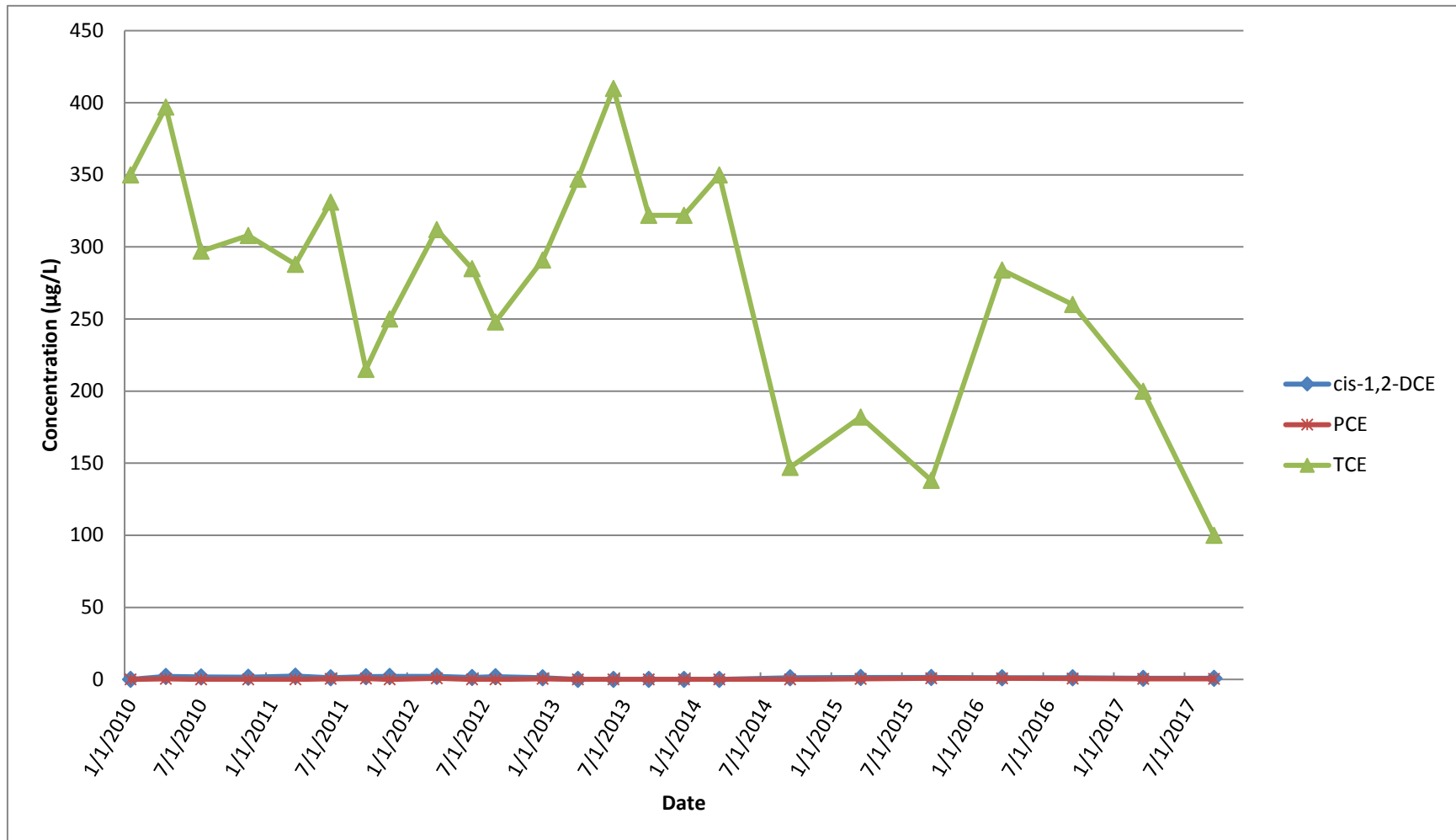


Figure 13
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
RW3-MW4

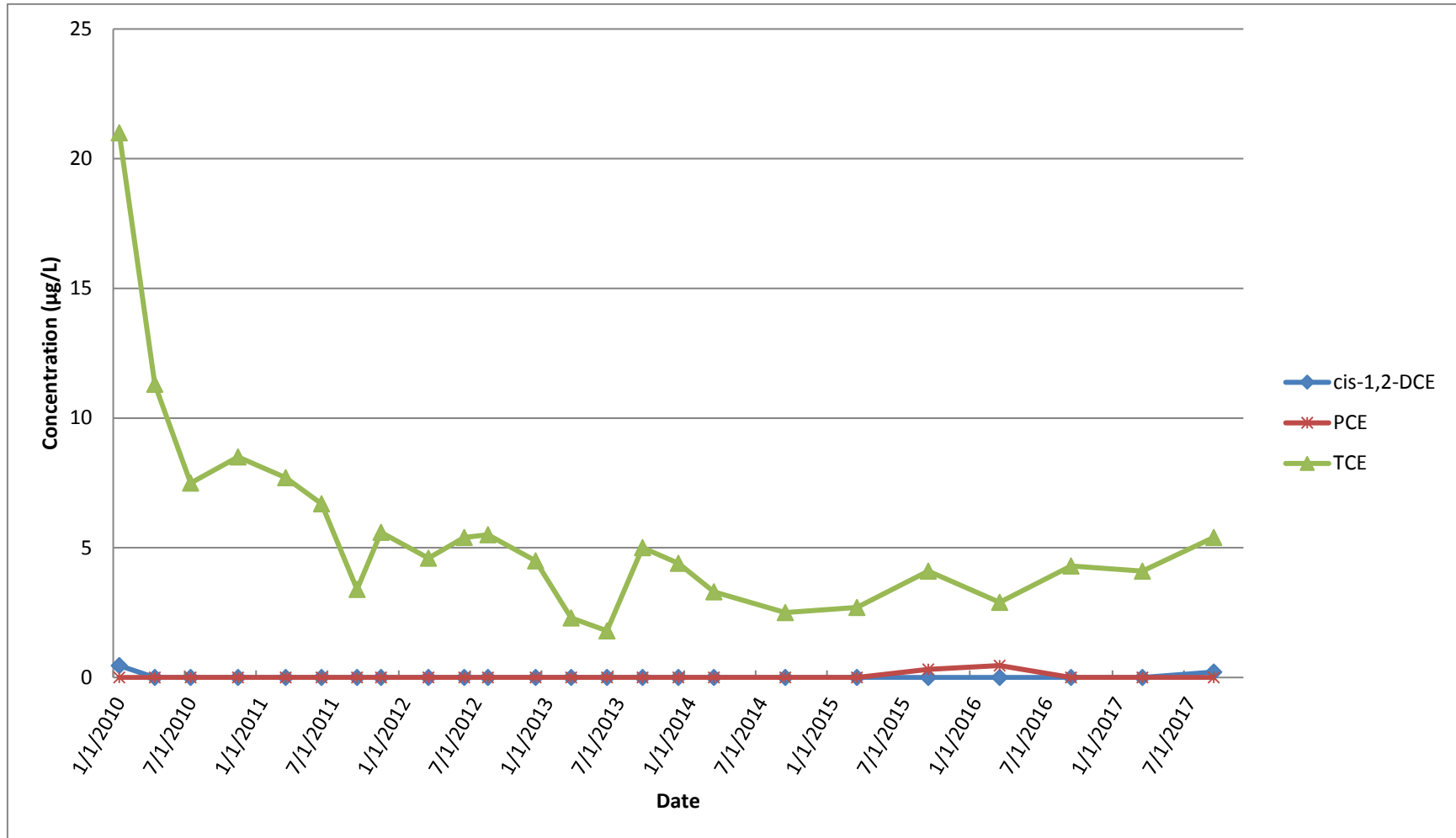
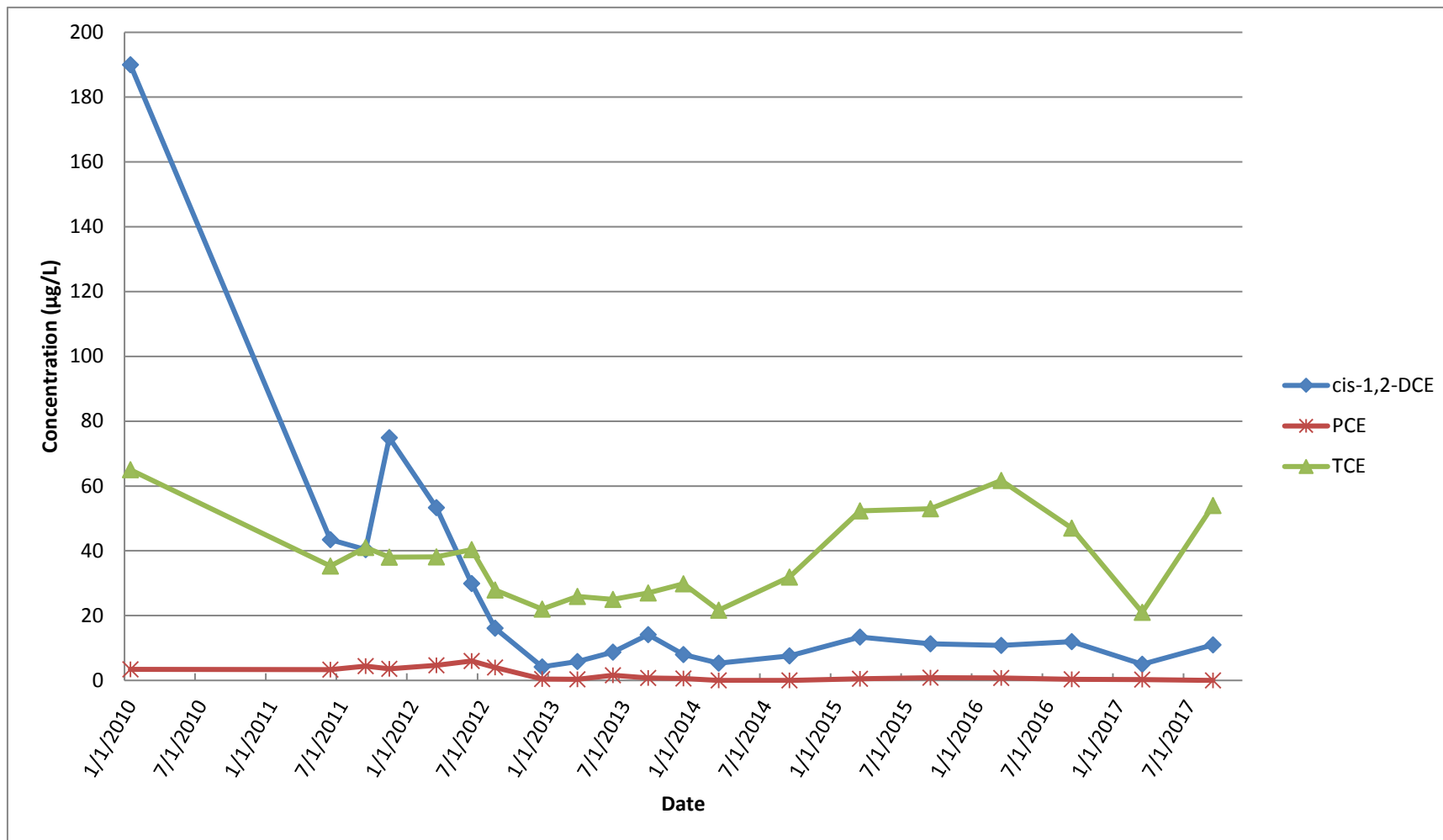


Figure 14
GM-38 Area Groundwater Remediation
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Concentration Trends of Select VOCs
TP-01



TABLES

Table 1
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Results
Fourth Quarter 2017

SPDES Parameters	Daily Maximum Goal	Units	October 2017									
			RW-1 ⁽²⁾	RW-3 ⁽³⁾	Combined Influent ⁽³⁾	Treated Effluent	Treated Effluent DUPLICATE	Air Stripper Effluent (ASE)	Bag Filter Effluent (BFE)	Liquid Carbon 1 Effluent (LC1)	Liquid Carbon 2 Effluent (LC2)	Liquid Carbon 3 Effluent (LC3)
Process Stream												
Well Depth		ft	445	530	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Screened Interval		ft	335-395 410-430	392-412 442-504	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sampling Date			10/3/17									
Average Flowrate	1100	GPM	950	0.5	950	953	NR	NR	950	NR	NR	NR
Total Flow		gallons	42,397,154	24,000	42,421,154	42,558,714	NR	NR	42,426,030	NR	NR	NR
pH	5.5 - 8.5	SU	5.17	NS	5.17	6.17	6.15	6.07	6.11	6.13	6.13	6.15
Carbon Tetrachloride	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroform	NA	µg/L	0.45 J	NS	0.45 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	5	µg/L	1.8	NS	1.80	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	0.36 J	NS	0.36	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.3	NS	1.30	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	6.8	NS	6.80	0.24 J	0.29 J	ND (1.0)	0.23 J	ND (1.0)	ND (1.0)	0.32 J
trans 1,2-Dichloroethene	5	µg/L	0.22 J	NS	0.22	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	5	µg/L	24	NS	24	ND (1.0)	ND (1.0)	0.35 J	0.35 J	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethane	5	µg/L	0.86 J	NS	0.86 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	5	µg/L	100	NS	100	0.67 J	0.63 J	2.0	1.6	0.48 J	0.59 J	0.37 J
1,1,2-Trichlorotrifluoroethane	5	µg/L	0.25 J	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.21 J	NS	0.21 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,4-Dioxane	--	µg/L	ND (20)	NS	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)	ND (20)
Mercury	0.00025	mg/L	ND (0.00010)	NS	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)
Total Suspended Solids (TSS)	NA	mg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)

Table 1
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Results
Fourth Quarter 2017

SPDES Parameters	Daily Maximum Goal	Units	November 2017										
			RW-1 ⁽²⁾	RW-3 ⁽³⁾	Combined Influent ⁽³⁾	Treated Effluent	Treated Effluent DUPLICATE	Air Stripper Effluent (ASE)	Bag Filter Effluent (BFE)	Liquid Carbon 1 Effluent (LC1)	Liquid Carbon 2 Effluent (LC2)	Liquid Carbon 3 Effluent (LC3)	
Process Stream													
Well Depth		ft	445	530	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Screened Interval		ft	335-395 410-430	392-412 442-504	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sampling Date			11/6/17										
Average Flowrate	1100	GPM	968	0.0	968	998	NR	NR	966	NR	NR	NR	NR
Total Flow		gallons	41,830,600	0	41,830,600	43,093,000	NR	NR	41,741,500	NR	NR	NR	NR
pH	5.5 - 8.5	SU	5.04	NS	5.04	6.04	6.03	5.95	5.98	6.02	6.04	6.04	6.04
Carbon Tetrachloride	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroform	NA	µg/L	0.31 J	NS	0.31 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	5	µg/L	2.0	NS	2.00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.5	NS	1.50	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	6.6	NS	6.60	0.33 J	ND (1.0)	0.28 J	ND (1.0)	0.42 J	ND (1.0)	ND (1.0)	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	5	µg/L	22	NS	22	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethane	5	µg/L	0.91 J	NS	0.91 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	5	µg/L	100	NS	100	0.75 J	0.63 J	1.4	1.3	0.52 J	0.89 J	0.57 J	
1,1,2-Trichlorotrifluoroethane	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.37 J	NS	0.37 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,4-Dioxane	--	µg/L	NS	NS	NS	1.90	NS	NS	NS	NS	NS	NS	NS
Mercury	0.00025	mg/L	ND (0.00010)	NS	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)
Total Suspended Solids (TSS)	NA	mg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)

Table 1
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Results
Fourth Quarter 2017

SPDES Parameters	Daily Maximum Goal	Units	December 2017										
			RW-1 ⁽²⁾	RW-3 ⁽³⁾	Combined Influent ⁽³⁾	Treated Effluent	Treated Effluent DUPLICATE	Air Stripper Effluent (ASE)	Bag Filter Effluent (BFE)	Liquid Carbon 1 Effluent (LC1)	Liquid Carbon 2 Effluent (LC2)	Liquid Carbon 3 Effluent (LC3)	
Process Stream													
Well Depth		ft	445	530	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Screened Interval		ft	335-395 410-430	392-412 442-504	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Sampling Date			12/4/17										
Average Flowrate	1100	GPM	923	0.2	923	954	NR	NR	921	NR	NR	NR	NR
Total Flow		gallons	41,767,639	8,400	41,776,039	43,174,821	NR	NR	41,682,195	NR	NR	NR	NR
pH	5.5 - 8.5	SU	5.08	NS	5.08	5.98	5.97	5.90	5.93	5.98	5.98	5.97	5.97
Carbon Tetrachloride	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Chloroform	NA	µg/L	0.31 J	NS	0.31 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethane	5	µg/L	1.4	NS	1.40	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	0.37 J	NS	ND (1.0)	ND (1.0)	0.21 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.1	NS	1.10	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	5.7	NS	5.70	0.21 J	0.24 J	0.21 J	0.22 J	0.42 J	ND (1.0)	0.21 J	0.21 J
trans 1,2-Dichloroethene	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Tetrachloroethene	5	µg/L	22	NS	22	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethane	5	µg/L	0.64 J	NS	0.64 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	5	µg/L	98	NS	98	0.64 J	0.88 J	1.2	1.1	0.47 J	0.52 J	0.39 J	0.39 J
1,1,2-Trichlorotrifluoroethane	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.22 J	NS	0.22 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,4-Dioxane	--	µg/L	NS	NS	NS	1.90	NS	NS	NS	NS	NS	NS	NS
Mercury	0.00025	mg/L	ND (0.00010)	NS	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)	ND (0.00010)
Total Suspended Solids (TSS)	NA	mg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)

Notes:

B - Method blank contamination

J - Estimated result between laboratory method detection limit and reporting limit

NA - Not Applicable

NS - Not Sampled. RW-3 sampling frequency has been reduced from monthly to semi-annually.

