

# **2015 Annual Operations Report**

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

**Contract No. N40085-10-D-9409  
Contract Task Order No. 0002**

April 2016

Prepared for:



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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
DoD	Department of Defense
DTW	depth to water
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Accreditation Program
GOCO	Government Owned Contractor Operated
gpm	gallon per minute
GWTP	groundwater treatment plant
H&S	H&S Environmental, Inc.
HMI	human-machine interface
IRP	Installation Restoration Program
KGS	KOMAN Government Solutions, LLC
LGAC	liquid-phase granular activated carbon
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
NYSDOH	New York State Department of Health
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
OU	operable unit
PCE	tetrachloroethene
PID	Proportional, Integral and Derivative

PLC	programmable logic controller
ROD	Record of Decision
scfm	standard cubic feet per minute
SPDES	Storm Pollution Discharge Elimination System
TCE	trichloroethene
TE	treated effluent
TtEC	Tetra Tech EC, Inc.
USEPA	U.S. Environmental Protection Agency
VC	vinyl chloride
VFD	variable frequency drive
VGAC	vapor-phase granular activated carbon
VOC	volatile organic compound

## 1.0 INTRODUCTION

KOMAN Government Solutions, LLC (KGS) has prepared this 2015 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. N40085-10-D-9409, Contract Task Order No. 0002. This 2015 Annual Operations Report summarizes activities that occurred during 2015 and also further details activities that occurred during the Fourth Quarter 2015 (October 2015 through December 2015). 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 “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 2015 Annual Operations Report:

- *Quarterly Operations Report, First Quarter 2015, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by H&S Environmental, Inc. (H&S) in October 2015.
- *Quarterly Operations Report, Second Quarter 2015, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by H&S in November 2015.
- *Quarterly Operations Report, Third Quarter 2015, Groundwater Treatment Plant, GM-38 Area Groundwater Remediation, Naval Weapons Industrial Reserve Plant, Bethpage, New York* prepared by H&S in February 2016.

### 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

Groundwater is extracted from recovery wells RW-1 and RW-3 (though RW-3 has recently been taken off-line, 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) Permit Application as an Applicable or Relevant and Appropriate Requirements (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 vinyl chloride, are removed via two 20,000-lb vapor phase granular activated carbon (VGAC) units (VGAC-1 and VGAC-2). Vinyl chloride 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).

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 transmitters, 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 recent 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. The report entitled “*Capture Zone Evaluation and Path Forward, GM-38 Area Groundwater Treatment Plant*” (Tetra Tech 2014) was submitted to NYSDEC in March 2014. The recommended path forward consisted of 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 routine maintenance tasks were also performed at the GWTP in 2015:

- On 25 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 9 January, 26 January, 9 February, 20 February, 2 March, 23 March, 2 April, 13 April, 12 May, 29 May, 10 June, 13 July, 17 August, 1 October, and 9 December, bag filters were changed out.
- On 2 March, 13 April, and 14 May, the system was shut down in order to backwash the three LGAC units.
- On 6 April, the GWTP intake air filters were replaced.
- On 16 June, a carbon changeout was performed on LGAC-1, LGAC-2, and LGAC-3. The LGACs were backwashed on 17 June and system restarted.
- On 16 and 17 September, a carbon changeout was performed on VGAC-1 and VGAC-2.

### 2.2 Non-routine Maintenance / Site Activities

The following non-routine activities were performed at the GWTP in 2015:

- On 15 January, indoor air samples were collected from the GWTP; results were provided under separate cover.
- On 23 January, new air relief valves were installed on the two bag filter units.
- On 28 January, a new air relief valve was installed on the effluent piping.

- On 11 March, an instrumentation contractor was on site to disable the in-line effluent pH meter, as it was not operable and determined not to be necessary for system operations since the pH adjustment system is no longer in operation. Effluent pH will continue to be monitored on a regular basis using a handheld pH meter, and the in-line meter will not be replaced. In addition, an issue with the Kepware software was resolved, and the water level probe for RW-1 was pulled, cleaned to improve performance, and reinstalled in the recovery well.
- On 20 April, the GWTP sump pump was replaced.
- On 12 May and 25 December, the system went down due to a power interruption caused by storms and/or loss of power in the area. The system was restarted upon arrival by the operator and restoration of power.
- On 7 June, the system went down due to a power interruption caused by storms and/or loss of power in the area. Upon restoration of power, the system could not be restarted and the EQ tank level indicator was found to be inoperable. A replacement level indicator was installed on 10 June, and the system resumed normal operation.
- As previously mentioned, on 1 July, recovery well RW-3 was taken off-line and the pumping rate for RW-1 was increased. RW-3 was operated for approximately one hour each subsequent month to maintain the integrity of the well for potential future use.
- On 2 July, a spare variable frequency drive (VFD) for RW-1 was procured.
- On 20 July, 11 August, and 16 August, rain gauge alarms were received. The system was restarted upon clearing of the alarms.
- On 27 August, security cameras were installed throughout the GWTP.

### 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 (TiEC 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 approved by NYSDEC Water Division for the effluent limitations and monitoring requirements. These results are also submitted to the NYSDEC on a monthly basis in the form of a Discharge Monitoring Report (DMR). A copy of the approved NYSDEC effluent limitation and monitoring constituents and the reporting forms are included in **Appendix A**.

##### 3.1.1 Fourth Quarter 2015 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 2015) are included in **Appendix A**. DMRs for January – September 2015 are included in previously submitted quarterly operations reports as indicated in Section 1.0.

##### 3.1.2 2015 Annual Summary

###### Flow Totals

Annual flow volumes and system operation for 2015 are summarized in **Table 2**. The total volume of groundwater treated in 2015 based on effluent flow totals was 546,502,340 gallons. The GWTP operated with an average uptime of 98.3% at an average effluent flowrate of 1,061 gpm.

### Mass Removal

Mass removal was calculated based on monthly influent concentrations combined with monthly influent flow totals. During 2015, approximately 939 lbs of VOCs were removed by the GWTP, for an average monthly mass removal rate of approximately 78 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 approved by the NYSDEC Division of Air Resources (DAR) in July 2009. In November 2011, the Navy submitted an evaluation proposing revised discharge goals, which NYSDEC approved in October 2013. A copy of this documentation is included as **Appendix B**.

### **3.2.1 Fourth Quarter 2015 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 2015 Annual Summary**

**Table 6** summarizes annual air emissions based on monthly emissions during the 12-month period. During 2015, total annual air emissions of permitted constituents consisted of 3.5 lbs of TCE, 0.61 lbs of vinyl chloride, 28 lbs of 1,2-DCE, and 1.4 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 (as summarized in **Table 7**), 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**.

Depth 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 the 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 ft bgs and 320 and 340 ft 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 2015. 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 29 October. 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 2015 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 2015 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 2015 semi-annual monitoring event 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 710 µg/L detected in February 2010), remaining below 300 µg/L since the latter half of 2012 and below 200 µg/L since May 2014. During the Fourth Quarter 2015, concentrations ranged from 140-155 µg/L. 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 11.2 µg/L in December 2015. PCE concentrations have also exhibited decreasing trends over time, with concentrations decreasing from 180 µg/L in February 2010 to a low of 30.5 µg/L in November 2015. 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, with the most recent data collected in Third Quarter 2015. Concentrations of TCE have decreased from initial concentrations in February 2010 (660 µg/L), remaining below 300 µg/L since the latter half of 2012, with a TCE concentration of 237 µg/L in the Third Quarter 2015. Concentrations of cis-1,2-DCE have remained consistently below 4.0 µg/L, and below 2.0 µg/L since September 2013. PCE has been detected at low levels during only a few sampling events, with the most recent detection of 0.68 µg/L in September 2015. Vinyl chloride has not been detected during any sampling event.

**Figure 7** presents concentrations detected at RW1-MW1, with the most recent data collected in Third Quarter 2015. The concentration of TCE in the Third Quarter 2015 (98.9 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 2015 (22.0 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 the lowest concentration observed to date. Concentrations of PCE have remained consistently below 1.0 µg/L.

**Figure 8** presents concentrations detected at RW1-MW3, with the most recent data collected in Third Quarter 2015. Concentrations of cis-1,2-DCE and PCE have consistently remained below 1.0 µg/L. Concentrations of TCE have also remained consistently low, ranging from 0.58 J – 3.2 µg/L.

**Figure 9** presents concentrations detected at RW2-MW1, with the most recent data collected in Third Quarter 2015. Concentrations of TCE in the Third Quarter 2015 (27.5 µg/L) were less than initial concentrations observed in May 2005 (37.6 µg/L), which was also the highest TCE concentration observed to date. The concentration of cis-1,2-DCE observed in the Third Quarter 2015 (13.3 µg/L) was above initial concentrations observed in May 2005 (non-detect) and also the maximum observed to date. PCE has not been detected during any sampling event.

**Figure 10** presents concentrations detected at RW3-MW1, with the most recent data collected in Third Quarter 2015. Concentrations of TCE in the Third Quarter 2015 (45.4 µg/L) were higher than initial concentrations observed in January 2010 (35.0 µg/L), though remain less than maximum TCE concentrations observed in November 2010 (77.6 µg/L). Concentrations of cis-1,2-DCE have remained consistently below 2.0 µg/L and concentrations of PCE have remained consistently near or below 2.0 µg/L.

**Figure 11** presents concentrations detected at RW3-MW2, with the most recent data collected in Third Quarter 2015. TCE concentrations observed in the Third Quarter 2015 (169 µg/L) were slightly above initial concentrations observed in January 2010 (160 µg/L), but less than the maximum concentration observed in April 2010 (211 µg/L). Concentrations of cis-1,2-DCE at this location have consistently remained between 1.0 – 2.0 µg/L. PCE has only been detected during a few sampling events, with concentrations ranging from 0.28 J µg/L to 0.52 J µg/L.

**Figure 12** presents concentrations detected at RW3-MW3, with the most recent data collected in Third Quarter 2015. TCE concentrations observed in the Third Quarter 2015 (138 µg/L) were less than initial concentrations observed in January 2010 (350 µg/L), and also less than the maximum concentration observed in June 2013 (410 µg/L); the TCE concentration in the Third Quarter 2015 was the lowest observed to date. Concentrations of cis-1,2-DCE have remained near or below 2.0 µg/L and PCE has remained below 1.0 µg/L.

**Figure 13** presents concentrations detected at RW3-MW4, with the most recent data collected in Third Quarter 2015. TCE concentrations have decreased since the initial sampling event in January 2010 (21 µg/L), with a concentration of 4.1 µg/L observed in the Third Quarter 2015. PCE was detected for the first time during the Third Quarter 2015 sampling event at a concentration of 0.31 J µg/L, and cis-1,2-DCE has not been detected since the initial sampling event in January 2010 (0.46 µg/L).

**Figure 14** presents concentrations detected at TP-01, with the most recent data collected in Third Quarter 2015. TCE concentrations observed in the Third Quarter 2015 (53.0 µg/L) were less than initial concentrations observed in January 2010 (65 µg/L), which was also the maximum concentration observed



to date. Concentrations of cis-1,2-DCE have generally decreased over time, from an initial value of 190 µg/L to 11.3 µg/L in the Third Quarter 2015. PCE concentrations have ranged from non-detectable levels in March 2014 to 6.0 µg/L in June 2012.

## **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. In accordance with the O&M Manual, the groundwater sampling frequency for the eight monitoring wells has been reduced to semi-annually. Water levels for the 14 monitoring wells will continue to be monitored on a quarterly basis.

## 5.0 REFERENCES

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## **TABLES**

**Table 1**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**Discharge Monitoring Results**  
**Fourth Quarter 2015**

SPDES Parameters	Daily Maximum Goal	Units	October 2015									
			RW-1 <sup>(1)</sup>	RW-3 <sup>(1)</sup>	Combined Influent <sup>(1)</sup> (RW-1 + RW-3)	Air Stripper Effluent (ASE)	Bag Filter Effluent (BFE)	Liquid Carbon 1 Effluent (LC1)	Liquid Carbon 2 Effluent (LC2)	Liquid Carbon 3 Effluent (LC3)	Treated Effluent (TE)	Treated Effluent (TE) Duplicate
Process Stream												
Well Depth		ft	445	530	NA	NA	NA	NA	NA	NA	NA	NA
Screened Interval		ft	335-395 410-430	392-412 442-504	NA	NA	NA	NA	NA	NA	NA	NA
Sampling Date			10/5/15									
Average Flowrate	1100	GPM	992	0	993	NR	991	NR	NR	NR	1,023	NR
Total Flow		gallons	44,299,167	18,500	44,317,667	NR	44,235,167	NR	NR	NR	45,678,433	NR
pH	5.5 - 8.5	SU	5.28	NA	5.28	5.86	5.95	6.12	6.13	6.13	6.13	6.15
Carbon Tetrachloride	NA	µg/L	0.28 J	NA	0.28 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	2.0	NA	2.0	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	0.31 J	NA	0.31 J	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	1.8	NA	1.8	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	12	NA	12	0.38 J	0.36 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	0.20 J	NA	0.20 J	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	33	NA	33	0.27 J	0.28 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethene	5	µg/L	1.3	NA	1.3	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	140	NA	140	2.0	1.7	ND (1.0)	0.20 J	0.26 J	0.24 J	0.35 J
Vinyl Chloride	2	µg/L	0.44 J	NA	0.44 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Mercury	0.00025	mg/L	ND (0.00020)	NA	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)	ND (0.00020)
Total Suspended Solids (TSS)	NA	mg/L	ND (4.2)	NA	ND (4.2)	ND (4.2)	ND (4.2)	ND (4.2)	ND (4.2)	ND (4.2)	ND (4.2)	ND (4.2)

**Table 1**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**Discharge Monitoring Results**  
**Fourth Quarter 2015**

SPDES Parameters	Daily Maximum Goal	Units	November 2015									
			RW-1 <sup>(1)</sup>	RW-3 <sup>(1)</sup>	Combined Influent <sup>(1)</sup> (RW-1 + RW-3)	Air Stripper Effluent (ASE)	Bag Filter Effluent (BFE)	Liquid Carbon 1 Effluent (LC1)	Liquid Carbon 2 Effluent (LC2)	Liquid Carbon 3 Effluent (LC3)	Treated Effluent (TE)	Treated Effluent (TE) Duplicate
Process Stream												
Well Depth		ft	445	530	NA	NA	NA	NA	NA	NA	NA	NA
Screened Interval		ft	335-395 410-430	392-412 442-504	NA	NA	NA	NA	NA	NA	NA	NA
Sampling Date			11/16/15									
Average Flowrate	1100	GPM	995	0.3	995	NR	994	NR	NR	NR	1,037	NR
Total Flow		gallons	42,990,133	13,400	43,003,533	NR	42,947,033	NR	NR	NR	44,782,267	NR
pH	5.5 - 8.5	SU	5.44	NA	5.44	5.89	6.08	6.10	6.13	6.13	6.18	6.17
Carbon Tetrachloride	NA	µg/L	ND (1.0)	NA	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	2.1	NA	2.1	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)	NA	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	2.1	NA	2.1	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	13.1	NA	13.1	0.43 J	0.39 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	0.29 J	NA	0.29 J	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	30.5	NA	30.5	0.28 J	0.28 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethene	5	µg/L	1.4	NA	1.4	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	155	NA	155	2.0	1.9	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.43 J	NA	0.43 J	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Mercury	0.00025	mg/L	ND (0.00050)	NA	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
Total Suspended Solids (TSS)	NA	mg/L	ND (5)	NA	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)

**Table 1**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**Discharge Monitoring Results**  
**Fourth Quarter 2015**

SPDES Parameters	Daily Maximum Goal	Units	December 2015									
			RW-1 <sup>(1)</sup>	RW-3 <sup>(1)(2)</sup>	Combined Influent <sup>(1)</sup> (RW-1 + RW-3)	Air Stripper Effluent (ASE)	Bag Filter Effluent (BFE)	Liquid Carbon 1 Effluent (LC1)	Liquid Carbon 2 Effluent (LC2)	Liquid Carbon 3 Effluent (LC3)	Treated Effluent (TE)	Treated Effluent (TE) Duplicate
Process Stream												
Well Depth		ft	445	530	NA	NA	NA	NA	NA	NA	NA	NA
Screened Interval		ft	335-395 410-430	392-412 442-504	NA	NA	NA	NA	NA	NA	NA	NA
Sampling Date			12/7/15									
Average Flowrate	1100	GPM	992	0.2	992	NR	990	NR	NR	NR	1,027	NR
Total Flow		gallons	44,275,240	10,700	44,285,940	NR	44,207,640	NR	NR	NR	45,857,440	NR
pH	5.5 - 8.5	SU	5.42	NA	5.42	5.94	6.12	6.13	6.16	6.16	6.18	6.18
Carbon Tetrachloride	NA	µg/L	ND (1.0)	NA	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	1.8	NA	1.8	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)	NA	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	1.9	NA	1.9	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	11.2	NA	11.2	0.42 J	0.37 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	ND (1.0)	NA	ND (1.0) J	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	36.2	NA	36.2	0.30 J	0.41 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,1-Trichloroethene	5	µg/L	1.3	NA	1.3	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	143	NA	143	1.8	1.8	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	2	µg/L	0.45 J	NA	0.45 J	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Mercury	0.00025	mg/L	ND (0.00050)	NA	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)	ND (0.00050)
Total Suspended Solids (TSS)	NA	mg/L	ND (5)	NA	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)	ND (5)

**Notes:**

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

NA - Not Applicable

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

NR - Not Recorded

NS - Not Sampled

gpm - gallons per minute

(1) 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. To maintain the integrity of RW-3 for potential future use, approximately 200 gallons per minute of water are pumped for a 1-hour period from the well on a monthly basis. RW-3 will be sampled semi-annually, consistent with the groundwater monitoring program. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

**Table 2**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**2015 Annual Flow Summary**

<b>Monthly Flow Totals</b>		
<b>Month</b>	<b>Total GWTP Influent Flow (gal)</b>	<b>Total GWTP Effluent Flow (gal)</b>
Jan-15	47,319,100	49,005,567
Feb-15	42,296,017	43,857,200
Mar-15	46,510,633	48,508,633
Apr-15	44,778,000	46,553,700
May-15	45,833,500	47,652,600
Jun-15	38,151,500	39,724,500
Jul-15	44,442,267	46,103,733
Aug-15	44,449,833	46,085,667
Sep-15	41,123,400	42,692,600
Oct-15	44,317,667	45,678,433
Nov-15	43,003,533	44,782,267
Dec-15	44,285,940	45,857,440
<b>Annual Flow Summary</b>		
	<b>GWTP Influent</b>	<b>GWTP Effluent</b>
2015 Total (gal)	526,511,390	546,502,340
2015 Monthly Average (gal)	43,875,949	45,541,862
2015 Effective Flowrate (gpm)	1004	1043
2015 Average Flowrate (gpm)	1022	1061

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**  
**2015 Mass Removal Summary**

Month	Total Flow (gal)			CCl <sub>4</sub>			1,1-DCA			1,2-DCA			1,1-DCE			cis-1,2-DCE		
	GWTP Effluent	GWTP Influent	2015 Cumulative Influent	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)
Jan-15	49,005,567	47,319,100	47,319,100	0.0	0.0000	0.0000	2.1	0.8280	0.8280	0.0	0.0000	0.0000	1.9	0.7514	0.7514	12.5	4.9336	4.9336
Feb-15	43,857,200	42,296,017	89,615,117	0.0	0.0000	0.0000	2.5	0.8679	1.6959	0.0	0.0000	0.0000	2.6	0.9188	1.6703	15.2	5.3775	10.3111
Mar-15	48,508,633	46,510,633	136,125,750	0.0	0.0000	0.0000	2.3	0.8922	2.5881	0.0	0.0000	0.0000	2.7	1.0334	2.7037	13.3	5.1438	15.4548
Apr-15	46,553,700	44,778,000	180,903,750	0.0	0.0000	0.0000	0.0	0.0000	2.5881	2.5	0.9261	0.9261	2.1	0.7995	3.5032	12.9	4.8176	20.2724
May-15	47,652,600	45,833,500	226,737,250	0.0	0.0000	0.0000	2.2	0.8565	3.4445	0.0	0.0000	0.9261	2.3	0.8651	4.3683	12.4	4.7340	25.0064
Jun-15	39,724,500	38,151,500	264,888,750	0.0	0.0000	0.0000	2.1	0.6613	4.1059	0.0	0.0000	0.9261	2.2	0.7087	5.0770	12.0	3.8284	28.8349
Jul-15	46,103,733	44,442,267	309,331,017	0.0	0.0000	0.0000	1.8	0.6675	4.7734	0.0	0.0000	0.9261	1.9	0.7046	5.7816	12.8	4.7469	33.5817
Aug-15	46,085,667	44,449,833	353,780,850	0.0	0.0000	0.0000	2.4	0.8902	5.6636	0.0	0.0000	0.9261	2.3	0.8531	6.6347	14.6	5.4153	38.9970
Sep-15	42,692,600	41,123,400	394,904,250	0.0	0.0000	0.0000	2.3	0.7893	6.4528	0.0	0.0000	0.9261	2.4	0.8236	7.4582	14.9	5.1130	44.1100
Oct-15	45,678,433	44,317,667	439,221,917	0.28	0.1035	0.1035	2.0	0.7396	7.1924	0.31	0.1146	1.0407	1.8	0.6657	8.1239	12.0	4.4377	48.5477
Nov-15	44,782,267	43,003,533	482,225,450	0.0	0.0000	0.1035	2.1	0.7536	7.9460	0.0	0.0000	1.0407	2.1	0.7536	8.8775	13.1	4.7008	53.2486
Dec-15	45,857,440	44,285,940	526,511,390	0.0	0.0000	0.1035	1.8	0.6652	8.6112	0.0	0.0000	1.0407	1.9	0.7021	9.5796	11.2	4.1389	57.3875
<b>2015 Totals</b>	<b>546,502,340</b>	<b>526,511,390</b>			<b>0.1035</b>		<b>8.6112</b>			<b>1.0407</b>			<b>9.5796</b>			<b>57.3875</b>		

Month	Total Flow (gal)			trans-1,2-DCE			PCE			1,1,1-TCA			TCE			VC		
	GWTP Effluent	GWTP Influent	2015 Cumulative Influent	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)	Influent Concentration (µg/L)	Mass Removal (lb)	2015 Cumulative Mass Removal (lb)
Jan-15	49,005,567	47,319,100	47,319,100	0.0	0.0000	0.0000	28.9	11.4268	11.4268	1.2	0.4774	0.4774	166	65.4776	65.4776	0.00	0.0000	0.0000
Feb-15	43,857,200	42,296,017	89,615,117	0.25	0.0879	0.0879	30.9	10.9167	22.3434	0.85	0.2993	0.7767	197	69.6197	135.0973	0.52	0.1843	0.1843
Mar-15	48,508,633	46,510,633	136,125,750	0.0	0.0000	0.0879	31.7	12.2998	34.6432	0.0	0.0000	0.7767	177	68.7131	203.8104	0.00	0.0000	0.1843
Apr-15	46,553,700	44,778,000	180,903,750	0.0	0.0000	0.0879	28.7	10.7248	45.3680	0.0	0.0000	0.7767	173	64.5780	268.3885	0.00	0.0000	0.1843
May-15	47,652,600	45,833,500	226,737,250	0.21	0.0798	0.1677	29.1	11.1462	56.5142	0.16	0.0603	0.8371	169	64.5807	332.9691	0.39	0.1505	0.3348
Jun-15	39,724,500	38,151,500	264,888,750	0.21	0.0668	0.2345	32.0	10.1956	66.7098	1.3	0.4109	1.2480	175	55.8410	388.8101	0.41	0.1310	0.4657
Jul-15	46,103,733	44,442,267	309,331,017	0.23	0.0853	0.3198	39.8	14.7597	81.4695	1.2	0.4450	1.6930	148	54.8855	443.6956	0.42	0.1558	0.6215
Aug-15	46,085,667	44,449,833	353,780,850	0.26	0.0964	0.4162	33.9	12.5739	94.0434	0.0	0.0000	1.6930	144	53.4112	497.1068	0.43	0.1595	0.7810
Sep-15	42,692,600	41,123,400	394,904,250	0.28	0.0961	0.5123	32.5	11.1525	105.1959	1.6	0.5490	2.2420	166	56.9635	554.0703	0.53	0.1819	0.9629
Oct-15	45,678,433	44,317,667	439,221,917	0.20	0.0740	0.5863	33.0	12.2037	117.3996	1.3	0.4808	2.7228	140	51.7731	605.8434	0.44	0.1627	1.1256
Nov-15	44,782,267	43,003,533	482,225,450	0.29	0.1041	0.6903	30.5	10.9447	128.3443	1.4	0.5024	3.2252	155	55.6206	661.4640	0.43	0.1543	1.2799
Dec-15	45,857,440	44,285,940	526,511,390	0.0	0.0000	0.6903	36.2	13.3775	141.7218	1.3	0.4804	3.7056	143	52.8447	714.3087	0.45	0.1663	1.4462
<b>2015 Totals</b>	<b>546,502,340</b>	<b>526,511,390</b>			<b>0.6903</b>		<b>141.7218</b>			<b>3.7056</b>			<b>714.3087</b>			<b>1.4462</b>		

**2015 Cumulative Mass (VOCs) Removed (lb)** 939

**2015 Average Monthly Mass (VOCs) Removed (lb)** 78

Notes:  
 CCl<sub>4</sub> = carbon tetrachloride  
 DCA = dichloroethane  
 DCE = dichloroethene  
 PCE = tetrachloroethane  
 TCA = trichloroethane  
 TCE = trichloroethene  
 NS = Not Sampled

Mass removal (lb) = Influent Concentration (µg/L) \* Influent Flow (gal) \* (2.20462 lb/kg) \* (3.785 L/gal) \* (1 kg/10<sup>6</sup> ug)

**Table 4**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**Air Sampling Results**  
**Fourth Quarter 2015**

DAR Parameters	Discharge Goal <sup>(3)</sup>	Units	October 2015					November 2015				
			Influent (VCI1)	VC12	VC23	Effluent	Effluent Duplicate	Influent (VCI1)	VC12	VC23	Effluent	Effluent Duplicate
Process Stream												
Sampling Date			10/5/15					11/2/15				
Average Flowrate		CFM	NR	NR	NR	9,049	NR	NR	NR	NR	9,670	NR
Total Flow <sup>(1)</sup>		ft <sup>3</sup>	NR	NR	NR	403,939,920	NR	NR	NR	NR	417,729,600	NR
Total Flow <sup>(2)</sup>		m <sup>3</sup>	NR	NR	NR	11,438,305	NR	NR	NR	NR	11,828,785	NR
1,2-Dichloroethane	NA	µg/m <sup>3</sup>	5.1	ND	ND	ND	ND	4.7 J	ND	ND	ND	ND
cis 1,2-Dichloroethene	> 100,000 <sup>(4)</sup>	µg/m <sup>3</sup>	140	1.2 J	1.8 J	1.2 J	ND	120	1.3 J	ND	0.96 J	ND
trans 1,2-Dichloroethene		µg/m <sup>3</sup>	3.7 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)	> 100,000	µg/m <sup>3</sup>	140	ND	ND	ND	ND	120	ND	ND	ND	ND
Toluene	NA	µg/m <sup>3</sup>	3.8	8.7	0.61 J	0.61 J	ND	1.9 J	8.0	0.73 J	4.3	ND
Xylene	NA	µg/m <sup>3</sup>	ND	13	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NA	µg/m <sup>3</sup>	4.0 J	ND	ND	ND	ND	ND	ND	ND	ND	ND
Trichloroethene	2,600	µg/m <sup>3</sup>	1,900	100	71	17	4.9	2,200	36	77	20	5.6
Vinyl Chloride	560	µg/m <sup>3</sup>	5.0	4.6	4.3	2.5	2.5	5 J	3.8	5.3	1.9 J	2.1
Tetrachloroethene	5,100	µg/m <sup>3</sup>	400	28	64	7.7	2.2 J	410	26	60	9.2	3.4 J