ND - Not detected above laboratory method detection limit. Limit of detection (LOD) given in parentheses

NS - Not Sampled

gpm - gallons per minute

(1) Wastewater discharge equivalence permit renewed on 18 August 2017. Discharge limits established for 10 years. Chloroform, 1,4-dioxane and 1,1,2-trichlorotrifluoroethane are now monitored under the new permit.

(2) On 1 July 2015, the RW-1 flowrate was increased from ~800 gpm to ~1,000 gpm and RW-3 was taken off-line, as approved by NYSDEC on 20 April 2015. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

(3) Well RW-3 was turned on for a total of approximately 3 hours this period to collect the Semi-Annual groundwater samples.

Table 2
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
2017 Annual Flow Summary

Monthly Flow Totals		
Month	Total GWTP Influent Flow (gal)	Total GWTP Effluent Flow (gal)
Jan-17	43,610,980	44,813,133
Feb-17	38,439,852	39,483,035
Mar-17	40,272,000	41,628,600
Apr-17	43,881,400	45,040,600
May-17	42,266,500	43,421,051
Jun-17	42,013,100	43,388,949
Jul-17	43,594,500	44,852,800
Aug-17	42,554,700	43,929,000
Sep-17	41,989,246	43,226,363
Oct-17	42,421,154	42,558,714
Nov-17	41,830,600	43,093,000
Dec-17	41,776,039	43,174,821
Annual Flow Summary		
	GWTP Influent	GWTP Effluent
2017 Total (gal)	504,650,071	518,610,066
2017 Monthly Average (gal)	42,054,173	43,217,505
2017 Effective Flowrate (gpm)	960	987
2017 Average Flowrate (gpm)	971	998

Notes:

gpm = gallons per minute

Effective Flowrate = total flow volume (gal) / total time period (min)

Average Flowrate = total flow volume (gal) / total system run time (min)

Table 3
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
2017 Mass Removal Summary

Month	Total Flow (gal)			CCl ₄			1,1-DCA			1,2-DCA			1,1-DCE			cis-1,2-DCE		
	GWTP Effluent	GWTP Influent	2017 Cumulative Influent	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)
Jan-17	44,813,133	43,610,980	43,610,980	0.00	0.0000	0.0000	1.9	0.6914	0.6914	0.27	0.0983	0.0983	1.4	0.5095	0.5095	8.9	3.2388	3.2388
Feb-17	39,483,035	38,439,852	82,050,832	0.00	0.0000	0.0000	1.9	0.6094	1.3009	0.00	0.0000	0.0983	1.4	0.4491	0.9585	8.5	2.7265	5.9653
Mar-17	41,628,600	40,272,000	122,322,832	0.00	0.0000	0.0000	2.0	0.6721	1.9730	0.38	0.1277	0.2260	1.4	0.4705	1.4290	8.0	2.6884	8.6537
Apr-17	45,040,600	43,881,400	166,204,232	0.00	0.0000	0.0000	2.0	0.7323	2.7053	0.24	0.0879	0.3138	1.5	0.5493	1.9783	9.1	3.3321	11.9858
May-17	43,421,051	42,266,500	208,470,732	0.00	0.0000	0.0000	1.5	0.5290	3.2343	0.00	0.0000	0.3138	0.9	0.3174	2.2957	7.0	2.4688	14.4546
Jun-17	43,388,949	42,013,100	250,483,832	0.26	0.0912	0.0912	1.6	0.5609	3.7953	0.00	0.0000	0.3138	1.0	0.3506	2.6463	6.8	2.3839	16.8386
Jul-17	44,852,800	43,594,500	294,078,332	0.00	0.0000	0.0912	1.5	0.5457	4.3409	0.42	0.1528	0.4666	1.2	0.4365	3.0828	6.9	2.5100	19.3486
Aug-17	43,929,000	42,554,700	336,633,032	0.00	0.0000	0.0912	1.6	0.5682	4.9091	0.25	0.0888	0.5554	1.5	0.5326	3.6154	6.5	2.3081	21.6567
Sep-17	43,226,363	41,989,246	378,622,278	0.38	0.1331	0.2243	1.9	0.6657	5.5748	0.00	0.0000	0.5554	1.1	0.3854	4.0009	6.7	2.3475	24.0043
Oct-17	42,558,714	42,421,154	421,043,432	0.00	0.0000	0.2243	1.8	0.6372	6.2120	0.36	0.1274	0.6828	1.3	0.4602	4.4610	6.8	2.4071	26.4114
Nov-17	43,093,000	41,830,600	462,874,032	0.00	0.0000	0.2243	2.0	0.6981	6.9101	0.00	0.0000	0.6828	1.5	0.5236	4.9846	6.6	2.3038	28.7151
Dec-17	43,174,821	41,776,039	504,650,071	0.00	0.0000	0.2243	1.4	0.4880	7.3981	0.37	0.1290	0.8118	1.1	0.3835	5.3681	5.7	1.9870	30.7021

2017 Totals **518,610,066** **504,650,071** **0.2243** **7.3981** **0.8118** **5.3681** **30.7021**

Month	Total Flow (gal)			trans-1,2-DCE			PCE			1,1,1-TCA			TCE			VC		
	GWTP Effluent	GWTP Influent	2017 Cumulative Influent	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)	Influent Concentration (µg/l)	Mass Removal (lb)	2017 Cumulative Mass Removal (lb)
Jan-17	44,813,133	43,610,980	43,610,980	0.22	0.0801	0.0801	24	8.7339	8.7339	1.1	0.4003	0.4003	110	40.0302	40.0302	0.26	0.0946	0.0946
Feb-17	39,483,035	38,439,852	82,050,832	0.00	0.0000	0.0801	24	7.6983	16.4321	1.0	0.3208	0.7211	110	35.2837	75.3139	0.31	0.0994	0.1941
Mar-17	41,628,600	40,272,000	122,322,832	0.00	0.0000	0.0801	24	8.0652	24.4973	1.0	0.3360	1.0571	110	36.9654	112.2793	0.41	0.1378	0.3318
Apr-17	45,040,600	43,881,400	166,204,232	0.00	0.0000	0.0801	28	10.2527	34.7500	1.1	0.4028	1.4599	120	43.9401	156.2195	0.20	0.0732	0.4051
May-17	43,421,051	42,266,500	208,470,732	0.00	0.0000	0.0801	24	8.4646	43.2146	1.0	0.3527	1.8126	110	38.7961	195.0156	0.26	0.0917	0.4968
Jun-17	43,388,949	42,013,100	250,483,832	0.00	0.0000	0.0801	25	8.7644	51.9791	1.0	0.3506	2.1632	110	38.5636	233.5792	0.21	0.0736	0.5704
Jul-17	44,852,800	43,594,500	294,078,332	0.00	0.0000	0.0801	24	8.7306	60.7096	1.0	0.3638	2.5269	100	36.3774	269.9565	0.23	0.0837	0.6541
Aug-17	43,929,000	42,554,700	336,633,032	0.00	0.0000	0.0801	22	7.8121	68.5218	0.80	0.2841	2.8110	100	35.5097	305.4663	0.24	0.0852	0.7393
Sep-17	43,226,363	41,989,246	378,622,278	0.00	0.0000	0.0801	21	7.3580	75.8797	0.98	0.3434	3.1544	95	33.2860	338.7522	0.24	0.0841	0.8234
Oct-17	42,558,714	42,421,154	421,043,432	0.22	0.0779	0.1579	24	8.4956	84.3753	0.86	0.3044	3.4588	100	35.3983	374.1505	0.21	0.0743	0.8977
Nov-17	43,093,000	41,830,600	462,874,032	0.00	0.0000	0.1579	22	7.6792	92.0545	0.91	0.3176	3.7765	100	34.9055	409.0560	0.37	0.1292	1.0269
Dec-17	43,174,821	41,776,039	504,650,071	0.00	0.0000	0.1579	22	7.6692	99.7237	0.64	0.2231	3.9996	98	34.1628	443.2188	0.22	0.0767	1.1035

2017 Totals **518,610,066** **504,650,071** **0.1579** **99.7237** **3.9996** **443.2188** **1.1035**

2017 Cumulative Mass (VOCs) Removed (lbs) **592.71**

2017 Average Monthly Mass (VOCs) Removed (lbs) **49.39**

Notes:
CCl₄ = carbon tetrachloride DCA = dichloroethane
TCA = trichloroethane DCE = dichloroethene
TCE = trichloroethene PCE = tetrachloroethane

Mass removal (lb) = Influent Concentration (ug/L) * Influent Flow (gal) * (2.20462 lb/kg) * (3.785 L/gal) * (10⁻⁹ ug/kg)

Table 4
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
Fourth Quarter 2017

DAR Parameters	Discharge Goal ⁽³⁾	Units	October 2017					
			Influent (VC11)	Effluent	Effluent Duplicate	VC12	VC23	
Process Stream								
Sampling Date			10/3/17					
Average Flowrate		CFM	NR	7,823	NR	NR	NR	NR
Total Flow ⁽¹⁾		ft ³	NR	349,196,400	NR	NR	NR	NR
Total Flow ⁽²⁾		m ³	NR	9,888,141	NR	NR	NR	NR
1,2-Dichloroethane	NA	µg/m ³	3.7 J	3.7	2.9 J	3.1 J	2.6 J	
cis 1,2-Dichloroethene	> 100,000 ⁽⁴⁾	µg/m ³	100	160	140	94	160	
trans 1,2-Dichloroethene		µg/m ³	ND	1.9 J	1.6 J	ND	2.2 J	
1,2-Dichloroethene (total)	> 100,000	µg/m ³	100	160	140	94	160	
Toluene	NA	µg/m ³	1.9 J	ND	ND	1.3 J	9.5	
Total Xylene	NA	µg/m ³	ND	ND	ND	ND	ND	
1,1,2-Trichloroethane	NA	µg/m ³	2.2 J	ND	ND	ND	ND	
Trichloroethene	2,600	µg/m ³	1600	4.8	2.2 J	1700	82	
Vinyl Chloride	560	µg/m ³	3.6 J	1.9 J	2.0	2.3 J	2.2	
Tetrachloroethene	5,100	µg/m ³	320	2.0 J	1.0 J	70	25	

Notes:

NA - Not applicable

ND - Not detected

NR - Not recorded

NS - Not sampled

SGC - Short-term Guideline Concentration

µg/m³ - micrograms per cubic meter

CFM - cubic feet per minute

DAR - Division of Air Resources

(1) Total Flow (ft³) = avg flowrate (cfm) * operational time (min)

(2) Total Flow (m³) = total flow (ft³) * (0.3048³)m³/ft³

(3) Discharge goal approved by NYSDEC's letter dated 10/31/2013.

(4) Discharge goal is for total 1,2-Dichloroethene.

Table 4
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
Fourth Quarter 2017

DAR Parameters	Discharge Goal ⁽³⁾	Units	November 2017				
			Influent (VC11)	Effluent	Effluent Duplicate	VC12	VC23
Process Stream							
Sampling Date			11/14/17				
Average Flowrate		CFM	NR	9,505	NR	NR	NR
Total Flow ⁽¹⁾		ft ³	NR	410,630,400	NR	NR	NR
Total Flow ⁽²⁾		m ³	NR	11,627,758	NR	NR	NR
1,2-Dichloroethane	NA	µg/m ³	3.1 J	ND	ND	ND	ND
cis 1,2-Dichloroethane	> 100,000 ⁽⁴⁾	µg/m ³	70	ND	2.3 J	ND	ND
trans 1,2-Dichloroethane		µg/m ³	1.7 J	ND	ND	ND	ND
1,2-Dichloroethane (total)	> 100,000	µg/m ³	72	ND	ND	ND	ND
Toluene	NA	µg/m ³	37	ND	12	2.4 J	0.40 J
Total Xylene	NA	µg/m ³	ND	ND	ND	0.87 J	ND
1,1,2-Trichloroethane	NA	µg/m ³	1.3 J	ND	ND	ND	ND
Trichloroethene	2,600	µg/m ³	1400	5.2	71	170	4.7
Vinyl Chloride	560	µg/m ³	ND U	1.4 J	1.8 J	2.1	2.1
Tetrachloroethene	5,100	µg/m ³	260	1.8 J	21	74	1.4 J

Notes:

NA - Not applicable

ND - Not detected

NR - Not recorded

NS - Not sampled

SGC - Short-term Guideline Concentration

µg/m³ - micrograms per cubic meter

CFM - cubic feet per minute

DAR - Division of Air Resources

(1) Total Flow (ft³) = avg flowrate (cfm) * operational time (min)

(2) Total Flow (m³) = total flow (ft³) * (0.3048³)m³/ft³

(3) Discharge goal approved by NYSDEC's letter dated 10/31/2013.

(4) Discharge goal is for total 1,2-Dichloroethene.

Table 4
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
Fourth Quarter 2017

DAR Parameters	Discharge Goal ⁽³⁾	Units	December 2017					
			Influent (VC11)	Effluent	Effluent Duplicate	VC12	VC23	
Process Stream								
Sampling Date			12/4/17					
Average Flowrate		CFM	NR	9,466	NR	NR	NR	NR
Total Flow ⁽¹⁾		ft ³	NR	422,544,384	NR	NR	NR	NR
Total Flow ⁽²⁾		m ³	NR	11,965,125	NR	NR	NR	NR
1,2-Dichloroethane	NA	µg/m ³	3.2	ND	ND	ND	ND	ND
cis 1,2-Dichloroethene	> 100,000 ⁽⁴⁾	µg/m ³	73	ND	ND	1.9 J	ND	ND
trans 1,2-Dichloroethene		µg/m ³	2.0 J	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)	> 100,000	µg/m ³	76	ND	ND	ND	ND	ND
Toluene	NA	µg/m ³	2.9 J	0.84 J	ND	4.7	ND	ND
Total Xylene	NA	µg/m ³	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NA	µg/m ³	ND U	ND	ND	ND	ND	ND
Trichloroethene	2,600	µg/m ³	1300	9.4	2.8 J	74	4.6	
Vinyl Chloride	560	µg/m ³	2.0	ND	1.7 J	2.4	2.6	
Tetrachloroethene	5,100	µg/m ³	280	3.4 J	ND	62	1.9 J	

Notes:

NA - Not applicable

ND - Not detected

NR - Not recorded

NS - Not sampled

SGC - Short-term Guideline Concentration

µg/m³ - micrograms per cubic meter

CFM - cubic feet per minute

DAR - Division of Air Resources

(1) Total Flow (ft³) = avg flowrate (cfm) * operational time (min)

(2) Total Flow (m³) = total flow (ft³) * (0.3048³)m³/ft³

(3) Discharge goal approved by NYSDEC's letter dated 10/31/2013.

(4) Discharge goal is for total 1,2-Dichloroethene.

Table 5
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Stack Emissions
Fourth Quarter 2017

DAR Parameters	Discharge Goal ⁽¹⁾	Units	October 2017	November 2017	December 2017
Sampling Date			10/3/17	11/14/17	12/4/17
Average Flowrate	N/A	CFM	7,823	9,505	9,466
Total Flow	N/A	ft ³	349,196,400	410,630,400	422,544,384
Total Flow	N/A	m ³	9,888,141	11,627,758	11,965,125
Trichloroethene	0.09	lb/hr	0.00014	0.00019	0.00033
Vinyl Chloride	0.02	lb/hr	0.00006	0.00005	0.00000
1,2 Dichloroethene	11	lb/hr	0.00469	0.00000	0.00000
1,2-Dichloroethane	NA	lb/hr	0.00011	0.00000	0.00000
Toluene	NA	lb/hr	0.00000	0.00000	0.00010
Total Xylene	NA	lb/hr	0.00000	0.00000	0.00000
1,1,2-Trichloroethane	NA	lb/hr	0.00000	0.00000	0.00000
Tetrachloroethene	0.18	lb/hr	0.00006	0.00006	0.00012

Notes:

NA - Not applicable

lb/hr - pounds per hour

DAR - Division of Air Resources

CFM - Cubic feet per minute

Stack Emissions (lb/hr) = average flowrate (cfm) * (0.3048^{^3})m³/ft³ * conc.(ug/m³) * 1 lb/453592370 ug *
60 min/hr

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.