**Table 4**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**Air Sampling Results**  
**Fourth Quarter 2015**

DAR Parameters	Discharge Goal <sup>(3)</sup>	Units	December 2015				
			Influent (VC11)	VC12	VC23	Effluent	Effluent Duplicate
Process Stream							
Sampling Date			12/7/15				
Average Flowrate		CFM	NR	NR	NR	9,591	NR
Total Flow <sup>(1)</sup>		ft <sup>3</sup>	NR	NR	NR	428,142,240	NR
Total Flow <sup>(2)</sup>		m <sup>3</sup>	NR	NR	NR	12,123,638	NR
1,2-Dichloroethane	NA	µg/m <sup>3</sup>	3.0 J	ND	ND	ND	ND
cis 1,2-Dichloroethene	> 100,000 <sup>(4)</sup>	µg/m <sup>3</sup>	130	ND	1.6 J	ND	ND
trans 1,2-Dichloroethene		µg/m <sup>3</sup>	ND	ND	ND	ND	ND
1,2-Dichloroethene (total)	> 100,000	µg/m <sup>3</sup>	130	ND	ND	ND	ND
Toluene	NA	µg/m <sup>3</sup>	2.4 J	ND	1.6 J	1.1 J	ND
Xylene	NA	µg/m <sup>3</sup>	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	NA	µg/m <sup>3</sup>	2.6 J	ND	ND	ND	ND
Trichloroethene	2,600	µg/m <sup>3</sup>	2,000	25	72	18	2.9 J
Vinyl Chloride	560	µg/m <sup>3</sup>	4.3	4.2	4.3	1.9 J	2.2
Tetrachloroethene	5,100	µg/m <sup>3</sup>	440	25	53	8.2	2.7 J

Notes:

NA - Not applicable

ND - Not detected

NR - Not recorded

NS - Not sampled

SGC - Short-term Guideline Concentration

µg/m<sup>3</sup> - micrograms per cubic meter

CFM - cubic feet per minute

DAR - Division of Air Resources

(1) Total Flow (ft<sup>3</sup>) = avg flowrate (cfm) \* operational time (min)

(2) Total Flow (m<sup>3</sup>) = total flow (ft<sup>3</sup>) \* (0.3048<sup>3</sup>)m<sup>3</sup>/ft<sup>3</sup>

(3) Discharge goal as approved by NYSDEC's letter dated 31 October 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 2015**

DAR Parameters	Discharge Goal <sup>(1)</sup>	Units	October 2015	November 2015	December 2015
Sampling Date			10/5/15	11/2/15	12/7/15
Average Flowrate		CFM	9,049	9,670	9,591
Total Flow		ft <sup>3</sup>	403,939,920	417,729,600	428,142,240
Total Flow		m <sup>3</sup>	11,438,305	11,828,785	12,123,638
Trichloroethene	0.09	lb/hr	0.00058	0.00072	0.00065
Vinyl Chloride	0.02	lb/hr	0.00008	0.00007	0.00007
1,2 Dichloroethene	11	lb/hr	0.00000	0.00000	0.00000
1,2-Dichloroethane	NA	lb/hr	0.00000	0.00000	0.00000
Toluene	NA	lb/hr	0.00002	0.00016	0.00004
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	0.00026	0.00033	0.00029

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<sup>^3</sup>)m<sup>3</sup>/ft<sup>3</sup> \* conc.(ug/m<sup>3</sup>) \* 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**  
**2015 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-15	0.00015	0.10922	0.00002	0.01852	0.00192	1.42463	0.00003	0.02374
Feb-15	0.00010	0.06970	0.00006	0.04224	0.00248	1.66848	0.00000	0.00000
Mar-15	0.00020	0.15182	0.00008	0.05606	0.00378	2.80291	0.00000	0.00000
Apr-15	0.00008	0.05544	0.00007	0.05040	0.00491	3.52827	0.00000	0.00000
May-15	0.00028	0.20510	0.00009	0.06409	0.00451	3.33281	0.00007	0.05384
Jun-15	0.00016	0.10063	0.00005	0.03212	0.00520	3.21158	0.00010	0.05995
Jul-15	0.00042	0.30853	0.00009	0.06961	0.00554	4.11373	0.00017	0.12341
Aug-15	0.00066	0.49262	0.00007	0.04926	0.00558	4.14841	0.00031	0.22816
Sep-15	0.00079	0.54631	0.00009	0.06176	0.00551	3.80041	0.00034	0.23753
Oct-15	0.00058	0.42869	0.00008	0.06304	0.00000	0.00000	0.00026	0.19417
Nov-15	0.00072	0.52156	0.00007	0.04955	0.00000	0.00000	0.00033	0.23992
Dec-15	0.00065	0.48046	0.00007	0.05072	0.00000	0.00000	0.00029	0.21888

	<u>TCE</u>	<u>VC</u>	<u>1,2-DCE</u>	<u>PCE</u>
<b>Discharge Goal (lb/yr)<sup>(1)</sup></b>	<b>770</b>	<b>170</b>	<b>98,000</b>	<b>1,500</b>
<b>2015 Total Emissions (lb/yr)</b>	<b>3.5</b>	<b>0.61</b>	<b>28</b>	<b>1.4</b>

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

Stack Emissions (lb/hr) = average flowrate (cfm) \* (0.3048<sup>3</sup>)m<sup>3</sup>/ft<sup>3</sup> \* conc.(ug/m<sup>3</sup>) \* 1 lb/453592370 ug \* 60 min/hr

Stack Emissions (lb/mo) = average flowrate (cfm) \* (0.3048<sup>3</sup>)m<sup>3</sup>/ft<sup>3</sup> \* conc.(ug/m<sup>3</sup>) \* 1 lb/453592370 ug \* 60 min/hr \* operational time (hr/mo)

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

**Table 7**  
**GM-38 Area Groundwater Remediation**  
**Groundwater Treatment Plant**  
**Naval Weapons Industrial Reserve Plant - Bethpage, NY**  
**Groundwater Level Measurements**  
**Fourth Quarter 2015**

Monitoring Well ID	Date	Well Elevation (ft amsl)	Total Depth (ft)	Screen Interval (ft)	Depth to Water (ft)	Groundwater Elevation (ft amsl)
RW1-MW1	10/29/15	85.86	435	395-435	37.34	48.52
RW1-MW2	10/29/15	87.35	435	395-435	40.80	46.55
RW1-MW3	10/29/15	80.34	435	395-435	30.15	50.19
RW2-MW1	10/29/15	90.75	510	470-510	40.05	50.70
RW2-MW2	10/29/15	90.15	510	470-510	39.40	50.75
RW2-MW3	10/29/15	89.75	510	470-510	39.11	50.64
RW3-MW1	10/29/15	92.22	350	330-350	38.91	53.31
RW3-MW2	10/29/15	91.98	495	475-495	40.00	51.98
RW3-MW3	10/29/15	92.98	340	320-340	40.30	52.68
RW3-MW4	10/29/15	92.92	495	475-495	40.78	52.14
TP-01	10/29/15	85.91	470	450-470	35.59	50.32
IW1-MW1	10/29/15	89.41	150	20-150	38.00	51.41
GM38D	NA	91.37	340	320-340	NA	NA
GM382D	NA	91.57	495	475-495	NA	NA

**Notes:**

amsl - above mean sea level

ft - feet

NA - Not Available













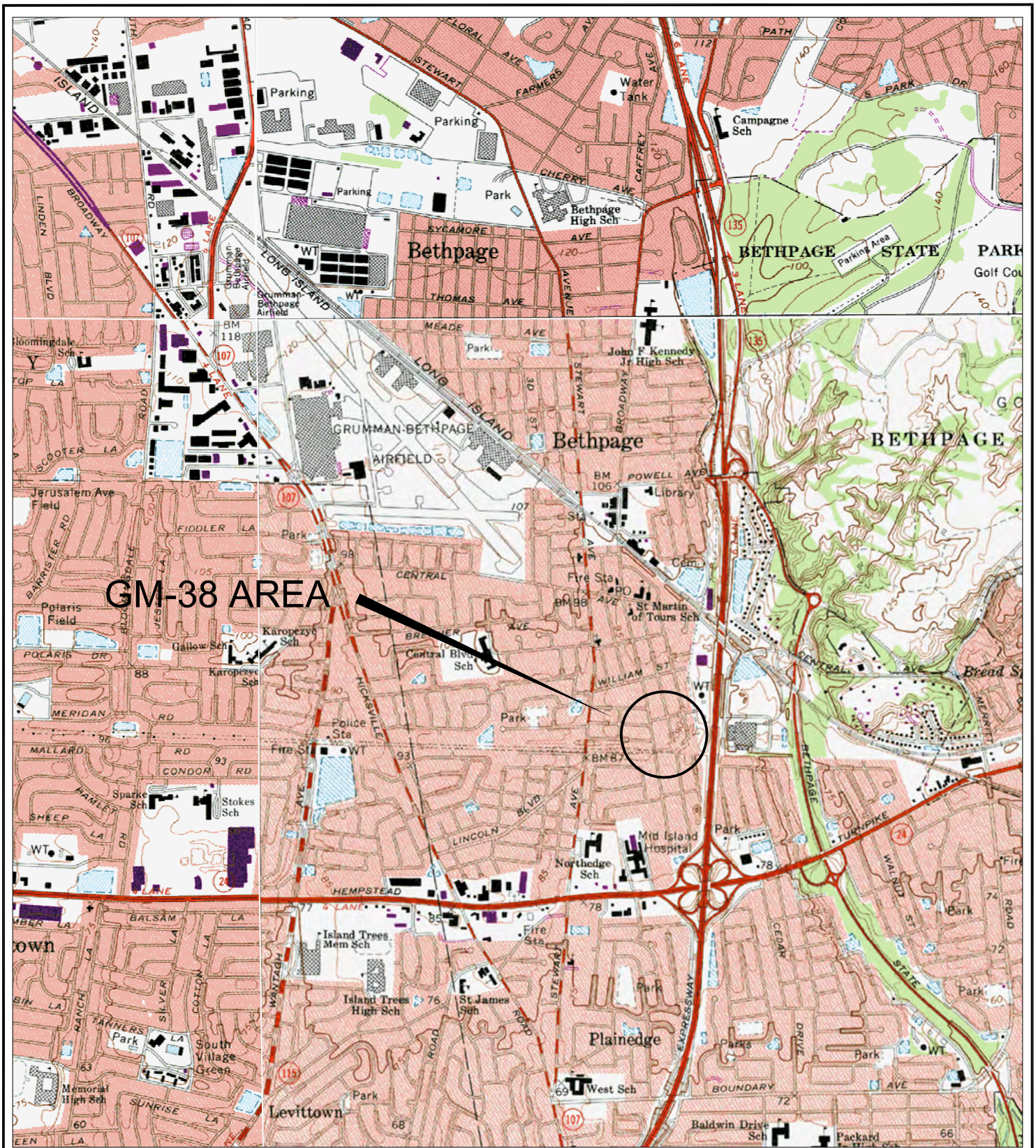


Table 8  
GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Summary of Historical Groundwater Analytical Results  
Through Fourth Quarter 2015

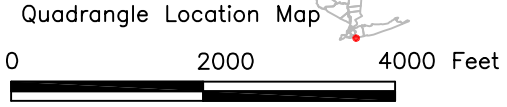
Sample ID	RW3-MW4																				
Sample Date	1/20/2010	4/22/2010	7/28/2010	7/28/2010	11/3/2010 <sup>(1)</sup>	3/24/2011	6/15/2011	9/28/2011	11/29/2011	3/7/2012	6/7/2012	8/22/2012	12/4/2012	3/14/2013	6/21/2013 <sup>(2)</sup>	9/17/2013	12/17/2013	3/26/2014	9/23/2014	3/25/2015	9/15/2015
Comments	Duplicate																				
Well Depth (Ft)	495																				
Screened Interval (Ft)	475-495																				
VOCS (EPA 624) ug/L																					
Acrolein	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	30 R	ND	ND	NR	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
Acetone	NR	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	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
Bromodichloromethane	NR	ND	ND	ND	ND	ND	NR	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
Bromomethane	NR	ND	ND	ND	ND	ND	NR	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
carbon disulfide	NR	ND	ND	ND	ND	ND	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
Chlorobenzene	ND	ND	ND	ND	ND	ND	NR	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
Chloroethane	NR	NR	NR	NR	NR	NR	NR	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	ND	NR	ND	ND	ND	ND	ND	ND
Chloroform	ND	ND	ND	ND	0.32J	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
Chloromethane	NR	ND	ND	ND	ND	ND	NR	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
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
1,2-dibromomethane	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	ND	NR	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	NR	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
1,1-dichloroethane	2.5	0.6	0.54J	0.50J	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
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
1,1-dichloroethene	1.0	ND	ND	ND	0.86J	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
cis-1,2-dichloroethene	0.46J	ND	ND	ND	1.6	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
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
1,2-dichloropropane	NR	ND	ND	ND	ND	ND	NR	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
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
1,4-dioxane	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
2-hexanone	NR	ND	ND	ND	ND	ND	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
methyl acetate	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	ND
methylcyclohexane	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	ND	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
styrene	NR	ND	ND	ND	ND	ND	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
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
Tetrachloroethene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.31 J
Toluene	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,1-trichloroethane	ND	ND	ND	ND	0.67J	ND	ND	0.66 J	ND	ND	ND	ND	ND	ND	0.29 J	ND	0.39 J	0.48 J	ND	0.60 J	ND
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
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
m,p-xylene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	NR	NR	NR	NR	NR	NR
Trichlorofluoromethane	NR	NR	NR	NR	NR	NR	NR	ND	ND	ND	ND	ND	ND	ND	NR	ND	ND	ND	ND	ND	ND
Trichlorofluoromethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	NR	NR	NR	NR	NR	NR
Trichlorotrifluoroethane	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	NR	NR	NR	NR	NR	NR
o-xylene	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	ND	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
Vinyl chloride	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
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
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