Table 6
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
2017 Air Emission Summary

Month	TCE Effluent Emission Rate		VC Effluent Emission Rate		1,2-DCE Effluent Emission Rate		PCE Effluent Emission Rate	
	lb/hr	lb/mo	lb/hr	lb/mo	lb/hr	lb/mo	lb/hr	lb/mo
Jan-17	0.00010	0.074400	0.00007	0.052080	0.00444	3.303360	0.00004	0.029760
Feb-17	0.00011	0.073920	0.00008	0.053760	0.00543	3.648960	0.00005	0.033600
Mar-17	0.00007	0.052080	0.00007	0.052080	0.00506	3.764640	0.00004	0.029760
Apr-17	0.00012	0.086400	0.00007	0.050400	0.00496	3.571200	0.00004	0.028800
May-17	0.00008	0.059520	0.00004	0.029760	0.00559	4.158960	0.00004	0.029760
Jun-17	0.00036	0.259200	0.00005	0.036000	0.00364	2.620800	0.00011	0.079200
Jul-17	0.00020	0.148800	0.00013	0.096720	0.00456	3.392640	0.00007	0.052080
Aug-17	0.00031	0.230640	0.00006	0.044640	0.00444	3.303360	0.00011	0.081840
Sep-17	0.00021	0.151200	0.00006	0.043200	0.00443	3.189600	0.00012	0.086400
Oct-17	0.00014	0.104160	0.00006	0.044640	0.00469	3.489360	0.00006	0.044640
Nov-17	0.00019	0.136800	0.00005	0.036000	0.00000	0.000000	0.00006	0.043200
Dec-17	0.00033	0.245520	0.00000	0.000000	0.00000	0.000000	0.00012	0.089280

	<u>TCE</u>		<u>VC</u>		<u>1,2-DCE</u>		<u>PCE</u>
Discharge Goal (lb/yr)	770		170		98,000		1,500
2017 Total Emissions (lb/yr)	1.62		0.54		34.44		0.63

Notes:

lb/hr = pounds per hour

lb/mo = pounds per month

lb/yr = pounds per year

DCE = dichloroethene

PCE = tetrachloroethane

TCE = trichloroethene

VC = vinyl chloride

Emissions = average flowrate (cfm) * (0.3048^{^3})m³/ft³ * conc.(mg/m³) * 0.000001 g/mg * 0.002205 lbs/g * 60 min/hr * operational time (hr)

Table 7
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Level Measurements
Fourth Quarter 2017

Monitoring Well ID	Date	Well Elevation (ft amsl)	Total Depth (ft)	Screen Interval (ft)	Depth to Water (ft)	Groundwater Elevation (ft amsl)
RW1-MW1	12/19/2017	85.86	435	395-435	40.41	45.45
RW1-MW2	12/19/2017	87.35	435	395-435	43.68	43.67
RW1-MW3	12/19/2017	80.34	435	395-435	33.57	46.77
RW2-MW1	12/19/2017	90.75	510	470-510	43.6	47.15
RW2-MW2	12/19/2017	90.15	510	470-510	43.45	46.7
RW2-MW3	12/19/2017	89.75	510	470-510	42.71	47.04
RW3-MW1	12/19/2017	92.22	350	330-350	41.21	51.01
RW3-MW2	12/19/2017	91.98	495	475-495	42.83	49.15
RW3-MW3	12/19/2017	92.98	340	320-340	42.31	50.67
RW3-MW4	12/19/2017	92.92	495	475-495	43.17	49.75
TP-01	12/19/2017	85.91	470	450-470	38.97	46.94
IW1-MW1	12/19/2017	89.41	150	20-150	39.98	49.43
RW-1	NA	91.37	340	320-340	NA	NA
RW-3	NA	91.57	495	475-495	NA	NA

Notes:

amsl - above mean sea level

ft - feet

NA - Not Applicable

Table 8
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Summary of Historical Groundwater Analytical Results
Through Fourth Quarter 2017

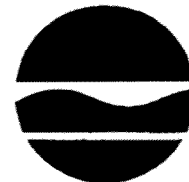
Sample ID	RW3-MW4																								
	1/20/2010	4/22/2010	7/28/2010	7/28/2010	11/3/2010 ⁽¹⁾	3/24/2011	6/15/2011	9/28/2011	11/29/2011	3/7/2012	6/7/2012	8/22/2012	12/4/2012	3/14/2013	6/21/2013 ⁽²⁾	9/17/2013	12/17/2013	3/26/2014	9/23/2014	3/25/2015	9/15/2015	3/21/2016	9/15/2016	3/2/2017	9/12/2017
Sample Date				Duplicate																					
Comments																									
Well Depth (Ft)	495																								
Screened Interval (Ft)	475-495																								
VOCS (EPA 624) ug/L ⁽⁴⁾																									
Acrolein	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	30 R	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acrylonitrile	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acetone	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Benzene	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromodichloromethane	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromoform	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Bromomethane	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbon disulfide	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Carbon tetrachloride	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Dibromochloromethane	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chloroethane	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-chloroethylvinyl ether	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND
Chloroform	ND	ND	ND	ND	0.32 J	ND	NR	0.87 J	ND	0.38 J	ND	ND	0.71 J	ND	1.2	ND	ND	1.2 J	0.38 J	1.2	ND	0.64 J	ND	ND	0.21 J
Chloromethane	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cyclohexane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2-dibromo-3-chloro-propane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2-dibromomethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,2-dichlorobenzene	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
dichlorodifluoromethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,1-dichloroethane	2.5	0.6	0.54 J	0.50 J	1.8	0.81	0.78 J	5.4 J	0.84 J	1.8	0.50 J	ND	1.2	3.8	4.6	2.9	4.9	5.5	2.7 J	6.9	0.88 J	4.9	2.0	1.5	2.6
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.23 J	ND	ND	0.37 J	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	1.0	ND	ND	ND	0.86 J	ND	0.20 J	0.53 J	ND	0.21 J	ND	ND	0.19 J	0.38 J	0.42 J	ND	0.39 J	0.95 J	0.37 J	1.3 J	0.21 J	0.85 J	0.40 J	0.27 J	0.41 J
cis-1,2-dichloroethene	0.46 J	ND	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.21 J
trans-1,2-dichloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dioxane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Ethylbenzene	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NR	ND
2-hexanone	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
isopropylbenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
methyl acetate	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Methylene chloride	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.43 J	ND	ND	ND	ND
methylcyclohexane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
4-methyl-2-pentanone	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
methyl-tert-butyl-ether	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
styrene	NR	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,1,2,2-tetrachloroethane	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-trichlorobenzene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31 J	0.46 J	ND	ND	ND
Toluene	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	ND	ND	ND	0.67 J	ND	ND	0.66 J	ND	ND	ND	ND	ND	0.29 J	ND	0.39 J	0.48 J	ND	0.60 J	ND	0.48 J	0.24 J	ND	ND	0.26 J
1,1,2-trichloroethane	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	21	11	7.5	8.0	308	7.7	6.7	3.4 J	5.6	4.6	5.4	5.5	4.5	2.3	1.8	5.0	4.4	3.3	2.5	2.7	4.1	2.9	4.3	4.1	5.4
m,p-xylene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Trichlorofluoromethane	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichlorotrifluoromethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Trichlorotrifluoroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
o-xylene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
1,1,2-trichloro-1,2,2-trifluoroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
xylenes (total)	ND	ND	ND	ND	ND	ND	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
Mercury (EPA 245.1) ug/L	NR	<0.20	<0.20	<0.20	<0.20	<0.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TSS (SM20 2540D) mg/L	NR	16.0	<4.0	<4.0	<4.0	<4.0	ND	11	6	5	ND	ND	ND	22	ND	ND	ND	9	5	5	ND	ND	1.4	ND	1.3

APPENDIX A

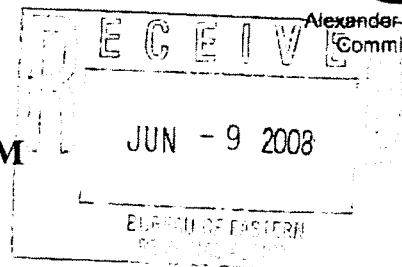
**NYSDEC EFFLUENT LIMITATIONS AND MONITORING
REQUIREMENTS AND MONTHLY DMRS**

**New York State Department of Environmental Conservation
Division of Water**

Bureau of Water Permits, 4th Floor
625 Broadway, Albany, New York 12233-3505
Phone: (518) 402-8111 • FAX: (518) 402-9029
Website: www.dec.state.ny.us



Alexander B. Grannis
Commissioner



MEMORANDUM

TO: Steven Scharf, DER
FROM: Jean Occidental, DOW, Bureau of Water Permits JO
SUBJECT: Naval Weapons Industrial Reserve Plant (NWIRP); DER Site # 1-01-001
DRAINAGE BASIN: na
DATE: June 6, 2008

In response to your request and the permittee's SPDES Permit Equivalent Application dated April 27, 2008, attached is the effluent criteria for the above noted groundwater remediation discharge.

The Division of Water does not have any regulatory authority over a discharge from a State, PRP, or Federal Superfund Site. The Division of Environmental Remediation will be responsible for ensuring compliance with the attached effluent criteria and approval of all engineering submissions. Additional Condition (1) identifies the contact to send all effluent results, engineering submissions, and modification requests. The Regional Water Engineer should be kept appraised of the status of these discharges and, in accordance with the attached criteria, receive a copy of the effluent results for informational purposes.

If you have any questions, please call me at (518) 402-8116.

Attachment

cc: (w/att) RWE, Region 1
C. Webber
BWP Permit Coordinator

Naval Weapons Industrial Reserve Plant

DER site # 1-01-001

Page 1 of 2

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning: April 1, 2009and lasting until: April 1, 2014

the discharges from the treatment facility to Groundwater shall be limited and monitored by the operator as specified below:

Outfall and Parameters	Limitations		Units	Minimum Monitoring Requirements	
	Daily Avg.	Daily Max.		Measurement Frequency	Sample Type
Treated Groundwater Remediation Discharge from: Recovery Wells 1, 2, and 3					
Flow	Monitor	1100	GPM	Continuous	Recorder
pH (range)	5.5 - 8.5		SU	Weekly	Grab
1,1-Dichloroethane	NA	5	µg/l	Monthly ¹	Grab
1,2-Dichloroethane	NA	0.6	µg/l	Monthly ¹	Grab
1,1-Dichloroethene	NA	5	µg/l	Monthly ¹	Grab
cis-1,2-Dichloroethene	NA	5	µg/l	Monthly ¹	Grab
trans-1,2-Dichloroethene	NA	5	µg/l	Monthly ¹	Grab
Tetrachloroethene	NA	5	µg/l	Monthly ¹	Grab
1,1,1-Trichloroethane	NA	5	µg/l	Monthly ¹	Grab
Trichloroethene	NA	5	µg/l	Monthly ¹	Grab
Vinyl chloride	NA	2	µg/l	Monthly ¹	Grab
Mercury	NA	0.25	µg/l	Monthly ¹	Grab

Footnotes:

- (1) The minimum measurement frequency shall be monthly following a period of 24 consecutive weekly sampling events showing no exceedances of the stated discharge limitations.

Naval Weapons Industrial Reserve Plant

DER site # 1-01-001

Page 1 of 2

Additional Conditions:

- (1) Discharge is not authorized until such time as an engineering submission showing the method of treatment is approved by the Department. The discharge rate may not exceed the effective or design treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to:

Steven Scharf
Division of Environmental Remediation
NYSDEC, 625 Broadway
Albany, NY 12233-7015
Phone: (518) 402-9620

With a copy sent to:

Regional Water Engineer
NYSDEC - Region 1
Building 40, SUNY Campus
Stony Brook, New York 11790-2356
Phone: (631) 444-0354

- (2) Only site generated wastewater is authorized for treatment and discharge.
- (3) Authorization to discharge is valid only for the period noted above but may be renewed if appropriate. A request for renewal must be received 6 months prior to the expiration date to allow for a review of monitoring data and reassessment of monitoring requirements.
- (4) Any use of corrosion/scale inhibitors, biocidal-type compounds, or other water treatment chemicals used in the treatment process must be approved by the department prior to use.
- (5) This discharge and administration of this discharge must comply with the substantive requirements of 6NYCRR Part 750.

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Remedial Bureau D

625 Broadway, 12th Floor, Albany, NY 12233-7013

P: (518) 402-9676 | F: (518) 402-9773

www.dec.ny.gov

August 31, 2017

Ms. Lora Fly
Remedial Project Manager
Naval Facilities Engineering Command
9324 Virginia Ave.
Bldg. Z-144, Code OPTE3-6
Norfolk, VA 23511

Re: SPDES Permit Equivalent Application,
Naval Weapons Industrial Reserve
Plant Site (NWIRP), Bethpage.
NYSDEC Site No 130003B

Lora:

The Department of the Navy (Navy) has requested to renew the State Pollutant Discharge Elimination System (SPDES) effluent for the GM-38 groundwater extraction and treatment system. The New York State Department Environmental Conservation (NYSDEC) has reviewed this request and has established discharge limits for the GM-38 system. These discharge limits, and associated reporting requirements, are detailed in the attached memorandum from the NYSDEC Division of Water.

Thanks and please do not hesitate to contact me at (518) 402-9478 or jason.pelton@dec.ny.gov with any questions.

Sincerely,

Jason M. Pelton
Project Manager
Remedial Section B, Remedial Bureau D
Division of Environmental Remediation

ec: B. Caldwell, EnSafe/Resolution Consultants
S. Edwards, NYSDEC
D. Hesler, NYSDEC
C. Haas, NYSDEC Region 1
W. Parish, NYSDEC Region 1
S. Karpinski, NYSDOH
J. DeFranco/J. Lovejoy, NCDOH
L. Thantu, USEPA Region 2

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Water, Bureau of Permits

625 Broadway, Albany, New York 12233-3505

P: (518) 402-8111 | F: (518) 402-9029

www.dec.ny.gov

MEMORANDUM

TO: Jason Pelton, DER
FROM: Robert Wither, Chief, South Permits Section, DOW
SUBJECT: Naval Weapons Industrial Reserve Plant, DER Site #1-30-003B
DATE: August 18, 2017

In response to your request received July 13, 2017, attached please find effluent limitations and monitoring requirements for the above noted remediation discharge.

The DOW does not have any regulatory authority over a discharge from a State, PRP, or Federal Superfund Site. DER will be responsible for ensuring compliance with the attached effluent limitations and monitoring requirements, and approval of all engineering submissions. Footnote 1 identifies the appropriate DER contact as the place to send all effluent results, engineering submissions, and modification requests. The Regional Water Engineer should be kept appraised of the status of this discharge and, in accordance with the attached criteria, receive a copy of the effluent results for informational purposes.

If you have any questions, please call me at 518-402-8123.

Attachment (Effluent Limitations and Monitoring Requirements)

cc: Cathy Haas, RWE, Region 1

EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning **September 1, 2017** and lasting until **August 31, 2027** the discharges from the wastewater treatment facility to groundwater, Class GA shall be limited and monitored by the operator as specified below:

Outfall Number and Parameter	Discharge Limitations		Units	Minimum Monitoring Requirements	
	Monthly Avg.	Daily Max		Measurement Frequency	Sample Type
Outfall 001 - Treated Remediation Discharge:					
Flow	Monitor	1100	GPM	Continuous	Recorder
pH (range)	5.5 - 8.5		SU	Monthly	Grab
1,1-Dichloroethane	NA	5	µg/l	Monthly	Grab
1,2-Dichloroethane	NA	0.6	µg/l	Monthly	Grab
1,1-Dichloroethene	NA	5	µg/l	Monthly	Grab
cis-1,2-Dichloroethene	NA	5	µg/l	Monthly	Grab
trans-1,2-Dichloroethene	NA	5	µg/l	Monthly	Grab
Tetrachloroethene	NA	5	µg/l	Monthly	Grab
1,1,1-Trichloroethane	NA	5	µg/l	Monthly	Grab
Trichloroethene	NA	5	µg/l	Monthly	Grab
Vinyl Chloride	NA	2	µg/l	Monthly	Grab
Mercury	NA	0.25	µg/l	Monthly	Grab
Chloroform	NA	5	µg/l	Monthly	Grab
Trichlorotrifluoroethane (Freon 113)	NA	5	µg/l	Monthly	Grab
1,4 Dioxane	NA	Monitor	µg/l	Monthly	Grab

Additional Conditions:

1. The discharge rate may not exceed the effective or design treatment system capacity. All monitoring data, engineering submissions and modification requests must be submitted to:

Jason Pelton
Division of Environmental Remediation
NYSDEC
625 Broadway
Albany, New York 12233- 7015
518-402-9870

With a copy sent to:

Regional Water Engineer, Region 1
NYSDEC
SUNY @ Stony Brook
50 Circle Road
Stony Brook, NY 11790-3409

2. Only site generated wastewater is authorized for treatment and discharge.
3. Authorization to discharge is valid only for the period noted above but may be renewed if appropriate. A request for renewal must be received 6 months prior to the expiration date to allow for a review of monitoring data and reassessment of monitoring requirements.
4. Both concentration (mg/l or µg/l) and mass loadings (lbs/day) must be reported to the Department for all parameters except flow and pH.
5. Any use of corrosion/scale inhibitors, biocidal-type compounds, or other water treatment chemicals used in the treatment process must be approved by the department prior to use.
6. This discharge and administration of this discharge must comply with the substantive requirements of 6NYCRR Part 750.



SBA-certified 8(a), SDB Company

11 November 2017

Mr. Jason Pelton
New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
625 Broadway
Albany, NY 12233-7252

**Subject: GROUNDWATER DISCHARGE MONITORING/AIR EMISSION REPORT
GM-38 AREA, NWIRP BETHPAGE, NY; DER SITE # 1-30-003B-OU 2
OCTOBER 2017 REPORTING PERIOD**

Dear Mr. Pelton:

KOMAN Government Solutions, LLC (KGS) is submitting this monthly monitoring report of the groundwater discharge and air emission results for the Groundwater Treatment Plant (GWTP) located at the Former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, NY, GM-38 Area. This report was prepared in accordance with GWTP operational requirements for DER Site # 1-30-003B-OU 2, and the SPDES Permit Equivalent # 13003B.

GWTP operational data from 1 October 2017 to 31 October 2017 are presented in Attachment A. During this reporting period, scheduled downtime occurred on 25 October 2017 to perform vapor carbon changeout in two 20,000 lbs vessels. The GWTP was down for approximately 11.5 hours. The scheduled downtime had minimum impact on the average flowrates during this reporting period.