## **FIGURES**



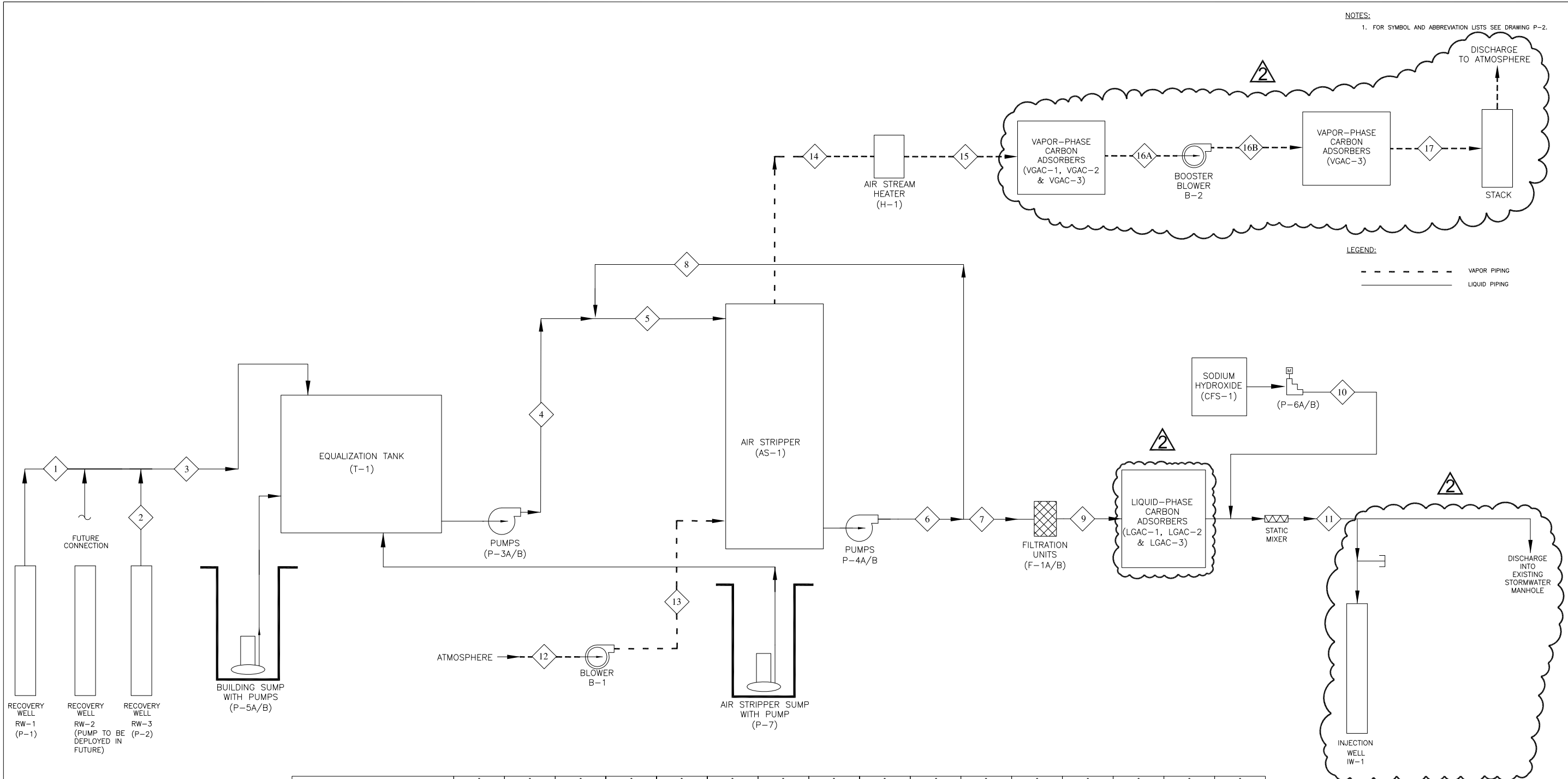
**GM-38 AREA**



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

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





NOTES:  
1. FOR SYMBOL AND ABBREVIATION LISTS SEE DRAWING P-2.

LEGEND:  
- - - VAPOR PIPING  
— LIQUID PIPING

STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COMPOSITION (UG/L, UNLESS OTHERWISE NOTED)																
BENZENE	4	4	4	4	3	-	-	-	-	-	-	-	-	-	-	-
TOLUENE	15	15	15	15	12	-	-	-	-	-	-	-	-	-	-	-
XYLENES, TOTAL	16	16	16	16	12	-	-	-	-	-	-	-	-	-	-	-
1,2-DICHLOROETHANE	3	3	3	3	2.8	-	-	-	-	-	2.7 E-07	-	-	-	-	-
cis 1,2-DICHLOROETHENE	1100	1100	1100	1100	1008	0.10	0.10	0.10	0.10	-	1.0 E-04	-	-	-	-	-
VINYL CHLORIDE	300	300	300	300	275	0.03	0.03	0.03	0.03	-	2.7 E-05	-	-	-	-	-
TETRACHLOROETHENE (PCE)	900	900	900	900	825	0.08	0.08	0.08	0.08	-	8.2 E-05	-	-	-	-	-
TRICHLOROETHENE (TCE)	3400	3400	3400	3400	3117	3.12	3.12	3.12	3.12	-	3.1 E-03	-	-	-	-	-
WATER FLOW RATE (GPM)	800	300	1100	1100	1200	1200	1100	100	1100	1.1 gpd	1100	-	-	-	-	-
TEMPERATURE (°F)	55	55	55	55	55	55	55	55	55	60	55	-	-	-	-	-
PRESSURE (PSIG)												-0.27	1.50	1.36	1.18	0.53
DENSITY (lb/ft <sup>3</sup> )										95.5		0.077	0.085	0.084	0.082	0.079
MASS FLOW RATE (lb/hr)	400364	150136	550500	550500	600545	600545	550500	50,045	550500	0.59	550500	36,960	40,800	40,320	39,360	37,920
RELATIVE HUMIDITY (%)												50	50	100	50	50
STATIC PRESSURE (PSIA)												0.214	0.214	0.214	0.275	0.275
pH (S.U.)	5.5	5.5	5.5	5.5	5.5	6.0	6.0	6.0	6.0	14	7.0					
VAPOR FLOW RATE (CFM)												8000	8000	8000	8000	8000
TOTAL VAPOR VOC (PPMV)												-	-	25.5	25.5	1.2
TOTAL VAPOR VOC (LBS/HR)												-	-	3.18	3.18	0.15

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DEPARTMENT OF THE NAVY  
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT  
LESTER

ENGINEERING FIELD ACTIVITY - NORTHEAST  
PENNSYLVANIA  
BETHPAGE, NEW YORK

GM-38 AREA  
GROUNDWATER TREATMENT PLANT  
PROCESS FLOW DIAGRAM - GROUNDWATER AND OFF-GAS TREATMENT

APPROVED: [Signature]  
DATE: 05/05/06

PREP BY: DLB  
DATE: 03/31/08  
REVISED: 02/24/09

DESCRIPTION: ADDITIONAL RECOVERY WELL #1 CONNECTION REVISED BASED ON VENDOR SUBMITTALS. DRAWING UPDATES FOR CONSTRUCTION.

REV: 0  
1  
2

APPROVED: [Signature]  
DATE: 05/05/06

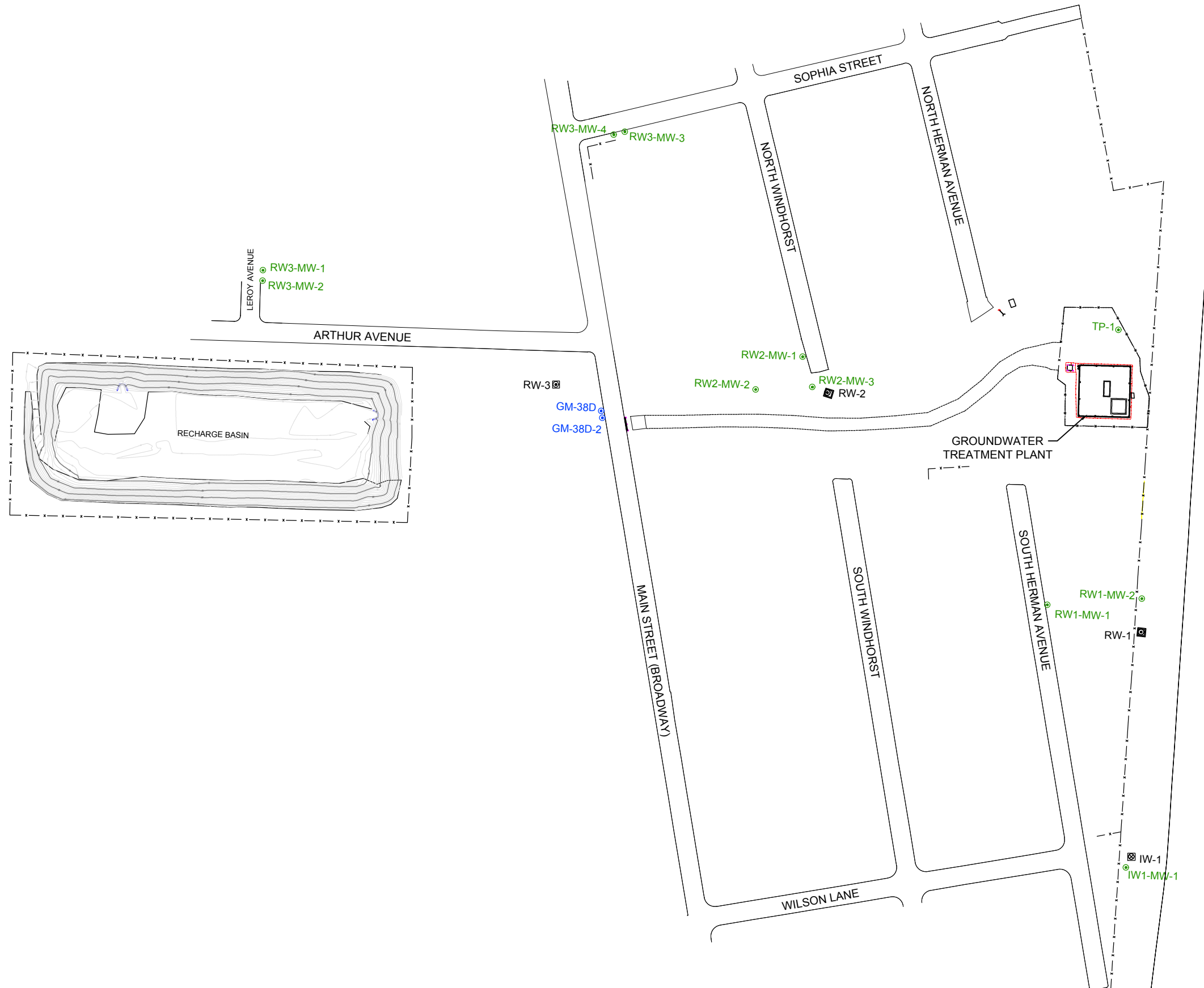
DATE: 05/05/06

CODE ID NO.: 80091  
SCALE: AS SHOWN  
SPEC. NO.:  
CONSTR. CONTR. NO.: N62472-99-D-0032  
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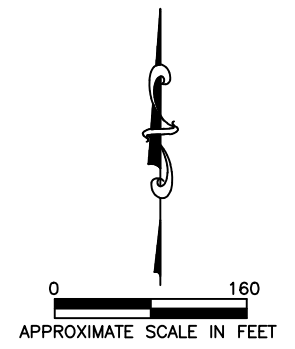
SHEET: D OF 1  
DIS. SH. NO.: 1-4

**Legend**

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



(SEAFORD-OYSTER BAY EXPRESSWAY - RTE 135)



<b>SITE MAP</b>			
<b>NWIRP BETHPAGE GM-38 AREA BETHPAGE, NEW YORK</b>			
KOMAN Government Solutions, LLC 160 East Main Street, Suite 2F, Westborough, MA 01581			
SCALE	DATE	FIGURE	
SEE BARSCALE	4/26/2016	3	

- 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.