As indicated in Attachment A, all SPDES permitted constituents were in compliance with regulatory guidelines during this reporting period.

Please contact me at 610-400-0622 with any questions or concerns you may have regarding this report.

Sincerely,

KOMAN Government Solutions, LLC

Stephane Roy
Project Manager

Attachment A: Groundwater and Air Sampling Results from October 2017

Cc: S. Edwards, NYSDEC
Donald Hesler, NYSDEC
C. Haas, NYSDEC Region 1
W. Parish, NYSDEC Region 1
Robert Wither, NYSDEC Division of Water
Jennifer Pilewski, NYSDEC – Region 1 Water Engineer
S. Karpinski, NYSDOH
J. Lovejoy, NCDH
L. Thantu, USEPA Region 2
Gerard Ennis, Nassau County Department of Public Works
Tom Licata, Town of Oyster Bay
Matt Russo, Town of Oyster Bay
Lora Fly, NAVFAC Mid-Atlantic RPM
Greg Pearman, NWIRP Bethpage
GM-38 Copy

ATTACHMENT A
GROUNDWATER AND AIR SAMPLING RESULTS
OCTOBER 2017

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Report
October 2017**

SPDES Parameters	October 2017 ⁽¹⁾					
	Daily Treated Effluent Maximum ⁽¹⁾	Units	RW-1 ⁽²⁾	RW-3 ⁽³⁾	Combined Influent ⁽³⁾	Treated Effluent
Well Depth	N/A	ft	445	530	N/A	N/A
Screened Interval	N/A	ft bgs	335-395 410-430	392-412 442-504	N/A	N/A
Sampling Date	N/A		10/3/17			
Effective Flowrate	1100	GPM	950	0.5	950	953
Total Flow	N/A	gallons	42,397,154	24,000	42,421,154	42,558,714
pH	5.5 - 8.5	SU	5.17	NS	5.17	6.17
Chloroform	5	µg/L	0.45 J	NS	0.45 J	ND (1.0)
1,1-Dichloroethane	5	µg/L	1.8	NS	1.80	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	0.36 J	NS	0.36	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.3	NS	1.30	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	6.8	NS	6.80	0.24 J
trans 1,2-Dichloroethene	5	µg/L	0.22 J	NS	0.22	ND (1.0)
Tetrachloroethene	5	µg/L	24	NS	24	ND (1.0)
1,1,1-Trichloroethane	5	µg/L	0.86 J	NS	0.86 J	ND (1.0)
Trichloroethene	5	µg/L	100	NS	100	0.67 J
1,1,2-Trichlorofluoroethane	5	µg/L	0.25 J	NS	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.21 J	NS	0.21 J	ND (1.0)
1,4-Dioxane	--	µg/L	ND (20)	NS	ND (20)	ND (20)
Mercury	0.00025	mg/L	ND (0.00010)	NS	ND (0.00010)	ND (0.00010)
Total Suspended Solids (TSS)	N/A	mg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)

Notes:

J - Estimated result between laboratory method detection limit and reporting limit

ND - Not detected above laboratory method detection limit. Reporting Limit (RL) given in parentheses.

NR - Not Recorded

N/A - Not Applicable

NS - Not Sampled

(1) Wastewater discharge equivalence permit renewed on 18 August 2017. Discharge limits established for 10 years. Chloroform, 1,4-dioxane and 1,1,2-trichlorotrifluoroethane are now monitored under the new permit.

(2) On 1 July 2015, the RW-1 flowrate was increased from ~800 gpm to ~1,000 gpm and RW-3 was taken off-line, as approved by NYSDEC on 20 April 2015. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

(3) Well RW-3 was turned on for a total of approximately 2 hours this period.

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
October 2017**

DAR Parameters	October 2017	Discharge Goal ⁽¹⁾	October 2017	
			Influent	Effluent
Process Stream				
Sampling Date	N/A	N/A	10/3/17	
Average Flowrate	CFM	N/A	NR	7,823
Total Flow	ft ³	N/A	NR	349,196,400
Total Flow	m ³	N/A	NR	9,888,141
1,2-Dichloroethane	µg/m ³	N/A	3.7 J	3.7
cis 1,2-Dichloroethene	µg/m ³	> 100,000 ⁽²⁾	100	160
trans 1,2-Dichloroethene	µg/m ³		ND	1.9 J
1,2-Dichloroethene (total)	µg/m ³	>100,000	100	160
Toluene	µg/m ³	N/A	1.9 J	ND
Total Xylene	µg/m ³	N/A	ND	ND
1,1,2-Trichloroethane	µg/m ³	N/A	2.2 J	ND
Trichloroethene	µg/m ³	2,600	1600	4.8
Vinyl Chloride	µg/m ³	560	3.6 J	1.9 J
Tetrachloroethene	µg/m ³	5,100	320	2.0 J

Notes:

CFM - cubic feet per minute

DAR - Division of Air Resources

J - Estimated result between laboratory method detection limit and reporting limit

N/A - Not Applicable

NR - Not recorded

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.

(2) Discharge goal is for total 1,2-Dichloroethene.

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Controlled Stack Emissions
October 2017**

DAR Parameters	Units	Discharge Goal ⁽¹⁾	October 2017
Sampling Date	N/A	N/A	10/3/17
Average Flowrate	CFM	N/A	7,823
Total Flow	ft ³	N/A	349,196,400
Total Flow	m ³	N/A	9,888,141
Trichloroethene	lb/hr	0.09	0.00014
Vinyl Chloride	lb/hr	0.02	0.00006
1,2 Dichloroethene	lb/hr	11	0.00469
1,2-Dichloroethane	lb/hr	N/A	0.00011
Toluene	lb/hr	N/A	0.00000
Total Xylene	lb/hr	N/A	0.00000
1,1,2-Trichloroethane	lb/hr	N/A	0.00000
Tetrachloroethene	lb/hr	0.18	0.00006

Notes:

CFM - cubic feet per minute

DAR - Division of Air Resources

N/A - Not Applicable

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.



SBA-certified 8(a), SDB Company

14 December 2017

Mr. Jason Pelton
New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
625 Broadway
Albany, NY 12233-7252

**Subject: GROUNDWATER DISCHARGE MONITORING/AIR EMISSION REPORT
GM-38 AREA, NWIRP BETHPAGE, NY; DER SITE # 1-30-003B-OU 2
NOVEMBER 2017 REPORTING PERIOD**

Dear Mr. Pelton:

KOMAN Government Solutions, LLC (KGS) is submitting this monthly monitoring report of the groundwater discharge and air emission results for the Groundwater Treatment Plant (GWTP) located at the Former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, NY, GM-38 Area. This report was prepared in accordance with GWTP operational requirements for DER Site # 1-30-003B-OU 2, and the SPDES Permit Equivalent # 13003B.

GWTP operational data from 1 November 2017 to 30 November 2017 are presented in Attachment A. During this reporting period, there was no scheduled or unscheduled downtime for the GWTP.

As indicated in Attachment A, all SPDES permitted constituents were in compliance with regulatory guidelines during this reporting period.

Please contact me at 610-400-0622 with any questions or concerns you may have regarding this report.

Sincerely,

KOMAN Government Solutions, LLC

Stephane Roy
Project Manager

Attachment A: Groundwater and Air Sampling Results from November 2017

Cc: S. Edwards, NYSDEC
Donald Hesler, NYSDEC
C. Haas, NYSDEC Region 1
W. Parish, NYSDEC Region 1
Robert Wither, NYSDEC Division of Water
Jennifer Pilewski, NYSDEC – Region 1 Water Engineer
S. Karpinski, NYSDOH
J. Lovejoy, NCDH
L. Thantu, USEPA Region 2
Gerard Ennis, Nassau County Department of Public Works
Tom Licata, Town of Oyster Bay
Matt Russo, Town of Oyster Bay
Lora Fly, NAVFAC Mid-Atlantic RPM
Greg Pearman, NWIRP Bethpage
GM-38 Copy

ATTACHMENT A
GROUNDWATER AND AIR SAMPLING RESULTS
NOVEMBER 2017

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Report
November 2017**

SPDES Parameters	November 2017 ⁽¹⁾					
Process Stream	Daily Treated Effluent Maximum ⁽¹⁾	Units	RW-1 ⁽²⁾	RW-3 ⁽³⁾	Combined Influent ⁽³⁾	Treated Effluent
Well Depth	N/A	ft	445	530	N/A	N/A
Screened Interval	N/A	ft bgs	335-395 410-430	392-412 442-504	N/A	N/A
Sampling Date	N/A		11/6/17			
Effective Flowrate	1100	GPM	968	0.0	968	998
Total Flow	N/A	gallons	41,830,600	0	41,830,600	43,093,000
pH	5.5 - 8.5	SU	5.04	NS	5.04	6.04
Chloroform	5	µg/L	0.31 J	NS	0.31 J	ND (1.0)
1,1-Dichloroethane	5	µg/L	2.0	NS	2.00	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.5	NS	1.50	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	6.6	NS	6.60	0.33 J
trans 1,2-Dichloroethene	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)
Tetrachloroethene	5	µg/L	22	NS	22	ND (1.0)
1,1,1-Trichloroethane	5	µg/L	0.91 J	NS	0.91 J	ND (1.0)
Trichloroethene	5	µg/L	100	NS	100	0.75 J
1,1,2-Trichlorotrifluoroethane	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.37 J	NS	0.37 J	ND (1.0)
1,4-Dioxane	--	µg/L	NS	NS	NS	1.9
Mercury	0.00025	mg/L	ND (0.00010)	NS	ND (0.00010)	ND (0.00010)
Total Suspended Solids (TSS)	N/A	mg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)

Notes:

J - Estimated result between laboratory method detection limit and reporting limit

ND - Not detected above laboratory method detection limit. Reporting Limit (RL) given in parentheses.

NR - Not Recorded

N/A - Not Applicable

NS - Not Sampled

(1) Wastewater discharge equivalence permit renewed on 18 August 2017. Discharge limits established for 10 years. Chloroform, 1,4-dioxane and 1,1,2-trichlorotrifluoroethane are now monitored under the new permit.

(2) On 1 July 2015, the RW-1 flowrate was increased from ~800 gpm to ~1,000 gpm and RW-3 was taken off-line, as approved by NYSDEC on 20 April 2015. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

(3) Well RW-3 was turned on for a total of approximately 1 hours this period.

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
November 2017**

DAR Parameters		Discharge Goal ⁽¹⁾	November 2017	
			Influent	Effluent
Process Stream				
Sampling Date			11/14/17	
Average Flowrate	CFM	N/A	NR	9,505
Total Flow	ft ³	N/A	NR	410,630,400
Total Flow	m ³	N/A	NR	11,627,758
1,2-Dichloroethane	µg/m ³	N/A	3.1 J	ND
cis 1,2-Dichloroethene	µg/m ³	> 100,000 ⁽²⁾	70	ND
trans 1,2-Dichloroethene	µg/m ³		1.7 J	ND
1,2-Dichloroethene (total)	µg/m ³	>100,000	72	ND
Toluene	µg/m ³	N/A	37	ND
Total Xylene	µg/m ³	N/A	ND	ND
1,1,2-Trichloroethane	µg/m ³	N/A	1.3 J	ND
Trichloroethene	µg/m ³	2,600	1400	5.2
Vinyl Chloride	µg/m ³	560	ND U	1.4 J
Tetrachloroethene	µg/m ³	5,100	260	1.8 J

Notes:

CFM - cubic feet per minute

DAR - Division of Air Resources

J - Estimated result between laboratory method detection limit and reporting limit

N/A - Not Applicable

NR - Not recorded

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.

(2) Discharge goal is for total 1,2-Dichloroethene.

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Controlled Stack Emissions
November 2017**

DAR Parameters	Units	Discharge Goal ⁽¹⁾	November 2017
Sampling Date			11/14/17
Average Flowrate	CFM	N/A	9,505
Total Flow	ft ³	N/A	410,630,400
Total Flow	m ³	N/A	11,627,758
Trichloroethene	lb/hr	0.09	0.00019
Vinyl Chloride	lb/hr	0.02	0.00005
1,2 Dichloroethene	lb/hr	11	0.00000
1,2-Dichloroethane	lb/hr	N/A	0.00000
Toluene	lb/hr	N/A	0.00000
Total Xylene	lb/hr	N/A	0.00000
1,1,2-Trichloroethane	lb/hr	N/A	0.00000
Tetrachloroethene	lb/hr	0.18	0.00006

Notes:

CFM - cubic feet per minute

DAR - Division of Air Resources

N/A - Not Applicable

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.



SBA-certified 8(a), SDB Company

8 January 2018

Mr. Jason Pelton
New York State Department of Environmental Conservation
Division of Solid & Hazardous Materials
625 Broadway
Albany, NY 12233-7252

**Subject: GROUNDWATER DISCHARGE MONITORING/AIR EMISSION REPORT
GM-38 AREA, NWIRP BETHPAGE, NY; DER SITE # 1-30-003B-OU 2
DECEMBER 2017 REPORTING PERIOD**

Dear Mr. Pelton:

KOMAN Government Solutions, LLC (KGS) is submitting this monthly monitoring report of the groundwater discharge and air emission results for the Groundwater Treatment Plant (GWTP) located at the Former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, NY, GM-38 Area. This report was prepared in accordance with GWTP operational requirements for DER Site # 1-30-003B-OU 2, and the SPDES Permit Equivalent # 13003B.

GWTP operational data from 1 December 2017 to 31 December 2017 are presented in Attachment A. During this reporting period, there was no scheduled or unscheduled downtime for the GWTP.

As indicated in Attachment A, all SPDES permitted constituents were in compliance with regulatory guidelines during this reporting period.

Please contact me at 610-400-0622 with any questions or concerns you may have regarding this report.

Sincerely,

KOMAN Government Solutions, LLC

Stephane Roy
Project Manager

Attachment A: Groundwater and Air Sampling Results from December 2017

Cc: S. Edwards, NYSDEC
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GM-38 Copy

ATTACHMENT A
GROUNDWATER AND AIR SAMPLING RESULTS
DECEMBER 2017

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Report
December 2017**

SPDES Parameters	December 2017 ⁽¹⁾					
Process Stream	Daily Treated Effluent Maximum ⁽¹⁾	Units	RW-1 ⁽²⁾	RW-3 ⁽³⁾	Combined Influent ⁽³⁾	Treated Effluent
Well Depth	N/A	ft	445	530	N/A	N/A
Screened Interval	N/A	ft bgs	335-395 410-430	392-412 442-504	N/A	N/A
Sampling Date	N/A		12/4/17			
Effective Flowrate	1100	GPM	923	0.2	923	954
Total Flow	N/A	gallons	41,767,639	8,400	41,776,039	43,174,821
pH	5.5 - 8.5	SU	5.08	NS	5.08	5.98
Chloroform	5	µg/L	0.31 J	NS	0.31 J	ND (1.0)
1,1-Dichloroethane	5	µg/L	1.4	NS	1.4	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	0.37 J	NS	0.37 J	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.1	NS	1.1	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	5.7	NS	5.7	0.21 J
trans 1,2-Dichloroethene	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)
Tetrachloroethene	5	µg/L	22	NS	22	ND (1.0)
1,1,1-Trichloroethane	5	µg/L	0.64 J	NS	0.64 J	ND (1.0)
Trichloroethene	5	µg/L	98	NS	98	0.64 J
1,1,2-Trichlorotrifluoroethane	5	µg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.22 J	NS	0.22 J	ND (1.0)
1,4-Dioxane	--	µg/L	NS	NS	NS	1.90
Mercury	0.00025	mg/L	ND (0.00010)	NS	ND (0.00010)	ND (0.00010)
Total Suspended Solids (TSS)	N/A	mg/L	ND (1.0)	NS	ND (1.0)	ND (1.0)

Notes:

J - Estimated result between laboratory method detection limit and reporting limit

ND - Not detected above laboratory method detection limit. Reporting Limit (RL) given in parentheses.

NR - Not Recorded

N/A - Not Applicable

NS - Not Sampled

(1) Wastewater discharge equivalence permit renewed on 18 August 2017. Discharge limits established for 10 years. Chloroform, 1,4-dioxane and 1,1,2-trichlorotrifluoroethane are now monitored under the new permit.

(2) On 1 July 2015, the RW-1 flowrate was increased from ~800 gpm to ~1,000 gpm and RW-3 was taken off-line, as approved by NYSDEC on 20 April 2015. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

(3) Well RW-3 was turned on for a total of approximately 1 hour this period.

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
December 2017**

DAR Parameters		Discharge Goal ⁽¹⁾	December 2017	
			Influent	Effluent
Process Stream				
Sampling Date			12/4/17	
Average Flowrate	CFM	N/A	NR	9,466
Total Flow	ft ³	N/A	NR	422,544,384
Total Flow	m ³	N/A	NR	11,965,125
1,2-Dichloroethane	µg/m ³	N/A	3.2	ND
cis 1,2-Dichloroethene	µg/m ³	> 100,000 ⁽²⁾	73	ND
trans 1,2-Dichloroethene	µg/m ³		2.0 J	ND
1,2-Dichloroethene (total)	µg/m ³	>100,000	76	ND
Toluene	µg/m ³	N/A	2.9 J	0.84 J
Total Xylene	µg/m ³	N/A	ND	ND
1,1,2-Trichloroethane	µg/m ³	N/A	ND U	ND
Trichloroethene	µg/m ³	2,600	1300	9.4
Vinyl Chloride	µg/m ³	560	2.0	ND
Tetrachloroethene	µg/m ³	5,100	280	3.4 J

Notes:

CFM - cubic feet per minute

DAR - Division of Air Resources

J - Estimated result between laboratory method detection limit and reporting limit

N/A - Not Applicable

NR - Not recorded

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.

(2) Discharge goal is for total 1,2-Dichloroethene.

**GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Controlled Stack Emissions
December 2017**

DAR Parameters	Units	Discharge Goal ⁽¹⁾	December 2017
Sampling Date			12/4/17
Average Flowrate	CFM	N/A	9,466
Total Flow	ft ³	N/A	422,544,384
Total Flow	m ³	N/A	11,965,125
Trichloroethene	lb/hr	0.09	0.00033
Vinyl Chloride	lb/hr	0.02	0.00000
1,2 Dichloroethene	lb/hr	11	0.00000
1,2-Dichloroethane	lb/hr	N/A	0.00000
Toluene	lb/hr	N/A	0.00010
Total Xylene	lb/hr	N/A	0.00000
1,1,2-Trichloroethane	lb/hr	N/A	0.00000
Tetrachloroethene	lb/hr	0.18	0.00012

Notes:

CFM - cubic feet per minute

DAR - Division of Air Resources

N/A - Not Applicable

(1) Discharge goal as approved by NYSDEC's letter dated 31 October 2013.

APPENDIX B

**NYSDEC AIR DISCHARGE LIMIT
DOCUMENTATION**

New York State Department of Environmental Conservation
Division of Environmental Remediation
Remedial Action Bureau A, 12th Floor
625 Broadway, Albany, New York 12233-7015
Phone: (518) 402-9620 FAX: (518) 402-9022



Joseph Martens
Commissioner

October 31, 2013

Lora Fly
Remedial Program Manager
NAVFAC Mid-Atlantic
Northeast IPT
9742 Maryland Avenue
Norfolk, VA, 23511-3095

RE: Northrop Grumman, Naval Weapons Industrial Reserve Plant (NWIRP) and Grumman Steel Los Sites, NYSDEC Site No.'s I-30-003 A & B.

Dear Ms. Fly:

Tetra Tech NUS Inc., on behalf of the Department of the Navy NAVFAC Midlantic, has submitted an application to remove the GM 38 Area Groundwater Extraction and Treatment system impregnated Xeolite™ resin from the air discharge treatment system. Currently, the air treatment system uses a combined activated carbon with permanganate impregnated resin treatment train. The New York State Department of Environmental Conservation (NYSDEC) has reviewed the Department of the Navy application and concurs with the findings presented.

The routine monitoring, as detailed in Table 1, clearly indicates that vinyl chloride, one of the main contaminants of concern, has diminished to almost non-detect, and discharge concentrations have dropped to below the limit to require air treatment for the other contaminants as well. However, NAVFAC Midlantic is still proposing activated carbon to reduce the other discharge contaminant levels. Therefore, the NYSDEC hereby approves the proposed changes to the GM 38 Area air treatment. The Xeolite™ resin beds will remain in place should reactivation, based on routine monitoring, be required.

If you have any questions in the interim, please contact me at (518)402-9620.

Sincerely,

Steven M. Scharf, P.E.
Project Engineer
Remedial Action Bureau A
Division of Environmental Remediation

EC: J. Swartwout
S. Scharf
W. Parish, Region 1
S. Karpinski, NYSDOH
E. Hannon, NGC
D. Stern, Arcadis
D. Brayack, TTNUS



NOR-01264

November 21, 2011

Mr. Stephen Scharf
New York Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Remedial Action A
625 Broadway, 11th Floor
Albany, New York 12233-7015

Reference: CLEAN Contract No. N62470-08-D-1001
Contract Task Order WE06

Subject: Proposed Modification to Discharge Limits for Off Gas Volatile Organic Compounds (VOCs)
for Air Stripping Tower
GM-38 Offsite Groundwater Treatment Plant,
NWIRP Bethpage, New York

Dear Mr. Scharf:

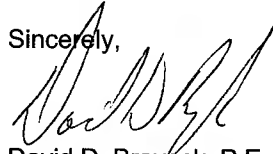
On behalf of the Navy, please find enclosed a copy of the subject document. This document presents an evaluation of current concentrations of off gas VOCs from the GM-38 groundwater treatment plant air-stripping tower (prior to treatment with granular activated carbon). Maximum emission rates were re-evaluated due to decreasing maximum concentrations of target VOCs in un-treated air stripper AS-1 off gas. In addition, breakthrough of target contaminants (e.g., cis-1,2-dichloroethene) is beginning to occur in the granular activated carbon bed. Maximum emission rates were re-evaluated to provide a determination if breakthrough of contaminants would trigger the need for a replacement of the granular activated carbon bed.

Existing Discharge Goals were established in the "Final Operation, Maintenance and Monitoring Plan for Groundwater Treatment Plant GM-38 Area Groundwater Remediation" prepared by Tetra Tech EC (April 2010). Existing goals were based on emission estimates for a 95% reduction (see Attachment A), instead of being based on the original DAR-1 analysis of air stripper off gas. Emission estimates were calculated using the air stripper design flow rate of 8,000 cubic feet per minute (cfm), and previous contaminant discharge rates in pounds per hour (lb/hr). Original emission estimates are provided in Attachment B.

Proposed Revised Discharge Goals were calculated using an average flow rate of 9,200 cfm, January to March 2011 VOC loading rates (taken from the Quarterly Operations Report First Quarter 2011 from ECOR Federal Services), and the Actual Annual % of Annual Guideline Concentrations (AGCs), taken from the revised DAR-1 Model Output. The revised DAR-1 Model Output is provided in Attachment C. Existing Discharge Goals and Proposed Revised Discharge Goals are compared in tabular format in the first page of the attachment. Proposed Revised Discharge Goals for trichloroethene (TCE) are the same as previous. The proposed limit for tetrachloroethene (PCE) is approximately 10 times the previous limit, and vinyl chloride is approximately 2 times the previous limit. Revised Discharge Goals for 1,2-dichloroethene (goals are the same for cis-1,2-dichloroethene) are 100 times greater than previously established limits. It is recommended that these revised limits replace previous discharge goals, and treatment of air stripper off gas by granular activated carbon is recommended to continue for TCE and PCE, with no treatment required for vinyl chloride and 1,2-dichloroethene.

If you have any questions please contact Ms. Lora Fly, NAVFAC Mid-LANT, at (757) 341-2012.

Sincerely,



David D. Brayack, P.E.
Project Manager

Enclosure: (1) Proposed Modification to Discharge Limits for Off Gas Volatile Organic Compounds
(VOCs) for Air Stripping Tower
GM-38 Offsite Groundwater Treatment Plant

Distribution:

Mid-Lant, Lora Fly
NYSDEC (Albany), Henry Wilkie
NYSDOH (Troy), Steve Karpinski
NAVAIR, Richard Smith
USEPA, Carol Stein
NGC, Kent Smith
Tetra Tech NUS, Dave Brayack
ECOR Solutions, Al Taormina
Administrative Record
Public Repository
Project File

Tetra Tech NUS, Inc.

5700 Lake Wright Drive, Suite 309, Norfolk, VA 23502
Tel 757.461.3768 Fax 757.461.4148 www.ttnus.com

TABLE 1
COMPARISON OF EXISTING DISCHARGE GOALS WITH ACTUAL EMISSIONS AND PROPOSED DISCHARGE GOALS
AIR STRIPPING TOWER GM-38 OFFSITE GROUNDWATER TREATMENT PLANT
NWIRP BETHPAGE, NEW YORK

Chemical	Existing Discharge Goal		Actual January to March 2011 Values (Pre-Off Gas Treatment)		Proposed Revised Discharge Goals based on DAR-1 Analysis	
	Existing Discharge Loading Rate (pounds (lbs)/hour) ⁽¹⁾	Equivalent Existing Discharge Goals (µg/m ³) ⁽²⁾	Actual Jan-Mar 2011 Concentration (µg/m ³) ⁽³⁾	Actual VOC Loading Pre-Off Gas Treatment (lbs/hour) ⁽⁴⁾	Proposed Discharge Loading Rate (lbs/hour) ⁽⁵⁾	Equivalent Proposed Discharge Goal (µg/m ³) ⁽⁵⁾
TCE	0.09	2,600	10,000	0.345	0.09	2,600
PCE	0.02	580	6,800	0.234	0.18	5,100
Vinyl Chloride	0.01	290	76	0.003	0.02	560
1,2-Dichloroethene (total)	0.03	870	750	0.026	11	greater than 100,000

Notes:

⁽¹⁾Existing Discharge Goals are based on the design flow rate of 8,000 cfm. Existing Discharge Goals were taken from the Final Operations and Maintenance Plan for GM-38 Area Groundwater Remediation from Tetra Tech EC. Existing goals were based on emission estimates for a 95% reduction, and not the previous DAR-1 Analysis. Attachment B (provided at the end of this package) provides the original emission estimates.

⁽²⁾Existing Discharge Goals were calculated using the actual flow rate of 9,200 cfm and the existing discharge loading rate in pounds per hour (lb/hr).

⁽³⁾Values were taken from the Quarterly Operations Report First Quarter 2011 from ECOR Federal Services. Values were the maximum effluent concentration in off gas from air stripper stack AS-1 prior to treatment with vapor phase granular activated carbon (GAC), for the months of January, February and March 2011.

⁽⁴⁾Actual VOC Loading was calculated using an average flow rate of 9,200 cfm and the January-March 2011 concentrations. Existing off gas treatment consists of two stage vapor phase GAC followed by potassium permanganate zeolite media to provide additional treatment for vinyl chloride.

⁽⁵⁾Values were calculated using an average flow rate of 9,200 cfm, and the Actual Annual % of the AGCs from the 2011 DAR-1 Model Output to achieve air quality requirements.

ATTACHMENT A
2008 AIR PERMIT SUBMITTAL

New York State Department of Environmental Conservation Air Permit Application



DEC ID									
-									

APPLICATION ID									
-								/	

OFFICE USE ONLY									

Section I - Certification

Title V Certification	
I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information [required pursuant to 6 NYCRR 201-6.3(d)] I believe the information is, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.	
Responsible Official	Title
Signature	Date ____ / ____ / ____

State Facility Certification	
I certify that this facility will be operated in conformance with all provisions of existing regulations.	
Responsible Official	Title
Signature	Date ____ / ____ / ____

Section II - Identification Information

Title V Facility Permit <u>N/A</u>	<input type="checkbox"/> New	<input type="checkbox"/> Significant Modification	<input type="checkbox"/> Administrative Amendment	State Facility Permit <u>N/A</u>	<input type="checkbox"/> New	<input type="checkbox"/> Modification
<input type="checkbox"/> Renewal	<input type="checkbox"/> Minor Modification	General Permit Title: _____		General Permit Title: _____		
<input checked="" type="checkbox"/> Application involves construction of new facility			<input type="checkbox"/> Application involves construction of new emission unit(s)			

Owner/Firm			
Name <u>US Navy/NAVFAC Midlant</u>			
Street Address <u>9742 Maryland Ave, Bldg Z-144</u>			
City <u>Norfolk</u>	State <u>VA</u>	Country <u>US</u>	Zip <u>23511-3095</u>
Owner Classification <input checked="" type="checkbox"/> Federal		<input type="checkbox"/> State	<input type="checkbox"/> Municipal
<input type="checkbox"/> Corporation/Partnership		<input type="checkbox"/> Individual	Taxpayer ID
Facility <input type="checkbox"/> Confidential			
Name <u>Naval Weapons Industrial Reserve Plant (NWIRP) GM-38 Area</u>			
Location Address <u>Bethpage</u>			
<input type="checkbox"/> City / <input checked="" type="checkbox"/> Town / <input type="checkbox"/> Village <u>Oyster Bay, New York</u>			Zip <u>11714</u>
Project Description <input type="checkbox"/> Continuation Sheet(s)			
<u>Air stripping of groundwater to remove VOCs</u>			

Owner/Firm Contact Mailing Address			
Name (Last, First, Middle Initial) <u>Fly, Lora</u>		Phone No. (757)444-0781	
Affiliation <u>Department of the Navy</u>		Title <u>Remedial PM</u>	Fax No. ()
Street Address <u>9742 Maryland Ave. Bldg Z-144</u>			
City <u>Norfolk</u>	State <u>VA</u>	Country <u>US</u>	Zip <u>23511-3095</u>
Facility Contact Mailing Address			
Name (Last, First, Middle Initial) <u>Same</u>		Phone No. ()	
Affiliation		Title	Fax No. ()
Street Address			
City	State	Country	Zip

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Section III - Facility Information

Classification					
<input type="checkbox"/> Hospital	<input type="checkbox"/> Residential	<input type="checkbox"/> Educational/Institutional	<input type="checkbox"/> Commercial	<input checked="" type="checkbox"/> Industrial	<input type="checkbox"/> Utility

Affected States (Title V Only) N/A					
<input type="checkbox"/> Vermont	<input type="checkbox"/> Massachusetts	<input type="checkbox"/> Rhode Island	<input type="checkbox"/> Pennsylvania	Tribal Land: _____	
<input type="checkbox"/> New Hampshire	<input type="checkbox"/> Connecticut	<input type="checkbox"/> New Jersey	<input type="checkbox"/> Ohio	Tribal Land: _____	

SIC Codes									
9999									

Facility Description		<input type="checkbox"/> Continuation Sheet(s)
Groundwater Remediation by Air Stripping followed by Vapor-Phase GAC for emission control		

Compliance Statements (Title V Only) N/A	
<p>I certify that as of the date of this application the facility is in compliance with all applicable requirements: <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>If one or more emission units at the facility are not in compliance with all applicable requirements at the time of signing this application (the 'NO' box must be checked), the noncomplying units must be identified in the "Compliance Plan" block on page 8 of this form along with the compliance plan information required. For all emission units at this facility that are operating <u>in compliance</u> with all applicable requirements complete the following:</p> <ul style="list-style-type: none"> <input type="checkbox"/> This facility will continue to be operated and maintained in such a manner as to assure compliance for the duration of the permit, except those units referenced in the compliance plan portion of Section IV of this application. <input type="checkbox"/> For all emission units, subject to any applicable requirements that will become effective during the term of the permit, this facility will meet all such requirements on a timely basis. <input type="checkbox"/> Compliance certification reports will be submitted at least once a year. Each report will certify compliance status with respect to each requirement, and the method used to determine the status. 	

Facility Applicable Federal Requirements N/A										<input type="checkbox"/> Continuation Sheet(s)
Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause	
	CERCLA	all substantive requirements								

Facility State Only Requirements										<input type="checkbox"/> Continuation Sheet(s)
Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause	

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Section IV - Emission Unit Information

Emission Unit Description										<input type="checkbox"/> Continuation Sheet(s)
EMISSION UNIT	0	-	0	0	E	U	1			
Air Stripper AS-1 for groundwater remediation, provided with activated carbon for emission control.										
The emission point is stack 00ST-1. The 2-stage VGAC is followed by a 3rd vessel containing a potassium permanganate zeolite media for increased VC capacity.										