RW3-MW4	3/25/2015	9/15/2015
cis-1,2-DCE	ND	ND
PCE	ND	0.31 J
TCE	2.7	4.1
VC	ND	ND

RW3-MW3	3/25/2015	3/25/2015 - DUP	9/15/2015
cis-1,2-DCE	1.3	1.3	1.3
PCE	0.36 J	0.37 J	0.77 J
TCE	182	184	138
VC	ND	ND	ND

RW3-MW2	3/25/2015	9/14/2015
cis-1,2-DCE	1.5	1.4
PCE	ND	0.52 J
TCE	159	169
VC	ND	ND

RW3-MW1	3/25/2015	9/15/2015
cis-1,2-DCE	ND	ND
PCE	2.2	1.6
TCE	41.8	45.4
VC	ND	ND

RW2-MW1	3/26/2015	9/14/2015
cis-1,2-DCE	2.6	13.3
PCE	ND	ND
TCE	4.3	27.5
VC	ND	ND

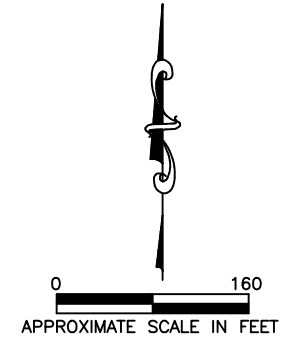
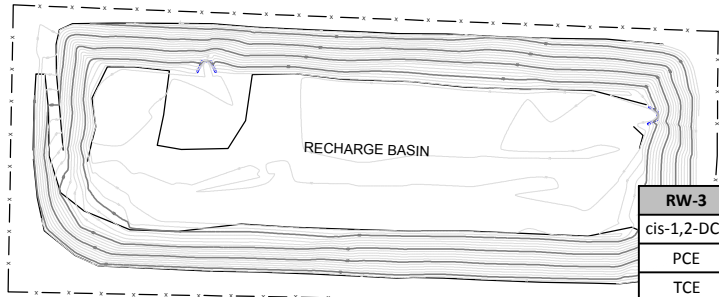
TP-01	3/25/2015	9/14/2015	9/14/2015 - DUP
cis-1,2-DCE	13.4	11.3	11.6
PCE	0.48 J	0.82 J	0.88 J
TCE	52.3	53.0	53.9
VC	ND	ND	ND

RW1-MW3	3/25/2015	9/14/2015
cis-1,2-DCE	0.54 J	0.49 J
PCE	ND	0.50 J
TCE	2.0	2.4
VC	ND	ND

RW-3	1/12/2015	2/10/2015	3/16/2015	4/16/2015	5/6/2015	6/15/2015	9/15/2015
cis-1,2-DCE	1.7 J	1.9	1.7 J	1.7 J	1.7	1.7 J	1.6
PCE	ND	ND	ND	ND	ND	ND	0.68 J
TCE	215	231	230	224	209	223	237
VC	ND	ND	ND	ND	ND	ND	ND

RW1-MW1	3/25/2015	9/15/2015
cis-1,2-DCE	39.5	22.0
PCE	0.30 J	0.62 J
TCE	99.5	98.9
VC	ND	ND

RW-1	1/12/2015	2/10/2015	3/16/2015	4/16/2015	5/6/2015	6/15/2015	7/6/2015	8/5/2015	9/14/2015	10/5/2015	11/16/2015	12/7/2015
cis-1,2-DCE	15.5	18.5	16.1	15.7	15.0	14.5	12.8	14.6	14.9	12	13.1	11.2
PCE	35.9	38.5	39.5	35.9	36.3	39.7	39.8	33.9	32.5	33	30.5	36.2
TCE	154	189	164	160	159	164	148	144	166	140	155	143
VC	ND	0.65 J	ND	ND	0.49 J	0.51 J	0.42 J	0.43 J	0.53 J	0.44 J	0.43 J	0.45 J



**2015 GROUNDWATER ANALYTICAL MAP  
 SELECT VOC CONCENTRATIONS**

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

KOMAN Government Solutions, LLC  
 160 East Main Street, Suite 2F, Westborough, MA 01581

SCALE	DATE	FIGURE	
SEE BARSCALE	4/26/2016	4	

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

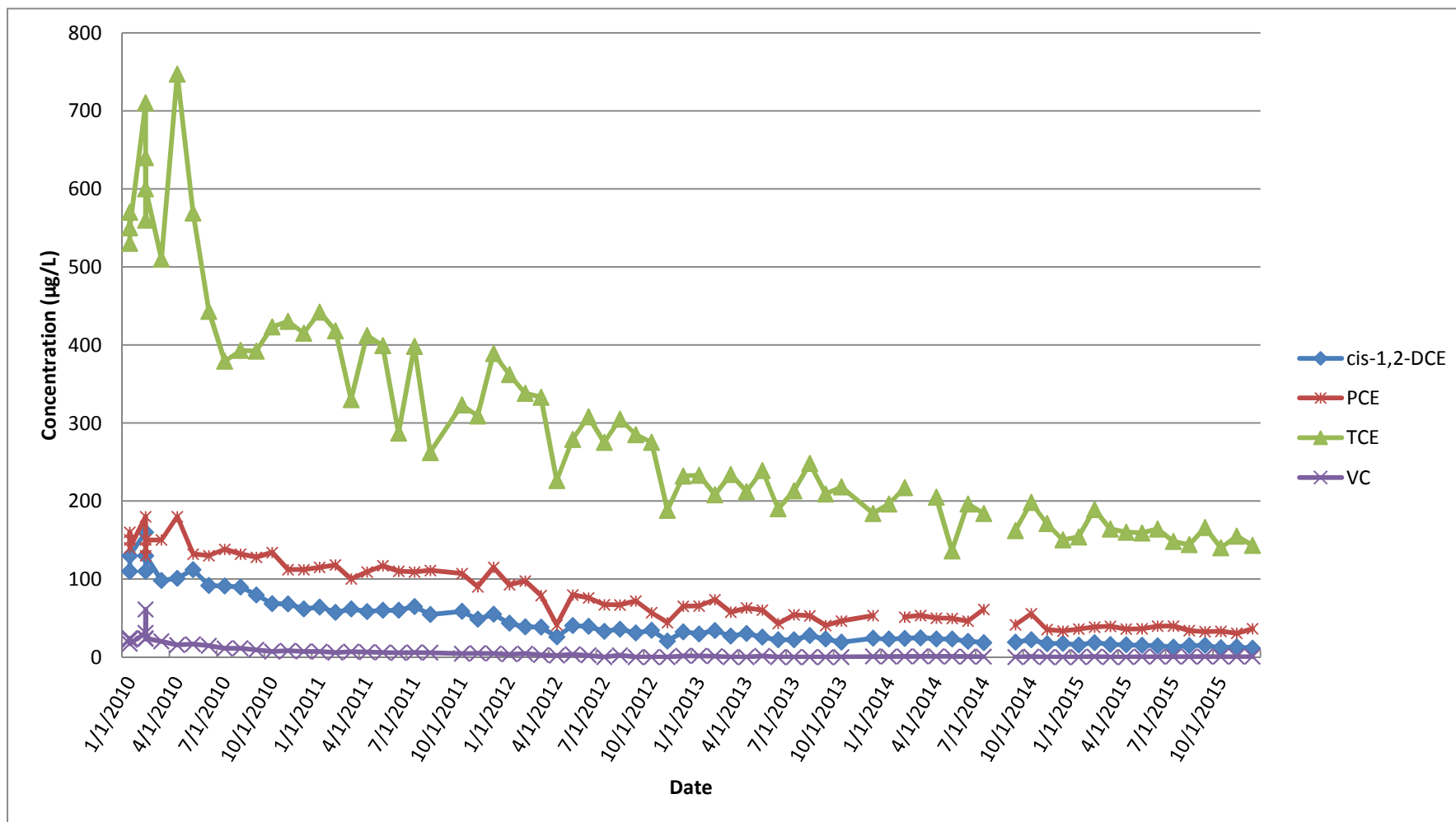
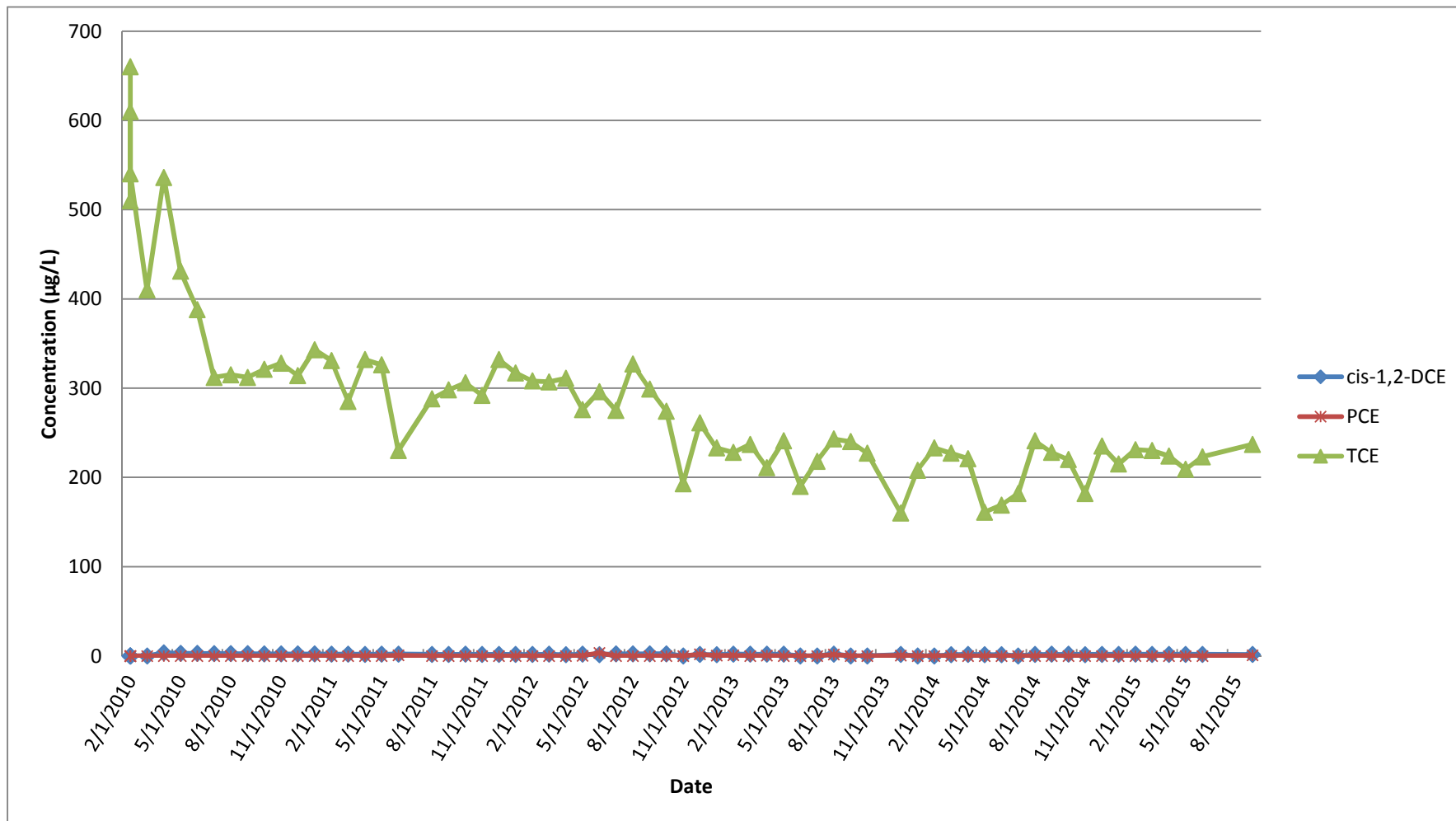
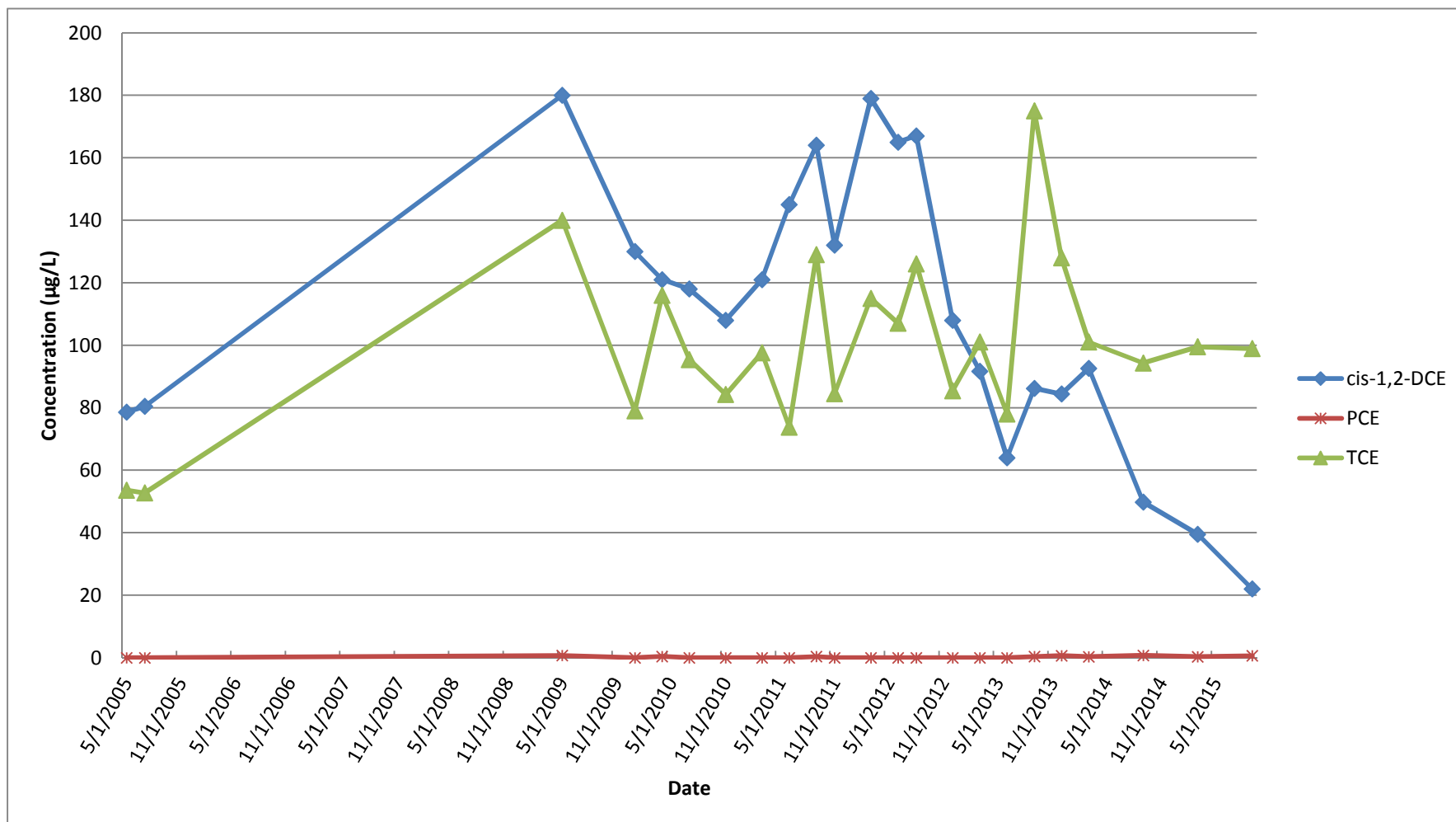