Building					<input type="checkbox"/> Continuation Sheet(s)	
Building	Building Name			Length (ft)	Width (ft)	Orientation
BLDG-1	Treatment Plant			75	75	0

Emission Point							<input type="checkbox"/> Continuation Sheet(s)
EMISSION PT.	00ST1						
Ground Elev. (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
90	40	15	36	80	Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	
19	8020			BLDG-1	50		
EMISSION PT.							
Ground Elev. (ft)	Height (ft)	Height Above Structure (ft)	Inside Diameter (in)	Exit Temp. (°F)	Cross Section		
					Length (in)	Width (in)	
Exit Velocity (FPS)	Exit Flow (ACFM)	NYTM (E) (KM)	NYTM (N) (KM)	Building	Distance to Property Line (ft)	Date of Removal	

Emission Source/Control								<input type="checkbox"/> Continuation Sheet(s)
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
AS-1	I				048	Granular Act. Carbon	Air Stripping Column	
Design Capacity	Design Capacity Units			Waste Feed		Waste Type		
	Code	Description		Code	Description	Code	Description	
Emission Source		Date of Construction	Date of Operation	Date of Removal	Control Type		Manufacturer's Name/Model No.	
ID	Type				Code	Description		
Design Capacity	Design Capacity Units			Waste Feed		Waste Type		
	Code	Description		Code	Description	Code	Description	

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Section IV - Emission Unit Information (continued)

Process Information										<input type="checkbox"/> Continuation Sheet(s)	
EMISSION UNIT 0 - 00 E U 1								PROCESS		PR 1	
Description											
The remedial system is air stripping, using a packed column at a groundwater flow rate of 1,100 gpm (plus 100 gpm recycle, for a total of 1,200 gpm). Vapor phase treatment includes the use of 3 vessels, a 2-stage GAC unit, followed by a 3rd vessel containing a potassium permanganate impregnated zeolite for increased VC capacity. Prior to entering the vapor-phase GAC adsorption system, the humidity of the air stripper exhaust is reduced to approximately 50 percent or less to optimize the efficiency of the vapor-phase GAC.											
Air Stripper AS-1: Existing. Type: Vertical, Cylindrical Construction: Aluminum											
Packing: 25-foot Jaeger Tripack. Dimensions: 10.0 ft. Dia x 47 ft. H											
Source Classification Code (SCC)		Total Thruput		Thruput Quantity Units							
		Quantity/Hr	Quantity/Yr	Code	Description						
<input type="checkbox"/> Confidential <input checked="" type="checkbox"/> Operating at Maximum Capacity <input type="checkbox"/> Activity with Insignificant Emissions		Operating Schedule		Building		Floor/Location					
		Hrs/Day	Days/Yr								
		24	365	BLDG-1		Main					
Emission Source/Control Identifier(s)											
AS-1											
EMISSION UNIT -								PROCESS			
Description											
Source Classification Code (SCC)		Total Thruput		Thruput Quantity Units							
		Quantity/Hr	Quantity/Yr	Code	Description						
<input type="checkbox"/> Confidential <input type="checkbox"/> Operating at Maximum Capacity <input type="checkbox"/> Activity with Insignificant Emissions		Operating Schedule		Building		Floor/Location					
		Hrs/Day	Days/Yr								
Emission Source/Control Identifier(s)											

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Section IV - Emission Unit Information (continued)

Emission Unit	Emission Point	Process	Emission Source	Emission Unit Applicable Federal Requirements										<input type="checkbox"/> Continuation Sheet(s)	
				Title	Type	Part	Sub Part	Section	Sub Division	Parag.	Sub Parag.	Clause	Sub Clause		
-															
-															
-															
-															

Emission Unit	Emission Point	Process	Emission Source	Emission Unit State Only Requirements										<input type="checkbox"/> Continuation Sheet(s)	
				Title	Type	Part	Sub Part	Section	Sub Division	Parag.	Sub Parag.	Clause	Sub Clause		
-															
-															
-															
-															

Emission Unit Compliance Certification											<input type="checkbox"/> Continuation Sheet(s)	
Rule Citation												
Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause			
6	NYCRR	212										
<input checked="" type="checkbox"/> Applicable Federal Requirement				<input type="checkbox"/> State Only Requirement				<input type="checkbox"/> Capping				
Emission Unit	Emission Point	Process	Emission Source	CAS No.			Contaminant Name					
0-00EU1	00ST1	PR1	AS-1	00079 - 01 - 6			Trichloroethylene					
Monitoring Information												
<input type="checkbox"/> Continuous Emission Monitoring				<input type="checkbox"/> Monitoring of Process or Control Device Parameters as Surrogate								
<input checked="" type="checkbox"/> Intermittent Emission Testing				<input type="checkbox"/> Work Practice Involving Specific Operations								
<input type="checkbox"/> Ambient Air Monitoring				<input type="checkbox"/> Record Keeping/Maintenance Procedures								
Description												
Monthly grab samples analyzed for VOCs from the vapor phase treatment system influent, effluent and two intermediate locations.												
Work Practice		Process Material					Reference Test Method					
Type	Code	Description										
Parameter												
Code		Description					Manufacturer Name/Model No.					
23		Concentration										
Limit				Limit Units								
Upper		Lower		Code	Description							
3,125				255	micrograms per cubic meter							
Averaging Method			Monitoring Frequency				Reporting Requirements					
Code	Description		Code	Description			Code	Description				
01	Instantaneous		05	Monthly			10	Upon Request				

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Section IV - Emission Unit Information (continued)

Determination of Non-Applicability (Title V Only) N/A <input type="checkbox"/> Continuation Sheet(s)										
Rule Citation										
Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause	
Emission Unit	Emission Point	Process	Emission Source			<input type="checkbox"/> Applicable Federal Requirement <input type="checkbox"/> State Only Requirement				
-										
Description										
Rule Citation										
Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause	
Emission Unit	Emission Point	Process	Emission Source			<input type="checkbox"/> Applicable Federal Requirement <input type="checkbox"/> State Only Requirement				
-										
Description										
Process Emissions Summary <input type="checkbox"/> Continuation Sheet(s)										
EMISSION UNIT	0 - 0 0 E U 1					PROCESS	P	R	1	
CAS No.	Contaminant Name			% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined		
0079 - 01 - 6	Trichloroethylene					95	1.87	02		
PTE			Standard Units	PTE How Determined		Actual				
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)			
0.09	99			02						
EMISSION UNIT	0 - 0 0 E U 1					PROCESS	P	R	1	
CAS No.	Contaminant Name			% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined		
00075 - 01 - 4	Vinyl Chloride					95	0.17	03		
PTE			Standard Units	PTE How Determined		Actual				
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)			
0.01	3.7			02						
EMISSION UNIT	0 - 0 0 E U 1					PROCESS	P	R	1	
CAS No.	Contaminant Name			% Thruput	% Capture	% Control	ERP (lbs/hr)	ERP How Determined		
000540 - 59 - 0	1,2-Dichloroethylene					95	0.6	02		
PTE			Standard Units	PTE How Determined		Actual				
(lbs/hr)	(lbs/yr)	(standard units)				(lbs/hr)	(lbs/yr)			
0.03	7.3			02						

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Section IV - Emission Unit Information (continued)

EMISSION UNIT		Emission Unit Emissions Summary				<input type="checkbox"/> Continuation Sheet(s)
0	-	0	0	E	U	1
CAS No.		Contaminant Name				
00107- 06 - 2		1,2-Dichloroethane				
ERP (lbs/yr)	PTE Emissions		Actual			
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)		
13.4	Below Reporting Threshold BRT					
CAS No.		Contaminant Name				
00108 - 88 - 3		Toluene				
ERP (lbs/yr)	PTE Emissions		Actual			
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)		
72.7	BRT		BRT			
CAS No.		Contaminant Name				
01330- 20 - 7		Xylene				
ERP (lbs/yr)	PTE Emissions		Actual			
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)		
77.1	BRT		BRT			
CAS No.		Contaminant Name				
-		1,1,2-Trichloroethane				
ERP (lbs/yr)	PTE Emissions		Actual			
	(lbs/hr)	(lbs/yr)	(lbs/hr)	(lbs/yr)		
	BRT		BRT			

Compliance Plan													<input type="checkbox"/> Continuation Sheet(s)
For any emission units which are <u>not in compliance</u> at the time of permit application, the applicant shall complete the following													
Consent Order			Certified progress reports are to be submitted every 6 months beginning ____ / ____ / ____										
Emission Unit	Process	Emission Source	Applicable Federal Requirement										
			Title	Type	Part	Sub Part	Section	Sub Division	Parag.	Sub Parag.	Clause	Sub Clause	
Remedial Measure / Intermediate Milestones										R/I	Date Scheduled		

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Section IV - Emission Unit Information (continued)

Request for Emission Reduction Credits						<input type="checkbox"/> Continuation Sheet(s)			
EMISSION UNIT -									
Emission Reduction Description									
Contaminant Emission Reduction Data									
Baseline Period ____ / ____ / ____ to ____ / ____ / ____						Reduction			
						Date	Method		
						____ / ____ / ____			
CAS No.		Contaminant Name				ERC (lbs/yr)			
						Netting		Offset	
-									
-									
-									
Facility to Use Future Reduction									
Name						APPLICATION ID			
						- / - / - / - / - / - / - / - / - / -			
Location Address									
<input type="checkbox"/> City / <input type="checkbox"/> Town / <input type="checkbox"/> Village						State		Zip	

Use of Emission Reduction Credits						<input type="checkbox"/> Continuation Sheet(s)			
EMISSION UNIT -									
Proposed Project Description									
Contaminant Emissions Increase Data									
CAS No.		Contaminant Name				PEP (lbs/yr)			
-									
Statement of Compliance									
<input type="checkbox"/> All facilities under the ownership of this "ownership/firm" are operating in compliance with all applicable requirements and state regulations including any compliance certification requirements under Section 114(a)(3) of the Clean Air Act Amendments of 1990, or are meeting the schedule of a consent order.									
Source of Emission Reduction Credit - Facility									
Name						PERMIT ID			
						- / - / - / - / - / - / - / - / - / -			
Location Address									
<input type="checkbox"/> City / <input type="checkbox"/> Town / <input type="checkbox"/> Village						State		Zip	
Emission Unit	CAS No.	Contaminant Name			ERC (lbs/yr)				
					Netting		Offset		
-	-								
-	-								
-	-								



DEC ID									
-									

Supporting Documentation

- P.E. Certification (form attached)
- List of Exempt Activities (form attached)
- Plot Plan
- Methods Used to Determine Compliance (form attached)
- Calculations
- Air Quality Model (____ / ____ / ____)
- Confidentiality Justification
- Ambient Air Monitoring Plan (____ / ____ / ____)
- Stack Test Protocols/Reports (____ / ____ / ____)
- Continuous Emissions Monitoring Plans/QA/QC (____ / ____ / ____)
- MACT Demonstration (____ / ____ / ____)
- Operational Flexibility: Description of Alternative Operating Scenarios and Protocols
- Title IV: Application/Registration
- ERC Quantification (form attached)
- Use of ERC(s) (form attached)
- Baseline Period Demonstration
- Analysis of Contemporaneous Emission Increase/Decrease
- LAER Demonstration (____ / ____ / ____)
- BACT Demonstration (____ / ____ / ____)
- Other Document(s): _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)
 _____ (____ / ____ / ____)

ATTACHMENT B

2008 EMISSION ESTIMATES BASED ON 95% REMOVAL

**ATTACHMENT 1
Emission Estimate**

POTENTIAL EMISSION ESTIMATES,
USED TO DEVELOP 95% REDUCTION
OF EMISSION VALUES AS BASED ON
INFLUENT GROUNDWATER CONCENTRATIONS
(95% REDUCTION OF EMISSION
VALUES ARE PROVIDED
ON PAGE 7 OF THE 2008 AIR
PERMIT APPLICATION PROCESS
EMISSIONS SUMMARY)

Feed Water Flow 1,100 gpm: max or normal
250 m³/hr
Water Flow Including Recycle 1,200 gpm: max or normal
273 m³/hr
Air Flow 8,000 cfm
13,592 m³/hr
A/W vol ratio 50

EXAMPLE EMISSION CALC: Vinyl Chloride
4.8 ug/L x 1000 L/m³ x 250 m³ water/13,623 m³ air = 88 ug/m³

Name	CAS Number	Toxicity: H/M/L ²	VOC ³	HAP ⁴	GW Conc. ¹		Effluent Conc. ¹		Uncontrolled Stripper Exhaust							
					Max ug/L	Avg ug/L	Max ug/L	Avg ug/L	Max lb/day	Avg lb/day	Max lb/hr	Avg lb/hr	Max gm/sec	Avg gm/sec	Max ug/m ³	Avg ug/m ³
1,1,1-Trichloroethane (Methyl Chloroform)	00071-55-6	L	No	Yes	3	3.0			0.04	0.04	0.00	0.00	2.08E-04	2.08E-04	55	55
1,1,2-Trichloroethane	00079-00-5	M	Yes	Yes	3.5	0.3			0.05	0.00	0.00	0.00	2.43E-04	2.08E-05	64	6
1,1-Dichloroethane	00075-34-3	L	Yes	Yes	4	0.7			0.05	0.01	0.00	0.00	2.77E-04	4.85E-05	74	13
1,2-Dichloroethane	00107-06-2	M	Yes	Yes	3	1.0	0.3	0.1	0.04	0.01	0.00	0.00	1.87E-04	6.24E-05	55	18
1,1-Dichloroethylene (Vinylidene Chloride)	00075-35-4	M	Yes	Yes	9	1.6			0.12	0.02	0.00	0.00	6.24E-04	1.11E-04	165	29
1,2-Dichloroethylene	00540-59-0	M	Yes	No	1,100	31.5	1.3	0.0	14.51	0.42	0.60	0.02	7.62E-02	2.18E-03	20,219	579
Benzene	00071-43-2	H	Yes	Yes	4	0.1			0.05	0.00	0.00	0.00	2.77E-04	6.94E-06	74	2
Carbon Tetrachloride	00056-23-5	H	Yes	Yes	4	0.1			0.05	0.00	0.00	0.00	2.77E-04	6.94E-06	74	2
Chlorobenzene (Monochlorobenzene)	00108-90-7	M	Yes	Yes	1	0.1			0.01	0.00	0.00	0.00	6.94E-05	6.94E-06	18	2
Chloroform	00067-66-3	M	Yes	Yes	2	0.8			0.03	0.01	0.00	0.00	1.39E-04	5.55E-05	37	15
Methyl Tert Butyl Ether	01634-04-4	M	Yes	Yes	2	0.1			0.03	0.00	0.00	0.00	1.39E-04	6.94E-06	37	2
Tetrachloroethylene	00127-18-4	M	Yes	Yes	900	33.8	0.9	0.0	11.88	0.45	0.49	0.02	6.24E-02	2.34E-03	16,543	621
Toluene	00108-88-3	L	Yes	Yes	15	0.7			0.20	0.01	0.01	0.00	1.04E-03	4.85E-05	276	13
Trichloroethylene	00079-01-6	M	Yes	Yes	3,400	411.5	4.5	0.5	44.86	5.43	1.87	0.23	2.35E-01	2.85E-02	62,494	7,564
Vinyl chloride	00075-01-4	H	Yes	Yes	300	4.8	0.0	0.0	3.96	0.06	0.17	0.00	2.08E-02	3.33E-04	5,514	88
Xylenes	01330-20-7	M	Yes	Yes	16	0.2			0.21	0.00	0.01	0.00	1.11E-03	1.39E-05	294	4
Total VOCs					5,764	487.3	7.0	0.6	76.05	6.43	3.17	0.27				
Total HAPs					4,667	458.8	5.7	0.6	61.57	6.05	2.57	0.25				

Total Uncontrolled VOC 2,347 lb/yr
Total Uncontrolled HAP 2,209 lb/yr

1. Source: "GM-38 Groundwater Remedy Analysis Report", February 2003
2. Source: DAR-1 AGC/SGC Tables, NYSDEC Division of Air Resources, Air Toxics Section, September 10, 2007.
3. Source: 6 NYCRR Part 200.1(cg)
4. Source: 6 NYCRR Part 200.1(ag)

**ATTACHMENT 1
Emission Estimate**

Feed Water Flow 1,100 gpm: max or normal
250 m³/hr
Water Flow Including Recycle 1,200 gpm: max or normal
273 m³/hr
Air Flow 8,000 cfm
13,592 m³/hr
A/W vol ratio 50

Controlled Stripper Exhat

Name	CAS Number	Toxicity: H/M/L ²	VOC ³	HAP ⁴	Control by	Max	Avg	Max	Avg
					GAC	lb/day	lb/day	gm/sec	gm/sec
1,1,1-Trichloroethane (Methyl Chloroform)	00071-55-6	L	No	Yes	95%	0.00	0.00	1.04E-05	1.04E-05
1,1,2-Trichloroethane	00079-00-5	M	Yes	Yes	95%	0.00	0.00	1.21E-05	1.04E-06
1,1-Dichloroethane	00075-34-3	L	Yes	Yes	95%	0.00	0.00	1.39E-05	2.43E-06
1,2-Dichloroethane	00107-06-2	M	Yes	Yes	95%	0.00	0.00	9.36E-06	3.12E-06
1,1-Dichloroethylene (Vinylidene Chloride)	00075-35-4	M	Yes	Yes	95%	0.01	0.00	3.12E-05	5.55E-06
1,2-Dichloroethylene	00540-59-0	M	Yes	No	95%	0.73	0.02	3.81E-03	1.09E-04
Benzene	00071-43-2	H	Yes	Yes	95%	0.00	0.00	1.39E-05	3.47E-07
Carbon Tetrachloride	00056-23-5	H	Yes	Yes	95%	0.00	0.00	1.39E-05	3.47E-07
Chlorobenzene (Monochlorobenzene)	00108-90-7	M	Yes	Yes	95%	0.00	0.00	3.47E-06	3.47E-07
Chloroform	00067-66-3	M	Yes	Yes	95%	0.00	0.00	6.94E-06	2.77E-06
Methyl Tert Butyl Ether	01634-04-4	M	Yes	Yes	95%	0.00	0.00	6.94E-06	3.47E-07
Tetrachloroethylene	00127-18-4	M	Yes	Yes	95%	0.59	0.02	3.12E-03	1.17E-04
Toluene	00108-88-3	L	Yes	Yes	95%	0.01	0.00	5.20E-05	2.43E-06
Trichloroethylene	00079-01-6	M	Yes	Yes	95%	2.24	0.27	1.18E-02	1.43E-03
Vinyl chloride	00075-01-4	H	Yes	Yes	95%	0.20	0.00	1.04E-03	1.66E-05
Xylenes	01330-20-7	M	Yes	Yes	95%	0.01	0.00	5.55E-05	6.94E-07
Total VOCs						3.80	0.32		
Total HAPs						3.08	0.30		
						Total Controlled VOC	117 lb/yr		
						Total Controlled HAP	110 lb/yr		

1. Source: "GM-38 Groundwater Remedy Analysis Report", February 2003
2. Source: DAR-1 AGC/SGC Tables, NYSDEC Division of Air Resources, Air Tox
3. Source: 6 NYCRR Part 200.1(cg)
4. Source: 6 NYCRR Part 200.1(ag)

ATTACHMENT C

2011 DISCHARGE GOALS AND 2011 DAR-1 ANALYSIS

Tetra Tech NUS		STANDARD CALCULATION SHEET	
CLIENT: US CLEAN	FILE No:	BY: SK	PAGE: 1 of 1
SUBJECT: Calculation of Current Discharge Goals GM-38 Area NWIRP Bethpage, New York		CHECKED BY:	DATE: 9/7/2011

1. Purpose:

To calculate current discharge goals for Trichloroethene (TCE), Tetrachloroethene (PCE), Vinyl Chloride, cis 1,2-Dichloroethene, and 1,2-Dichloroethene (total), for treatment of off-gas from the air stripper stack AS-1.

2. Approach:

From the Contaminant Assessment Summary of the DAR-1 Model output for TCE, PCE, Vinyl Chloride, cis 1,2-Dichloroethene, and 1,2-Dichloroethene (total) (see DAR-1 output for analysis inputs), use the Actual Annual % of the Annual Guideline Concentration (AGC), a current average flow rate of 9,200 cubic feet per minute (cfm), and influent chemical emission rates in pounds per hour (lb/hour) and pounds per year (lb/year) to back calculate current discharge goals.

3. Calculation of Current Discharge Goals:

Chemical	Current Actual Annual % of AGC ⁽¹⁾	Current Maximum Concentration (µg/m ³) ⁽²⁾	Current Chemical Emission Rate Prior to Treatment (lb/hour) ⁽³⁾	Current Chemical Emission Rate Prior to Treatment (lb/year) ⁽³⁾	Calculated Discharge Goal (lb/hr) ⁽⁴⁾	Calculated Discharge Goal (lb/year) ⁽⁴⁾	Maximum Allowable Concentration (µg/m ³) ⁽⁴⁾
TCE	390.6	10,000	0.3446	3,019	0.0882	770	2,600
PCE	132.8	6,800	0.2344	2,053	0.1764	1,500	5,100
Vinyl Chloride	13.49	76	0.0026	22.94	0.0194	170	560
cis 1,2-Dichloroethene	0.2322	750	0.0258	226.4	11.13	98,000	320,000
1,2-Dichloroethene (total)	0.2322	750	0.0258	226.4	11.13	98,000	320,000

Notes:

⁽¹⁾Actual Annual % of the AGCs is from the attached DAR-1 Model Output.

⁽²⁾Values were taken from the Quarterly Operations Report First Quarter 2011 (June 2011) from ECOR Federal Services. Values were the maximum effluent concentration in off gas from air stripper stack AS-1 for the months of January, February, and March 2011.

⁽³⁾Chemical Emission Rates were calculated from maximum concentrations and an average flow rate of 9,200 cfm.

⁽⁴⁾Discharge Goals are based on a flow of 9,200 cfm, and calculated from the Actual Annual % of the AGCs from the DAR-1 Model Output to achieve air quality requirements. The summary of additional inputs for this model run is provided in the DAR-1 Model Output. Stack height is 40 feet, and the property line was evaluated at a distance of 50 feet.

BETHPAGE SITE GM-38 OFF-SITE GROUNDWATER AIR STRIPPER STACK EMISSIONS
 DAR-1 MODEL OUTPUT, POINT SOURCE (STACK EMISSIONS) TYPE
 INCLUDES ISCLT MODELING SUMMARY

- I. Summary of Inputs for Model Run to Nearest Property Line (50 feet), worst case scenario (highest contaminant concentrations seen in first quarter 2011 in untreated effluent from Air Stripper AS-1 prior to treatment with granular activated carbon (GAC))

Chemical	CAS No. 00079-01-6 (TCE)	CAS No. 00127-18-4 (PCE)	CAS No. 00075-01-4 (Vinyl Chloride)	CAS No. 00156-59-2 (cis 1,2- Dichloroethene)	CAS No. 00540-59-0 (1,2- Dichloroethene, total)
Emission Rate Prior to Treatment ⁽¹⁾ (lb/hour)	0.3444	0.2342	0.0026	0.0258	0.0258
Emission Rate Prior to Treatment ⁽¹⁾ (lb/year)	3,017	2,052	22.93	226.0	226.0
Maximum Concentration of Untreated Off Gas ($\mu\text{g}/\text{m}^3$) ⁽¹⁾	10,000	6,800	76	750	750
Annual Guideline Concentration (AGC) ($\mu\text{g}/\text{m}^3$)	0.5	1.0	0.11	63	63
Short-term Guideline Concentration (SGC) ($\mu\text{g}/\text{m}^3$)	14,000	1,000	180,000	--	--

HA	Height Above stack/ maximum height of plume (HA, feet)	15
SH	Stack Height/Treatment Building Air Stack (SH, feet)	40
D	Stack Diameter (D, inches)	36
T	Stack Exit Temperature (T, degrees Fahrenheit)	80
V	Stack Exit Velocity (V, ft/sec)	21.69
Q ⁽²⁾	Stack Exit Flow Rate [Q, Actual Cubic Feet per Minute (ACFM)]	9,200
Dpl	Shortest Distance from Source Building (Treatment Building) to Property Line (Dpl, feet) for point sources	50
BW	Building Width (BW, feet) of Source Building (Treatment Building) for point sources	75
BL	Building Length (BL, feet) of Source Building (Treatment Building)	75
Q	Actual Hourly Emission Rate (lbs/hour) for source contaminant	Chemical specific, see above
Qa	Actual Annual Emission Rate (lbs/year) for source contaminant	Chemical specific, see above

⁽¹⁾ Emission rates and maximum concentration values were taken from the Quarterly Operations Report First Quarter (June 2011) as provided by ECOR Services, using January, February, and March 2011 maximum rates of untreated off gas from Air Stripper AS-1 in the

GM-38 Treatment Building. Emission rates are based on continuous operation 24 hours per day, 7 days a week, 52 weeks a year, or approximately 8,760 hours of operation.

⁽²⁾ "Q" is an average value of January and February 2011 monthly flow rates. Effective water and vapor flow rates were reduced during the reporting period of March due to a shutdown of the Treatment Plant on March 23, 2011.

II. Contaminant Assessment Summary of TCE, PCE, Vinyl Chloride, cis 1,2-Dichloroethene, and 1,2-Dichloroethene (total):

CONTAMINANT ASSESSMENT SUMMARY OF DAR-1 ANALYSIS						9/ 8/11
						Page 1
CAS NUMBER	AGC ug/m3	SHORT-TERM	CAVITY	POINT or AREA SOURCE		
		MAXIMUM (Cav. Pt. Area) % OF SGC	ACTUAL ANNUAL % OF AGC	POTENTIAL ANNUAL % OF AGC	ACTUAL ANNUAL % OF AGC	
00075-01-4	0.11000000	0.0005	0.0000	13.3889	13.4948	
00079-01-6	0.50000000	0.7757	0.0000	390.1734	390.6266	
00127-18-4	1.00000000	7.3852	0.0000	132.6635	132.8415	
00156-59-2	63.00000000	0.0000	0.0000	0.2320	0.2322	
00540-59-0	63.00000000	0.0000	0.0000	0.2320	0.2322	
SUMMARY TOTALS		8.1614	0.0000	536.6897	537.4274	

III. Contaminant Impact Summary of TCE, PCE, Vinyl Chloride, cis 1,2-Dichloroethene, and 1,2-Dichloroethene (total):

CONTAMINANT IMPACT SUMMARY OF DAR-1 ANALYSIS						9/ 8/11
						Page 1
CAS NUMBER	AGC ug/m3	SHORT-TERM	CAVITY	POINT or AREA SOURCE		
		MAXIMUM (Cav. Pt. Area) ug/m3	ACTUAL ANNUAL ug/m3	POTENTIAL ANNUAL ug/m3	ACTUAL ANNUAL ug/m3	
00075-01-4	0.11000000	0.81988204	0.00000000	0.01472780	0.01484433	
00079-01-6	0.50000000	108.60282900	0.00000000	1.95086694	1.95113296	
00127-18-4	1.00000000	73.85244750	0.00000000	1.32663476	1.32841504	
00156-59-2	63.00000000	8.13575172	0.00000000	0.14614509	0.14630693	
00540-59-0	63.00000000	8.13575172	0.00000000	0.14614509	0.14630693	

IV. Contaminant Impact Summary Step by Step Menu for TCE:

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*****
NWIRP BETHPAGE GM-38 AREA          BETHPAGE          OYSTER BAY, NEW
EMISSION POINT =          TOTAL          CAS NUMBER = 00079-01-6          SIC = 0
AGC =          0.500000000 ug/m3          SGC =          14000.000000 ug/m3
STACK: HA= 15., SH= 40., D= 36., T= 80., U= 21.69, q= 9200.00
BUILDING: Dpl= 50., BW= 75., BL= 75., %CONTROL= 0.0000
** Reported Hourly Emission Rate <Q> is equal to          0.344400000 lbs/hour.
** Reported Annual Emission Rate <Qa> is equal to          3017.000000 lbs/year.
II.B. REFINED CAVITY IMPACT METHOD <DAR-1, APPENDIX B>.
II.B.1. Shortest Distance from building to Property Line < 50. feet >
is less than or equal to the cavity length, or 3 building
heights < 75. feet >. Therefore, this building will have
cavity impacts <if they occur> at receptors off plant property.
II.B.2. The largest building dimension < 75. feet > is greater than or
equal to the building height < 25. feet >. Therefore, the
computer will NOT redefine the cavity length.
II.B.3. Stack height < 40. feet > is greater than cavity height
< 38. feet >. Therefore, this source does not contribute to
the buildings cavity impact. The Computer will assume the
CAVITY Annual Impact equals 0.00 ug/m3.
II.C. CAVITY Annual Impact < 0.000 ug/m3 > is less than AGC
< 0.500 ug/m3 >.
III.A. STANDARD POINT SOURCE METHOD <DAR-1, APPENDIX B>.
III.A.1.b. Momentum flux, Fm, is equal to 1000.331 ft<4>/sec<2>.
III.A.1.b. Effective stack height, he, is equal to 51.001 feet.
III.A.2. STANDARD POINT SOURCE Actual Annual Impact is equal
to 2.604 ug/m3 for 8760. hours/year of operation.
III.A.3. STANDARD POINT SOURCE Potential Annual Impact is equal
to 2.601 ug/m3 assuming 8,760 hours/year of operation.
III.A.4.a. Stack height to building height ratio is greater than
1.5, but less than 2.5. Computer will multiply actual
annual & potential annual impacts by 0.75 factor.

```

III.A.5. STANDARD POINT SOURCE Short-Term Impact is calculated below using the DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.

III.D. STANDARD POINT SOURCE Actual Annual Impact < 1.953 ug/m3 > is greater than AGC < 0.500 ug/m3 >.

**** Refer to DAR-1 Section III.D.1. A refined site ****
**** specific modeling analysis may be required. ****

III.D. STANDARD POINT SOURCE Potential Annual Impact < 1.951 ug/m3 > is greater than AGC < 0.500 ug/m3 >.

**** Potential Annual Impact is based upon 8760 hours/year ****
**** operation instead of reported 8760. hours/year. ****

2.0 DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.
See "Technical Reference for the Screening Procedures of the DAR-1 Software Program, Wade/Sedefian," 1/11/94.

2.2 CAVITY Short-Term Impact is equal to 0.00 ug/m3 as the plume escaped the cavity region: $h_s < 40. \text{ feet} > > h_c < 26. \text{ feet} >$.

II.C. CAVITY Short-Term Impact < 0.000 ug/m3 > is less than SGC < 14000.000 ug/m3 >.

2.3 Momentum flux, F_m , is equal to 1000.331 ft(4)/sec(2).

2.3 Effective stack height, h_e , is equal to 51.001 feet.

2.4 Maximum non-downwash GEP stack Short-Term Impact (CSTP) is equal to 38.826 ug/m3, for $h_s/h_b = 1.60$

2.5 Maximum downwash Short-Term Impact (CSTD) is equal to 129.908 ug/m3, for: $h_s/h_b = 1.60$ and ESH = 51. feet.

2.6 Adjusted maximum downwash Short-Term (CSTD) is equal to 108.603 ug/m3, for: RF = 0.84

III.D. Maximum non-cavity Short-Term Impact (CST: 108.603 ug/m3 > is less than the SGC < 14000.000 ug/m3 > for the point source.

2.7 Maximum Short-Term cavity, point, or area source impact (SHORT-TERM MAXIMUM, (Cav,Pt,Area)) equals 108.603 ug/m3 and is reported in the ANALYSIS MENU. This value is less than the SGC < 14000.000 ug/m3 >.

V. Contaminant Impact Summary Step by Step Menu for PCE:

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*****
NWIRP BETHPAGE GM-38 AREA          BETHPAGE          OYSTER BAY, MEV
EMISSION POINT =          TOTAL          CAS NUMBER = 00127-18-4          SIC = 0
AGC =          1.000000000 ug/m3          SGC =          1000.000000 ug/m3
STACK: HA=          15., SH=          40., D=          36., T=          80., U=          21.69, q=          9200.00
BUILDING: Dpl=          50., BW=          75., BL=          75., %CONTROL=          0.0000
** Reported Hourly Emission Rate (Q) is equal to          0.234200000 lbs/hour.
** Reported Annual Emission Rate (Qa) is equal to          2052.000000 lbs/year.
II.B. REFINED CAVITY IMPACT METHOD (DAR-1, APPENDIX B).
II.B.1. Shortest Distance from building to Property Line ( 50. feet )
is less than or equal to the cavity length, or 3 building
heights ( 75. feet ). Therefore, this building will have
cavity impacts (if they occur) at receptors off plant property.
II.B.2. The largest building dimension ( 75. feet ) is greater than or
equal to the building height ( 25. feet ). Therefore, the
computer will NOT redefine the cavity length.
II.B.3. Stack height ( 40. feet ) is greater than cavity height
( 38. feet ). Therefore, this source does not contribute to
the buildings cavity impact. The Computer will assume the
CAVITY Annual Impact equals 0.00 ug/m3.
II.C. CAVITY Annual Impact ( 0.000 ug/m3 ) is less than AGC
( 1.000 ug/m3 ).
III.A. STANDARD POINT SOURCE METHOD (DAR-1, APPENDIX B).
III.A.1.b. Momentum flux, Fm, is equal to 1000.331 ft<4>/sec<2>.
III.A.1.b. Effective stack height, he, is equal to 51.001 feet.
III.A.2. STANDARD POINT SOURCE Actual Annual Impact is equal
to 1.771 ug/m3 for 8762. hours/year of operation.
III.A.3. STANDARD POINT SOURCE Potential Annual Impact is equal
to 1.769 ug/m3 assuming 8,760 hours/year of operation.
III.A.4.a. Stack height to building height ratio is greater than
1.5, but less than 2.5. Computer will multiply actual
annual & potential annual impacts by 0.75 factor.

```

III.A.5. STANDARD POINT SOURCE Short-Term Impact is calculated below using the DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.

III.D. STANDARD POINT SOURCE Actual Annual Impact (1.328 ug/m3) is greater than AGC (1.000 ug/m3).

**** Refer to DAR-1 Section III.D.1. A refined site specific modeling analysis may be required. ****

III.D. STANDARD POINT SOURCE Potential Annual Impact (1.327 ug/m3) is greater than AGC (1.000 ug/m3).

**** Potential Annual Impact is based upon 8760 hours/year operation instead of reported 8762. hours/year. ****

2.0 DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD. See "Technical Reference for the Screening Procedures of the DAR-1 Software Program, Wade/Sedefian," 1/11/94.

2.2 CAVITY Short-Term Impact is equal to 0.00 ug/m3 as the plume escaped the cavity region: hc(40. feet) > hc(26. feet).

II.C. CAVITY Short-Term Impact (0.000 ug/m3) is less than SGC (1000.000 ug/m3).

2.3 Momentum Flux, F_m , is equal to 1000.331 ft⁴/sec².

2.3 Effective stack height, h_e , is equal to 51.001 feet.

2.4 Maximum non-downwash GEP stack Short-Term Impact (CSTP) is equal to 26.403 ug/m3, for $h_c/h_b = 1.60$

2.5 Maximum downwash Short-Term Impact (CSTD) is equal to 88.340 ug/m3, for: $h_c/h_b = 1.60$ and ESH = 51. feet.

2.6 Adjusted maximum downwash Short-Term (CSTD) is equal to 73.852 ug/m3, for: RF = 0.84

III.D. Maximum non-cavity Short-Term Impact (CST: 73.852 ug/m3) is less than the SGC (1000.000 ug/m3) for the point source.

2.7 Maximum Short-Term cavity, point, or area source impact (SHORT-TERM MAXIMUM, (Cav,Pt,Area)) equals 73.852 ug/m3 and is reported in the ANALYSIS MENU. This value is less than the SGC (1000.000 ug/m3).