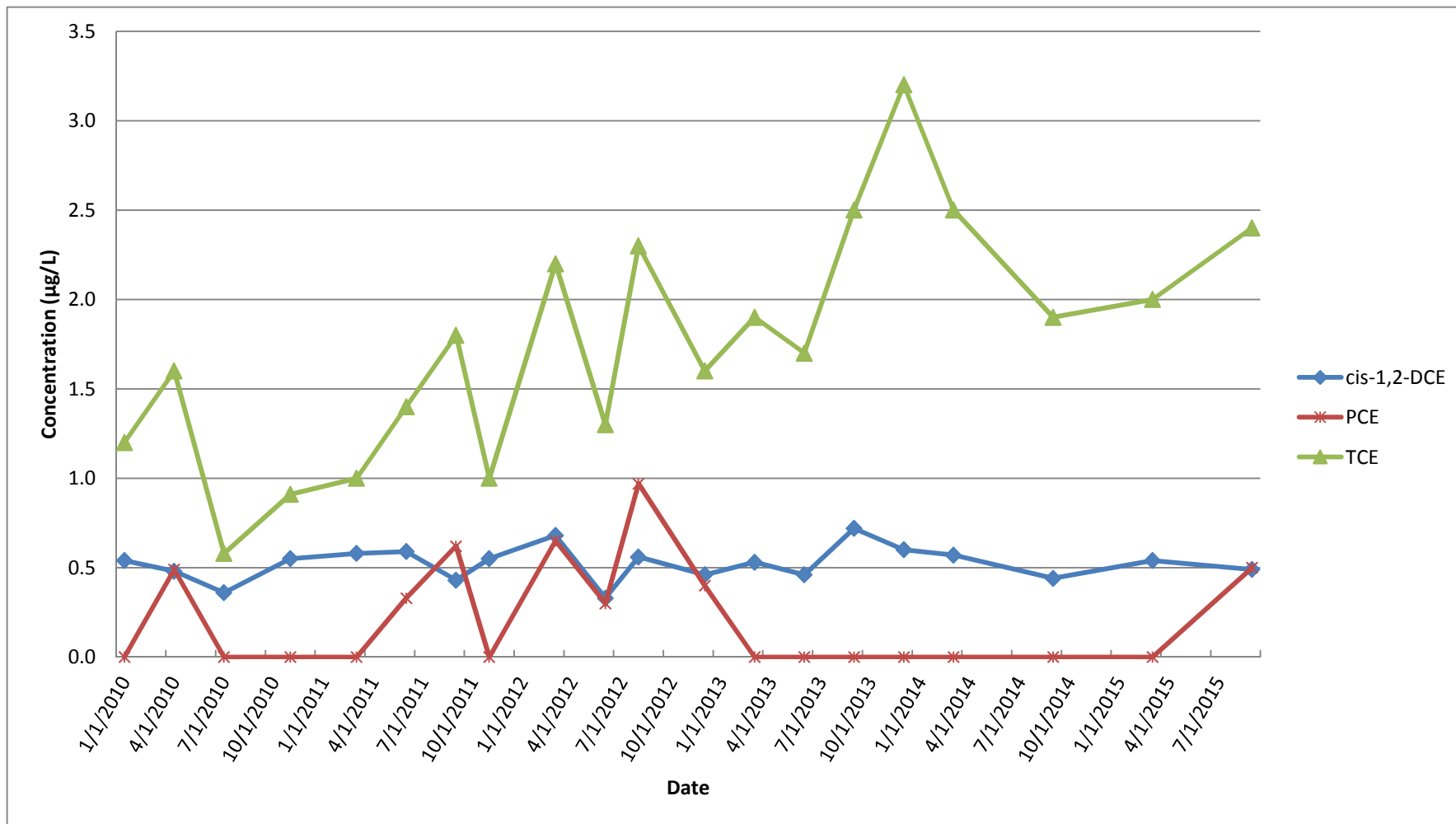
Figure 6  
GM-38 Area Groundwater Remediation  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Groundwater Concentration Trends of Select VOCs  
RW3



**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**

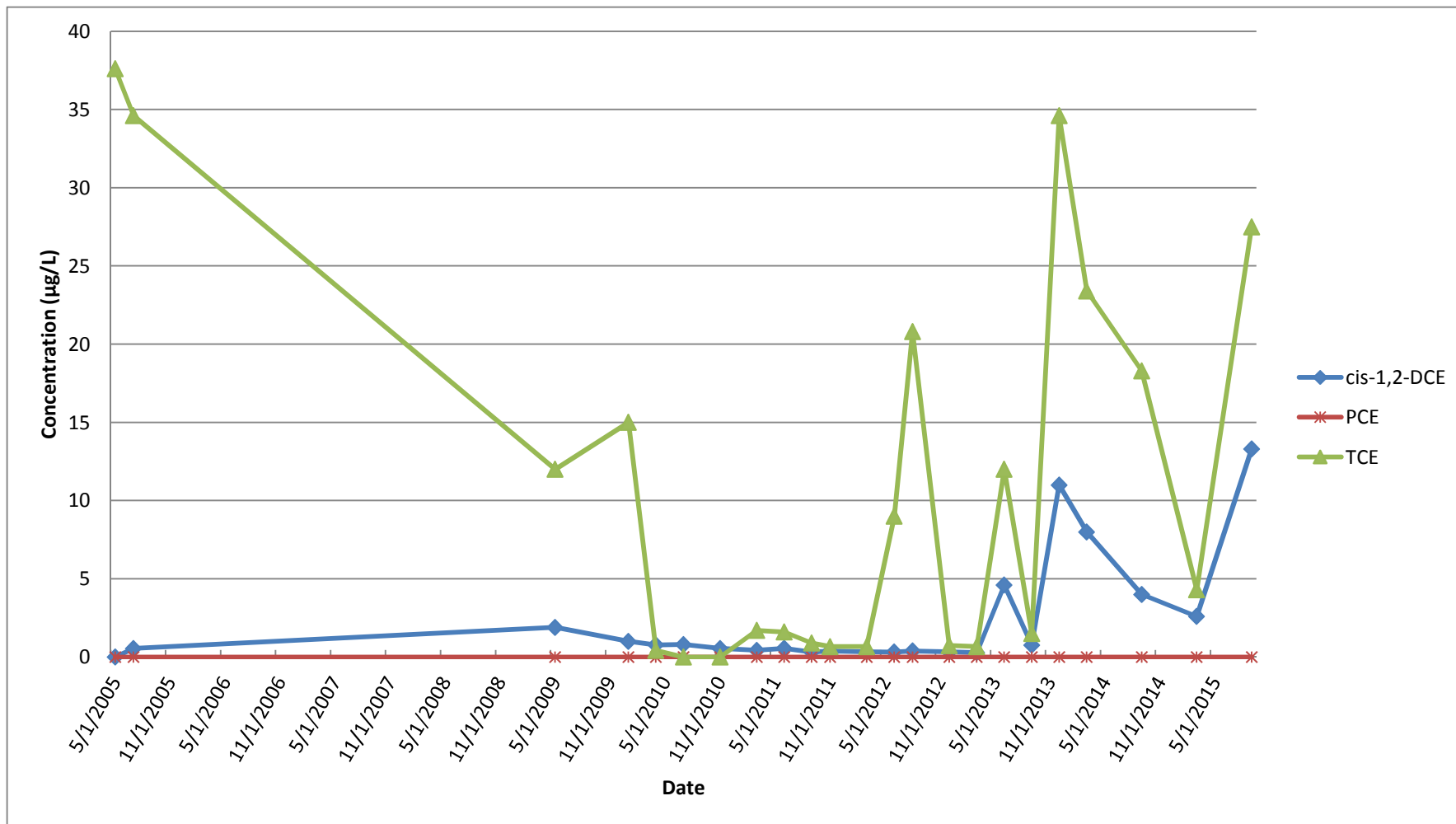




Figure 10  
GM-38 Area Groundwater Remediation  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Groundwater Concentration Trends of Select VOCs  
RW3-MW1

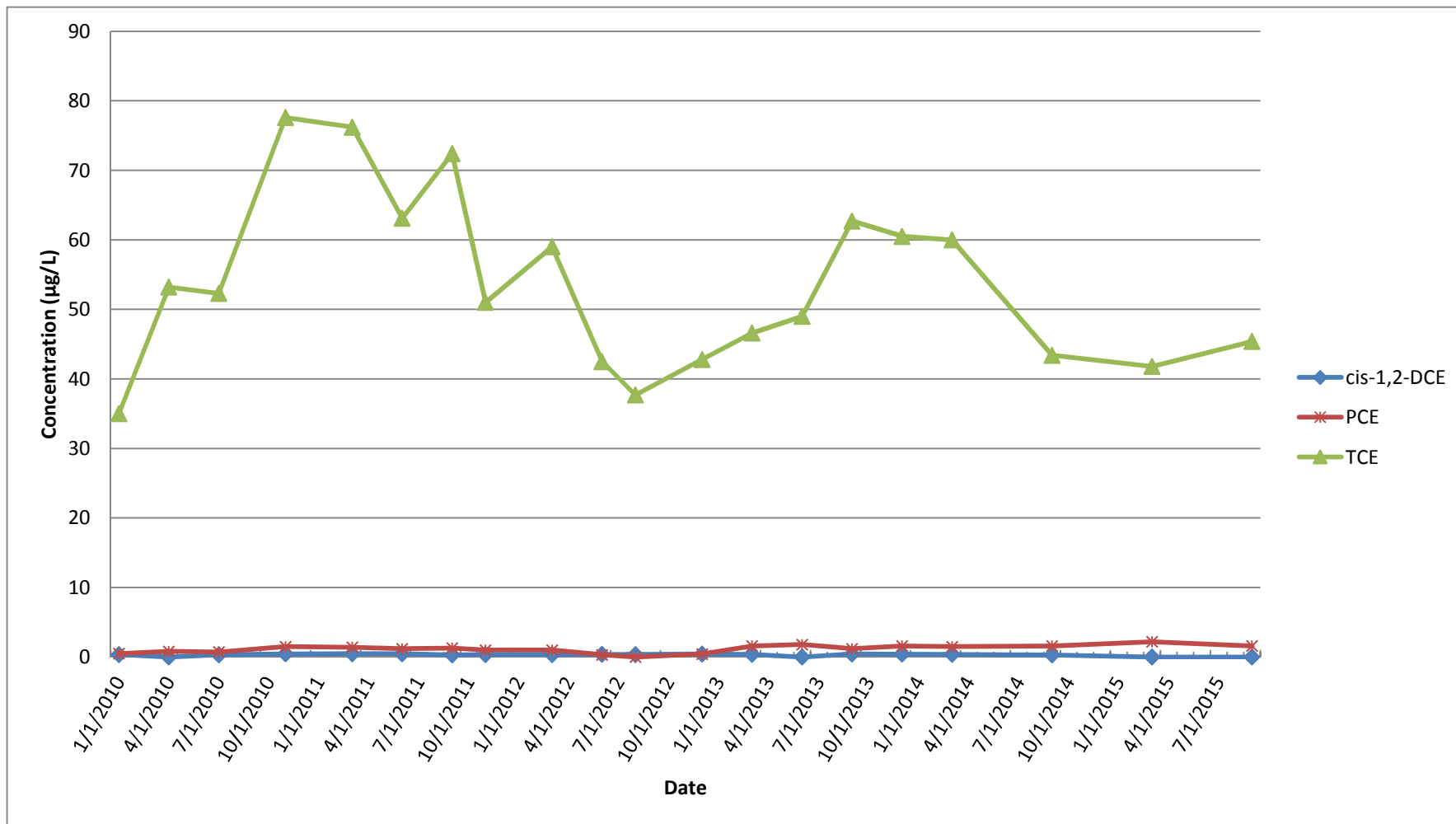


Figure 11  
GM-38 Area Groundwater Remediation  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Groundwater Concentration Trends of Select VOCs  
RW3-MW2

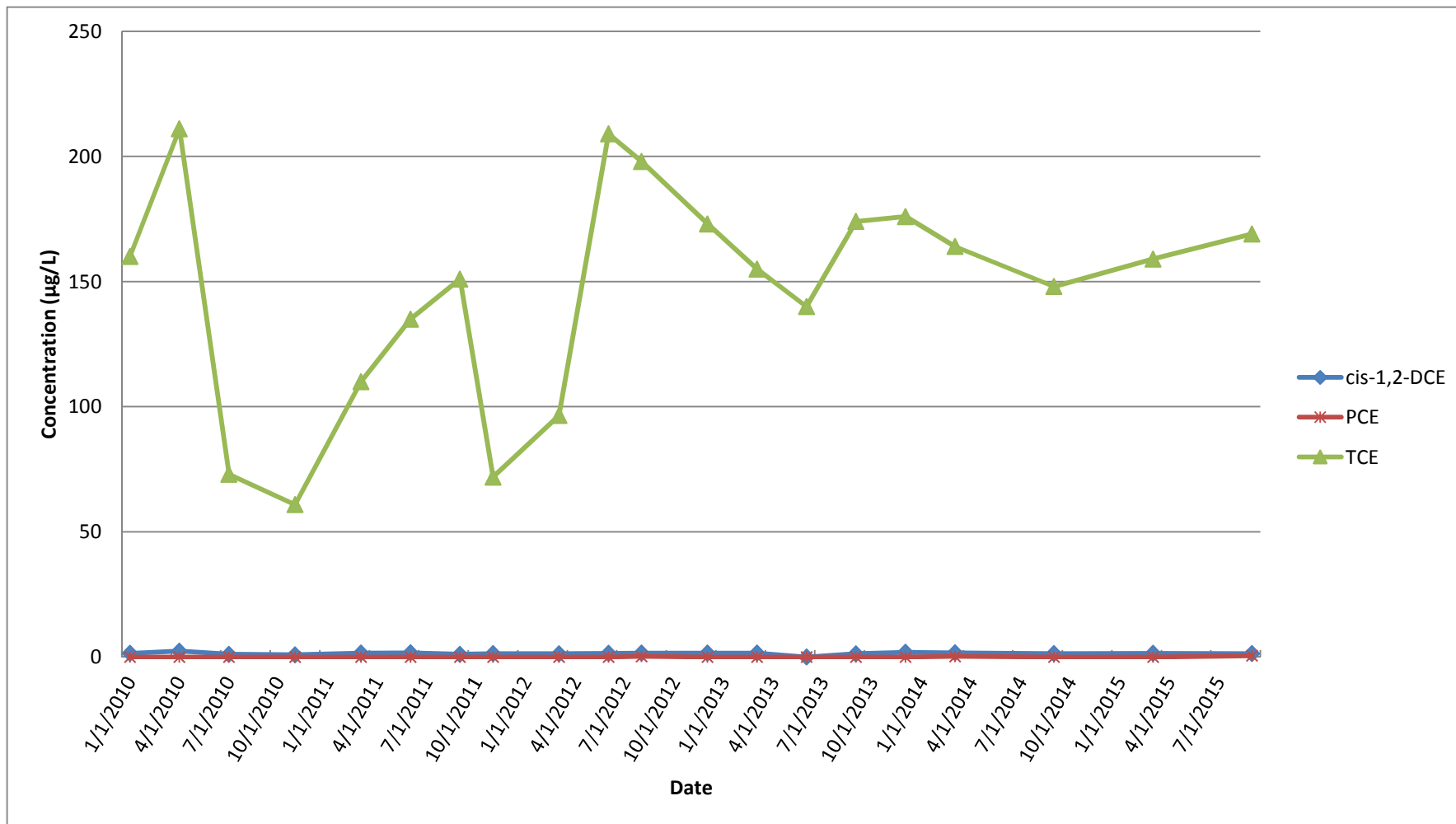


Figure 12  
GM-38 Area Groundwater Remediation  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Groundwater Concentration Trends of Select VOCs  
RW3-MW3

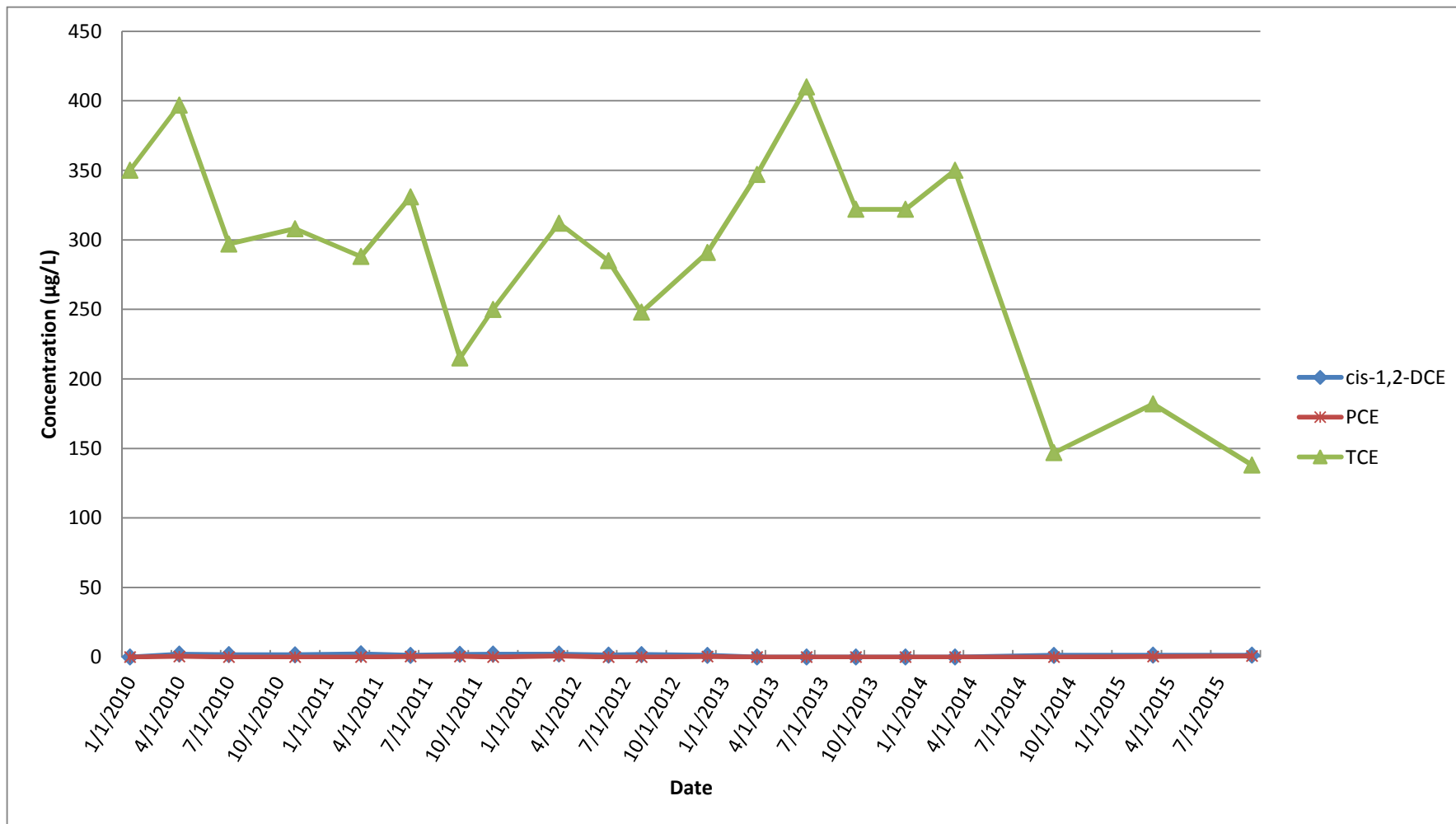
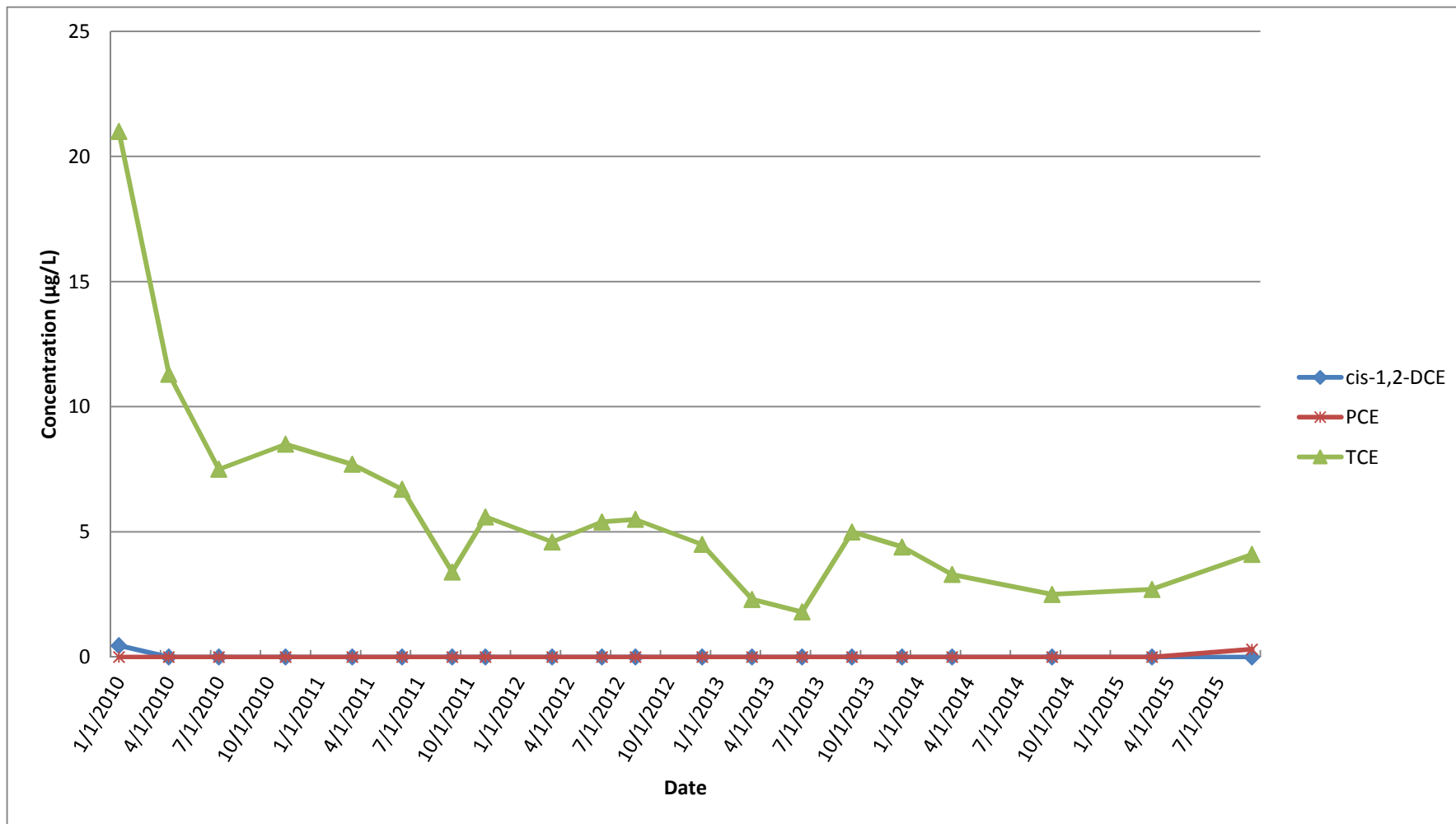
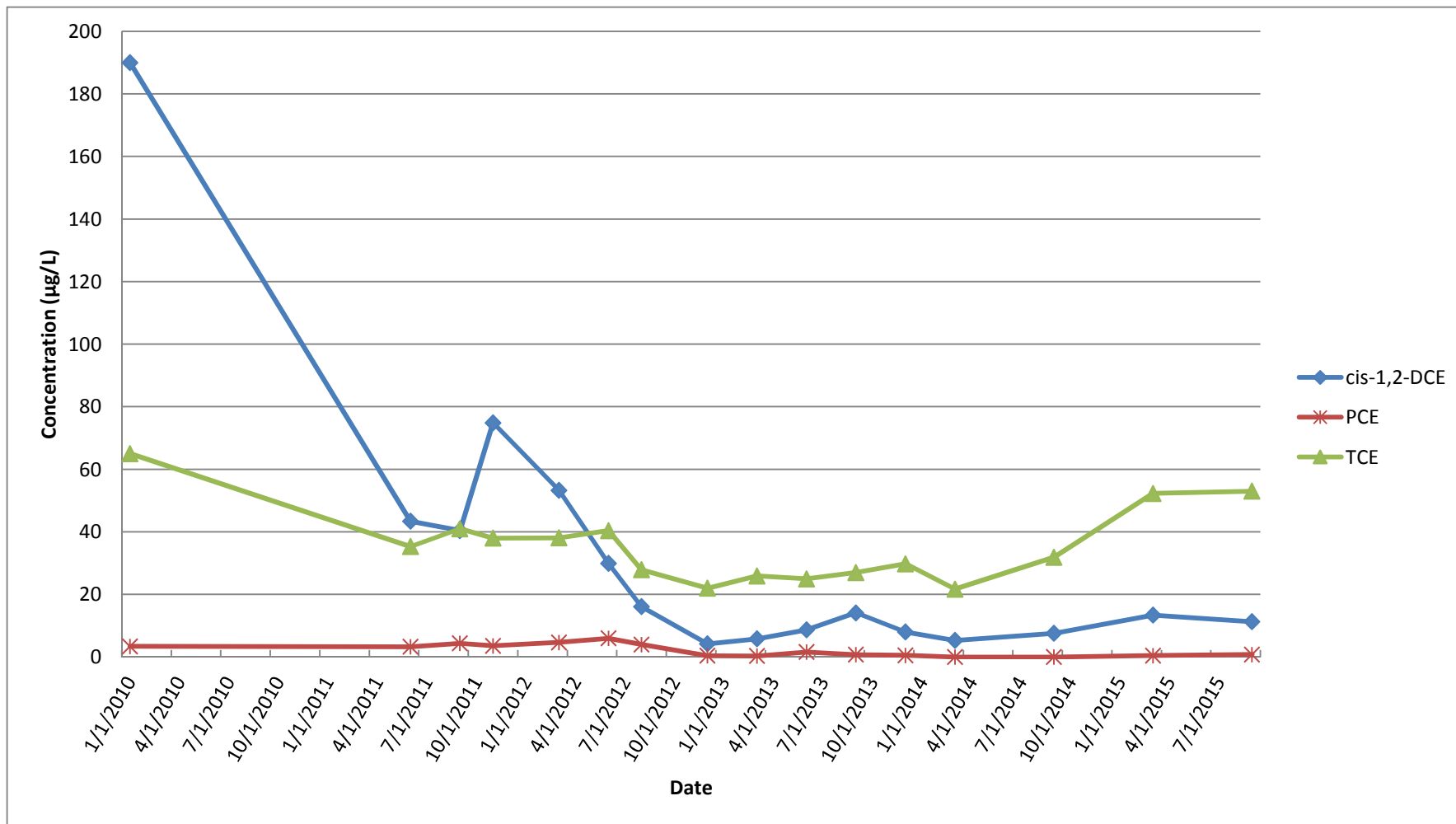