VI. Contaminant Impact Summary Step by Step Menu for Vinyl Chloride:

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*****
NWIRP BETHPAGE GM-38 AREA          BETHPAGE          OYSTER BAY, NEW
EMISSION POINT =          TOTAL          CAS NUMBER = 00075-01-4          SIC = 0
AGC =          0.110000000 ug/m3          SGC =          180000.000000 ug/m3
STACK: HA=          15., SH=          40., D=          36., I=          80., U=          21.69, q=          9200.00
BUILDING: Dpl=          50., BW=          75., BL=          75., %CONTROL=          0.0000
** Reported Hourly Emission Rate <Q> is equal to          0.002600000 lbs/hour.
** Reported Annual Emission Rate <Qa> is equal to          22.930000 lbs/year.
II.B. REFINED CAVITY IMPACT METHOD <DAR-1, APPENDIX B>.
II.B.1. Shortest Distance from building to Property Line < 50. feet >
is less than or equal to the cavity length, or 3 building
heights < 75. feet >. Therefore, this building will have
cavity impacts <if they occur> at receptors off plant property.
II.B.2. The largest building dimension < 75. feet > is greater than or
equal to the building height < 25. feet >. Therefore, the
computer will NOT redefine the cavity length.
II.B.3. Stack height < 40. feet > is greater than cavity height
< 38. feet >. Therefore, this source does not contribute to
the buildings cavity impact. The Computer will assume the
CAVITY Annual Impact equals 0.00 ug/m3.
II.C. CAVITY Annual Impact < 0.000 ug/m3 > is less than AGC
< 0.110 ug/m3 >.
III.A. STANDARD POINT SOURCE METHOD <DAR-1, APPENDIX B>.
III.A.1.b. Momentum flux, Fm, is equal to 1000.331 ft<4>/sec<2>.
III.A.1.b. Effective stack height, he, is equal to 51.001 feet.
III.A.2. STANDARD POINT SOURCE Actual Annual Impact is equal
to 0.020 ug/m3 for 8819. hours/year of operation.
III.A.3. STANDARD POINT SOURCE Potential Annual Impact is equal
to 0.020 ug/m3 assuming 8,760 hours/year of operation.
III.A.4.a. Stack height to building height ratio is greater than
1.5, but less than 2.5. Computer will multiply actual
annual & potential annual impacts by 0.75 factor.

```

III.A.5. STANDARD POINT SOURCE Short-Term Impact is calculated below using the DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.

III.D. STANDARD POINT SOURCE Actual Annual Impact < 0.015 ug/m3 > is less than AGC < 0.110 ug/m3 >.

III.D. STANDARD POINT SOURCE Potential Annual Impact < 0.015 ug/m3 > is less than AGC < 0.110 ug/m3 >.

**** Potential Annual Impact is based upon 8760 hours/year ****
 **** operation instead of reported 8819. hours/year. ****

2.0 DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.
 See "Technical Reference for the Screening Procedures of the DAR-1 Software Program, Wade/Sedefian," 1/11/94.

2.2 CAVITY Short-Term Impact is equal to 0.00 ug/m3 as the plume escaped the cavity region: hs< 40. feet > hc< 26. feet >.

II.C. CAVITY Short-Term Impact < 0.000 ug/m3 > is less than SGC < 180000.000 ug/m3 >.

2.3 Momentum flux, F_m , is equal to 1000.331 ft<4>/sec<2>.

2.3 Effective stack height, h_e , is equal to 51.001 feet.

2.4 Maximum non-downwash GEP stack Short-Term Impact (CSTP) is equal to 0.293 ug/m3, for $h_s/h_b = 1.60$

2.5 Maximum downwash Short-Term Impact (CSTD) is equal to 0.981 ug/m3, for: $h_s/h_b = 1.60$ and $ESH = 51. feet.$

2.6 Adjusted maximum downwash Short-Term (CSTD) is equal to 0.820 ug/m3, for: $RF = 0.84$

III.D. Maximum non-cavity Short-Term Impact (CST: 0.820 ug/m3 > is less than the SGC < 180000.000 ug/m3 > for the point source.

2.7 Maximum Short-Term cavity, point, or area source impact (SHORT-TERM MAXIMUM, (Cav,Pt,Area)) equals 0.820 ug/m3 and is reported in the ANALYSIS MENU. This value is less than the SGC < 180000.000 ug/m3 >.

VII. Contaminant Impact Summary Step by Step Menu for cis 1,2-Dichloroethene:

```

*****
NWIRP BETHPAGE GM-38 AREA          BETHPAGE          OYSTER BAY, NEW
EMISSION POINT =          TOTAL          CAS NUMBER = 00156-59-2          SIC = 0
AGC =          63.000000000 ug/m3          SGC =          0.000000 ug/m3
STACK: HA=          15., SH=          40., D=          36., I=          80., U=          21.69, q=          9200.00
BUILDING: Dpl=          50., BW=          75., BL=          75., %CONTROL=          0.0000
** Reported Hourly Emission Rate <Q> is equal to          0.025800000 lbs/hour.
** Reported Annual Emission Rate <Qa> is equal to          226.000000 lbs/year.
II.B.  REFINED CAVITY IMPACT METHOD <DAR-1, APPENDIX B>.
II.B.1.  Shortest Distance from building to Property Line < 50. feet >
         is less than or equal to the cavity length, or 3 building
         heights < 75. feet >. Therefore, this building will have
         cavity impacts <if they occur> at receptors off plant property.
II.B.2.  The largest building dimension < 75. feet > is greater than or
         equal to the building height < 25. feet >. Therefore, the
         computer will NOT redefine the cavity length.
II.B.3.  Stack height < 40. feet > is greater than cavity height
         < 38. feet >. Therefore, this source does not contribute to
         the buildings cavity impact. The Computer will assume the
         CAVITY Annual Impact equals 0.00 ug/m3.
II.C.  CAVITY Annual Impact <          0.000 ug/m3 > is less than AGC
         <          63.000 ug/m3 >.
III.A.  STANDARD POINT SOURCE METHOD <DAR-1, APPENDIX B>.
III.A.1.b.  Momentum flux, Fm, is equal to          1000.331 ft<4>/sec<2>.
III.A.1.b.  Effective stack height, he, is equal to          51.001 feet.
III.A.2.  STANDARD POINT SOURCE Actual Annual Impact is equal
         to          0.195 ug/m3 for 8760. hours/year of operation.
III.A.3.  STANDARD POINT SOURCE Potential Annual Impact is equal
         to          0.195 ug/m3 assuming 8,760 hours/year of operation.
III.A.4.a.  Stack height to building height ratio is greater than
         1.5, but less than 2.5. Computer will multiply actual
         annual & potential annual impacts by 0.75 factor.

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III.A.5. STANDARD POINT SOURCE Short-Term Impact is calculated below using the DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.

III.D. STANDARD POINT SOURCE Actual Annual Impact < 0.146 ug/m3 > is less than AGC < 63.000 ug/m3 >.

III.D. STANDARD POINT SOURCE Potential Annual Impact < 0.146 ug/m3 > is less than AGC < 63.000 ug/m3 >.

**** Potential Annual Impact is based upon 8760 hours/year ****
 **** operation instead of reported 8760. hours/year. ****

2.0 DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.
 See 'Technical Reference for the Screening Procedures of the DAR-1 Software Program, Wade/Sedefian,' 1/11/94.

2.2 CAVITY Short-Term Impact is equal to 0.00 ug/m3 as the plume escaped the cavity region: hs(40. feet) > hc(26. feet).

II.C. CAVITY Short-Term Impact is equal to 0.000 ug/m3.
 There is no SGC for this contaminant.

2.3 Momentum flux, Fm, is equal to 1000.331 ft(4)/sec(2).

2.3 Effective stack height, he, is equal to 51.001 feet.

2.4 Maximum non-downwash GEP stack Short-Term Impact (CSTP) is equal to 2.909 ug/m3, for hs/hb = 1.60

2.5 Maximum downwash Short-Term Impact (CSTD) is equal to 9.732 ug/m3, for: hs/hb = 1.60 and ESH = 51. feet.

2.6 Adjusted maximum downwash Short-Term (CSTD) is equal to 8.136 ug/m3, for: RF = 0.84

III.D. Maximum non-cavity Short-Term Impact (CST) equals 8.136 ug/m3 for the point source. There is no SGC for this contaminant.

2.7 Maximum Short-Term cavity, point, or area source impact (SHORT-TERM MAXIMUM, (Cav,Pt,Area)) equals 8.136 ug/m3 and is reported in the ANALYSIS MENU.

VIII. Contaminant Impact Summary Step by Step Menu for 1,2-Dichloroethene (total):

```

*****
NWIRP BETHPAGE GM-38 AREA          BETHPAGE          OYSTER BAY, NEW
EMISSION POINT =          TOTAL          CAS NUMBER = 00540-59-0          SIC = 0
AGC =          63.000000000 ug/m3          SGC =          0.000000 ug/m3
STACK: HA=          15., SH=          40., D=          36., T=          80., U=          21.69, q=          9200.00
BUILDING: Dpl=          50., BW=          75., BL=          75., %CONTROL=          0.0000
** Reported Hourly Emission Rate <Q> is equal to          0.025800000 lbs/hour.
** Reported Annual Emission Rate <Qa> is equal to          226.000000 lbs/year.
II.B. REFINED CAVITY IMPACT METHOD <DAR-1, APPENDIX B>.
II.B.1. Shortest Distance from building to Property Line < 50. feet >
is less than or equal to the cavity length, or 3 building
heights < 75. feet >. Therefore, this building will have
cavity impacts <if they occur> at receptors off plant property.
II.B.2. The largest building dimension < 75. feet > is greater than or
equal to the building height < 25. feet >. Therefore, the
computer will NOT redefine the cavity length.
II.B.3. Stack height < 40. feet > is greater than cavity height
< 38. feet >. Therefore, this source does not contribute to
the buildings cavity impact. The Computer will assume the
CAVITY Annual Impact equals 0.00 ug/m3.
II.C. CAVITY Annual Impact < 0.000 ug/m3 > is less than AGC
< 63.000 ug/m3 >.
III.A. STANDARD POINT SOURCE METHOD <DAR-1, APPENDIX B>.
III.A.1.b. Momentum flux, Pm, is equal to 1000.331 ft<4>/sec<2>.
III.A.1.b. Effective stack height, he, is equal to 51.001 feet.
III.A.2. STANDARD POINT SOURCE Actual Annual Impact is equal
to 0.195 ug/m3 for 8760. hours/year of operation.
III.A.3. STANDARD POINT SOURCE Potential Annual Impact is equal
to 0.195 ug/m3 assuming 8,760 hours/year of operation.
III.A.4.a. Stack height to building height ratio is greater than
1.5, but less than 2.5. Computer will multiply actual
annual & potential annual impacts by 0.75 factor.

```



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III.A.5. STANDARD POINT SOURCE Short-Term Impact is calculated below
         using the DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.

III.D. STANDARD POINT SOURCE Actual Annual Impact < 0.146 ug/m3 > is
         less than AGC < 63.000 ug/m3 >.

III.D. STANDARD POINT SOURCE Potential Annual Impact < 0.146 ug/m3 >
         is less than AGC < 63.000 ug/m3 >.

**** Potential Annual Impact is based upon 8760 hours/year ****
**** operation instead of reported 8760. hours/year. ****

2.0 DAR-1 SOFTWARE PROGRAM SHORT-TERM METHOD.
    See "Technical Reference for the Screening Procedures of the
    DAR-1 Software Program, Wade/Sedefian," 1/11/94.

2.2 CAVITY Short-Term Impact is equal to 0.00 ug/m3 as the plume
     escaped the cavity region: hs< 40. feet > hc< 26. feet >.

II.C. CAVITY Short-Term Impact is equal to 0.000 ug/m3.
      There is no SGC for this contaminant.

2.3 Momentum flux, Fm, is equal to 1000.331 ft<4>/sec<2>.

2.3 Effective stack height, he, is equal to 51.001 feet.

2.4 Maximum non-downwash GEP stack Short-Term Impact <CSTP> is equal
    to 2.909 ug/m3, for hs/hb = 1.60

2.5 Maximum downwash Short-Term Impact <CSTD> is equal
    to 9.732 ug/m3, for: hs/hb = 1.60 and ESH = 51. feet.

2.6 Adjusted maximum downwash Short-Term <CSTD> is equal
    to 8.136 ug/m3, for: RF = 0.84

III.D. Maximum non-cavity Short-Term Impact <CST> equals 8.136 ug/m3
      for the point source. There is no SGC for this contaminant.

2.7 Maximum Short-Term cavity, point, or area source impact
    <SHORT-TERM MAXIMUM, <Cav.Pt.Area>> equals 8.136 ug/m3
    and is reported in the ANALYSIS MENU.

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IX. AGCs and SGCs for TCE, PCE, Vinyl Chloride, cis 1,2-Dichloroethene, and 1,2-Dichloroethene (total):

AGCs & SGCs					9/ 8/11	
					Page 1	
CAS NUMBER	CONTAMINANT NAME	SGC ug/m3	II O V	AGC ug/m3	II I O O V X	CODES
00075-01-4	VINYL CHLORIDE	18000.00000	D	0.110000000	E H U	HA
00079-01-6	TRICHLOROETHYLENE	14000.00000	Z	0.500000000	D M O	HA
00127-10-4	TETRACHLOROETHYLENE	1000.00000	H	1.000000000	H M O	HA
00156-59-2	DICHLOROETHYLENE, cis	0.00000		63.000000000	D M	
00540-59-0	DICHLOROETHYLENE, 12	0.00000		63.000000000	D M	

X. Contaminant Emissions Summary for TCE, PCE, Vinyl Chloride, cis 1,2-Dichloroethene, and 1,2-Dichloroethene (total):

CONTAMINANT EMISSIONS SUMMARY				9/ 8/11
				Page 1
CAS NUMBER	CONTAMINANT NAME	NUM. OF EPs PER CONTAM.	EMISSIONS <lbs/hour>	EMISSIONS <lbs/year>
00075-01-4	VINYL CHLORIDE	1	0.0026000	22.93000
00079-01-6	TRICHLOROETHYLENE	1	0.3444000	3017.00000
00127-10-4	TETRACHLOROETHYLENE	1	0.2342000	2052.00000
00156-59-2	DICHLOROETHYLENE, cis	1	0.0258000	226.00000
00540-59-0	DICHLOROETHYLENE, 1,2	1	0.0258000	226.00000
SUMMARY TOTALS		5	0.6328000	5543.93000

XI. Meter Grid Modeling Results for Maximum Annual Concentrations of TCE, within 25 meters:

CONCENTRATIONS x 10 ⁻² <ug/m3> for 00079-01-6													09/08/11
AGC = 0.500000000 ug/m3													13:17:58
TIME	367000.	368000.	369000.	370000.	371000.	372000.	373000.	374000.	375000.	376000.	377000.	378000.	
4511000.	0.04	0.06	0.08	0.14	0.23	0.32	0.41	0.30	0.14	0.10	0.08	0.06	0.05
4510000.	0.03	0.05	0.08	0.13	0.25	0.43	0.60	0.40	0.17	0.12	0.09	0.07	0.06
4509000.	0.02	0.03	0.06	0.11	0.24	0.58	1.01	0.52	0.22	0.14	0.11	0.08	0.06
4508000.	0.02	0.03	0.04	0.06	0.18	0.62	2.16	0.64	0.31	0.19	0.13	0.11	0.09
4507000.	0.02	0.03	0.04	0.06	0.11	0.26	7.27	1.43	0.60	0.34	0.22	0.15	0.12
4506000.	0.03	0.03	0.05	0.07	0.13	0.33	2.58	2.99	1.12	0.51	0.30	0.20	0.14
4505000.	0.03	0.04	0.05	0.08	0.20	0.45	0.94	0.81	0.60	0.45	0.33	0.23	0.16
4504000.	0.03	0.04	0.07	0.12	0.20	0.22	0.47	0.43	0.33	0.27	0.24	0.20	0.16

TOP 100 CONTRIBUTORS TO MAXIMUM CONCENTRATION FOR 00079-01-6							09/08/11
@ UTMN: 373000. UTMN: 4507000.							13:17:58
Emission Point	Facility Name (shortened)	EP DIR	Distance to Max.(m)	CONC. ug/m3	Percent of Max.		
TOTAL	NWIRP BETHPAGE GM-38 AREA	SSE	539.	0.727E-01	100.000		
TOTAL OF ALL	1 CONTRIBUTORS			0.727E-01	100.000		

XII. ISCLT Model Run Information, within 25 meters:

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MODEL RUN INFORMATION
09/08/11
13:17:58

1. Current GRID SPACING equals 1000. meters.
2. Maximum Concentration (flashing) equals 0.0727115273 ug/m3
   @ UTME: 373000. UTMN: 4507000.

3. RUN FILE: TEMP?.RUN
4. METEOROLOGICAL FILE: ALB.MET
5. RUN MODE: URBAN
6. HALF-LIVES: not used to account for pollutant removal from air.
7. BLD. WAKE EFFECTS: AS-1 METHOD, All data KNOWN (hb, hv, hl, orientation)
8. EMISSIONS: ACTUAL ANNUAL EMISSIONS
9. SOURCES: All sources within 25. meters of
   UTME: 373275. UTMN: 4506537.
10. CONTAMINANT CAS NUMBER(s): 00079-01-6
11. EMISSION POINT - CONTAMINANT(s) found by computer: 1
12. No data is being copied to DUMP file.
```

APPENDIX C

FIELD LOGS

Date: 12.19.2017

Groundwater Level Measurement Sheet

Project Site: NWIRP Bethpage - GM-38
 Location: Bethpage, NY
 Field Crew: RH

Water Level Meter: Solinst
 Weather: Clear 48 F WSW 12 mph 29.2"
 Time of Low Tide: N/A
 Time of High Tide: N/A

Well ID	Time	Depth to Water (ft.)	Total Depth of Well / Screenshot Interval (ft.)	PID (ppm)	Comments
RW1-MW1	12.19.17/10:23	40.41	435 / 395-435	---	
RW1-MW2	12.19.17/9:15	43.68	435 / 395-435	---	
RW1-MW3	12.19.17/10:40	33.57	435 / 395-435	---	
RW2-MW1	12.19.17/10:48	43.60	510 / 470-510	---	
RW2-MW2	12.19.17/9:38	43.45	510 / 470-510	---	
RW2-MW3	12.19.17/9:30	42.71	510 / 470-510	---	
RW3-MW1	12.19.17/10:15	41.21	350 / 330-350	---	
RW3-MW2	12.19.17/10:07	42.83	495 / 475-495	---	
RW3-MW3	12.19.17/9:45	42.31	340 / 320-340	---	
RW3-MW4	12.19.17/9:55	42.17	495 / 475-495	---	
TP1	12.19.17/8:50	38.97	470 / 450-470	---	
IW1-MW1	12.19.17/9:20	39.98	470 / 450-470	---	
RW-1	12.19.17/9AM	---	Open vault and check integrity of piping, etc.		
RW-3	12.19.17/10:27	---	Open vault and check integrity of piping, etc.		

Signature: _____

Date: Dec 19 2017