Figure 13  
GM-38 Area Groundwater Remediation  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Groundwater Concentration Trends of Select VOCs  
RW3-MW4



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

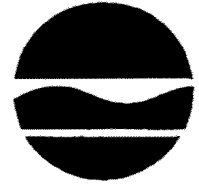


**APPENDIX A**

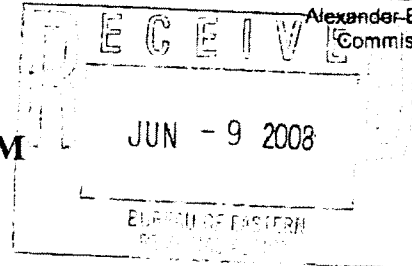
**NYSDEC EFFLUENT LIMITATIONS AND MONITORING  
REQUIREMENTS AND MONTHLY DMRS**

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

Bureau of Water Permits, 4<sup>th</sup> 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 apprised 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 <sup>1</sup>	Grab
1,2-Dichloroethane	NA	0.6	µg/l	Monthly <sup>1</sup>	Grab
1,1-Dichloroethene	NA	5	µg/l	Monthly <sup>1</sup>	Grab
cis-1,2-Dichloroethene	NA	5	µg/l	Monthly <sup>1</sup>	Grab
trans-1,2-Dichloroethene	NA	5	µg/l	Monthly <sup>1</sup>	Grab
Tetrachloroethene	NA	5	µg/l	Monthly <sup>1</sup>	Grab
1,1,1-Trichloroethane	NA	5	µg/l	Monthly <sup>1</sup>	Grab
Trichloroethene	NA	5	µg/l	Monthly <sup>1</sup>	Grab
Vinyl chloride	NA	2	µg/l	Monthly <sup>1</sup>	Grab
Mercury	NA	0.25	µg/l	Monthly <sup>1</sup>	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.

**OCTOBER 2015**



13 November 2015

Mr. Henry Wilkie  
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 2015 REPORTING PERIOD**

Dear Mr. Wilkie:

H&S Environmental, Inc. (H&S) 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.

GWTP operational data from 1 October 2015 to 31 October 2015 are presented in Attachment A. There was no significant downtime for the GWTP during this reporting period.

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

Please contact me at 508-366-7442 with any questions or concerns you may have regarding this report.

Sincerely,  
H&S Environmental, Inc.

Jennifer Good  
Project Manager

Attachment A: Groundwater and Air Sampling Results from October 2015

Cc: Steven Scharf – NYSDEC  
Jean Occidental - NYSDEC Division of Water  
Jennifer Pilewski - NYSDEC – Region 1 Water Engineer  
Gerard Ennis - Nassau County Department of Public Works  
Linda Bianculli - 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 2015**

**GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Discharge Monitoring Report  
October 2015**

SPDES Parameters	October 2015					
Process Stream	Daily Treated Effluent Maximum	Units	RW-1 <sup>(1)</sup>	RW-3 <sup>(1)</sup>	Combined Influent <sup>(1)</sup>	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		10/5/15			
Average Flowrate	1100	GPM	992	0.4	993	1,023
Total Flow	N/A	gallons	44,299,167	18,500	44,317,667	45,678,433
pH	5.5 - 8.5	SU	5.28	N/A	5.28	6.13
Carbon Tetrachloride	NA	µg/L	0.28 J	N/A	0.28 J	ND (1.0)
1,1-Dichloroethane	5	µg/L	2.0	N/A	2.0	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	0.31 J	N/A	0.31 J	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.8	N/A	1.8	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	12	N/A	12	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	0.20 J	N/A	0.20 J	ND (1.0)
Tetrachloroethene	5	µg/L	33	N/A	33	ND (1.0)
1,1,1-Trichloroethene	5	µg/L	1.3	N/A	1.3	ND (1.0)
Trichloroethene	5	µg/L	140	N/A	140	0.24 J
Vinyl Chloride	2	µg/L	0.44 J	N/A	0.44 J	ND (1.0)
Mercury	0.00025	mg/L	ND (0.00020)	N/A	ND (0.00020)	ND (0.00020)
Total Suspended Solids (TSS)	N/A	mg/L	ND (4.2)	N/A	ND (4.2)	ND (4.2)

**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

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

N/A - Not Applicable

(1) 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. To maintain the integrity of RW-3 for potential future use, approximately 200 gallons per minute of water are pumped for a 1-hour period from the well on a monthly basis. RW-3 will be sampled semi-annually, consistent with the groundwater monitoring program. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

**GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Air Sampling Results  
October 2015**

DAR Parameters	Units	Discharge Goal <sup>(1)</sup>	October 2015	
			Influent	Effluent
Process Stream				
Sampling Date	N/A	N/A	10/5/15	
Average Flowrate	CFM	N/A	NR	9,049
Total Flow	ft <sup>3</sup>	N/A	NR	403,939,920
Total Flow	m <sup>3</sup>	N/A	NR	11,438,305
1,2-Dichloroethane	µg/m <sup>3</sup>	N/A	5.1	ND
cis 1,2-Dichloroethene	µg/m <sup>3</sup>	> 100,000 <sup>(2)</sup>	140	1.2 J
trans 1,2-Dichloroethene	µg/m <sup>3</sup>		3.7 J	ND
1,2-Dichloroethene (total)	µg/m <sup>3</sup>	>100,000	140	ND
Toluene	µg/m <sup>3</sup>	N/A	3.8	0.61 J
Total Xylene	µg/m <sup>3</sup>	N/A	ND	ND
1,1,2-Trichloroethane	µg/m <sup>3</sup>	N/A	4.0 J	ND
Trichloroethene	µg/m <sup>3</sup>	2,600	1,900	17
Vinyl Chloride	µg/m <sup>3</sup>	560	5.0	2.5
Tetrachloroethene	µg/m <sup>3</sup>	5,100	400	7.7

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 2015**

<b>DAR Parameters</b>	<b>Units</b>	<b>Discharge Goal <sup>(1)</sup></b>	<b>October 2015</b>
Sampling Date	N/A	N/A	10/5/15
Average Flowrate	CFM	N/A	9,049
Total Flow	ft <sup>3</sup>	N/A	403,939,920
Total Flow	m <sup>3</sup>	N/A	11,438,305
Trichloroethene	lb/hr	0.09	0.00058
Vinyl Chloride	lb/hr	0.02	0.00008
1,2 Dichloroethene	lb/hr	11	0.00000
1,2-Dichloroethane	lb/hr	N/A	0.00000
Toluene	lb/hr	N/A	0.00002
Total Xylene	lb/hr	N/A	0.00000
1,1,2-Trichloroethane	lb/hr	N/A	0.00000
Tetrachloroethene	lb/hr	0.18	0.00026

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.



**NOVEMBER 2015**



17 December 2015

Mr. Henry Wilkie  
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 2015 REPORTING PERIOD**

Dear Mr. Wilkie:

H&S Environmental, Inc. (H&S) 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.

GWTP operational data from 1 November 2015 to 30 November 2015 are presented in Attachment A. There was no significant downtime for the GWTP during this reporting period.

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

Please contact me at 508-366-7442 with any questions or concerns you may have regarding this report.

Sincerely,  
H&S Environmental, Inc.

Jennifer Good  
Project Manager

Attachment A: Groundwater and Air Sampling Results from November 2015

Cc: Steven Scharf – NYSDEC  
Jean Occidental - NYSDEC Division of Water  
Jennifer Pilewski - NYSDEC – Region 1 Water Engineer  
Gerard Ennis - Nassau County Department of Public Works  
Linda Bianculli - 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 2015**

**GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Discharge Monitoring Report  
November 2015**

SPDES Parameters	November 2015					
Process Stream	Daily Treated Effluent Maximum	Units	RW-1 <sup>(1)</sup>	RW-3 <sup>(1)</sup>	Combined Influent <sup>(1)</sup>	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		11/16/15			
Average Flowrate	1100	GPM	995	0.3	995	1,037
Total Flow	N/A	gallons	42,990,133	13,400	43,003,533	44,782,267
pH	5.5 - 8.5	SU	5.44	N/A	5.44	6.18
Carbon Tetrachloride	NA	µg/L	ND (1.0)	N/A	ND (1.0)	ND (1.0)
1,1-Dichloroethane	5	µg/L	2.1	N/A	2.1	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	ND (1.0)	N/A	ND (1.0)	ND (1.0)
1,1-Dichloroethene	5	µg/L	2.1	N/A	2.1	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	13.1	N/A	13.1	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	0.29 J	N/A	0.29 J	ND (1.0)
Tetrachloroethene	5	µg/L	30.5	N/A	30.5	ND (1.0)
1,1,1-Trichloroethene	5	µg/L	1.4	N/A	1.4	ND (1.0)
Trichloroethene	5	µg/L	155	N/A	155	ND (1.0)
Vinyl Chloride	2	µg/L	0.43 J	N/A	0.43 J	ND (2.0)
Mercury	0.00025	mg/L	ND (0.00050)	N/A	ND (0.00050)	ND (0.00050)
Total Suspended Solids (TSS)	N/A	mg/L	ND (5)	N/A	ND (5)	ND (5)

**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

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

N/A - Not Applicable

(1) 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. To maintain the integrity of RW-3 for potential future use, approximately 200 gallons per minute of water are pumped for a 1-hour period from the well on a monthly basis. RW-3 will be sampled semi-annually, consistent with the groundwater monitoring program. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

**GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Air Sampling Results  
November 2015**

DAR Parameters	Units	Discharge Goal <sup>(1)</sup>	November 2015	
			Influent	Effluent
Process Stream				
Sampling Date	N/A	N/A	11/2/15	
Average Flowrate	CFM	N/A	NR	9,670
Total Flow	ft <sup>3</sup>	N/A	NR	417,729,600
Total Flow	m <sup>3</sup>	N/A	NR	11,828,785
1,2-Dichloroethane	µg/m <sup>3</sup>	N/A	4.7 J	ND
cis 1,2-Dichloroethene	µg/m <sup>3</sup>	> 100,000 <sup>(2)</sup>	120	0.96 J
trans 1,2-Dichloroethene	µg/m <sup>3</sup>		ND	ND
1,2-Dichloroethene (total)	µg/m <sup>3</sup>	>100,000	120	ND
Toluene	µg/m <sup>3</sup>	N/A	1.9 J	4.3
Total Xylene	µg/m <sup>3</sup>	N/A	ND	ND
1,1,2-Trichloroethane	µg/m <sup>3</sup>	N/A	ND	ND
Trichloroethene	µg/m <sup>3</sup>	2,600	2,200	20
Vinyl Chloride	µg/m <sup>3</sup>	560	5.0 J	1.9 J
Tetrachloroethene	µg/m <sup>3</sup>	5,100	410	9.2

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 2015**

<b>DAR Parameters</b>	<b>Units</b>	<b>Discharge Goal <sup>(1)</sup></b>	<b>November 2015</b>
Sampling Date	N/A	N/A	11/2/15
Average Flowrate	CFM	N/A	9,670
Total Flow	ft <sup>3</sup>	N/A	417,729,600
Total Flow	m <sup>3</sup>	N/A	11,828,785
Trichloroethene	lb/hr	0.09	0.00072
Vinyl Chloride	lb/hr	0.02	0.00007
1,2 Dichloroethene	lb/hr	11	0.00000
1,2-Dichloroethane	lb/hr	N/A	0.00000
Toluene	lb/hr	N/A	0.00016
Total Xylene	lb/hr	N/A	0.00000
1,1,2-Trichloroethane	lb/hr	N/A	0.00000
Tetrachloroethene	lb/hr	0.18	0.00033

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.

**DECEMBER 2015**





8 January 2016

Mr. Henry Wilkie  
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 2015 REPORTING PERIOD**

Dear Mr. Wilkie:

H&S Environmental, Inc. (H&S) 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.

GWTP operational data from 1 December 2015 to 31 December 2015 are presented in Attachment A. There was no significant downtime for the GWTP during this reporting period.

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

Please contact me at 508-366-7442 with any questions or concerns you may have regarding this report.

Sincerely,  
H&S Environmental, Inc.

Jennifer Good  
Project Manager

Attachment A: Groundwater and Air Sampling Results from December 2015

Cc: Steven Scharf – NYSDEC  
Jean Occidental - NYSDEC Division of Water  
Jennifer Pilewski - NYSDEC – Region 1 Water Engineer  
Gerard Ennis - Nassau County Department of Public Works  
Linda Bianculli - Town of Oyster Bay  
Lora Fly - NAVFAC Mid-Atlantic RPM  
Greg Pearman – NWIRP Bethpage  
GM-38 Copy

**ATTACHMENT A**  
**GROUNDWATER AND AIR SAMPLING RESULTS**  
**DECEMBER 2015**

**GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Discharge Monitoring Report  
December 2015**

SPDES Parameters	December 2015					
Process Stream	Daily Treated Effluent Maximum	Units	RW-1 <sup>(1)</sup>	RW-3 <sup>(1)</sup>	Combined Influent <sup>(1)</sup>	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		12/7/15			
Average Flowrate	1100	GPM	992	0.2	992	1,027
Total Flow	N/A	gallons	44,275,240	10,700	44,285,940	45,857,440
pH	5.5 - 8.5	SU	5.42	N/A	5.42	6.18
Carbon Tetrachloride	NA	µg/L	ND (1.0)	N/A	ND (1.0)	ND (1.0)
1,1-Dichloroethane	5	µg/L	1.8	N/A	1.8	ND (1.0)
1,2-Dichloroethane	0.6	µg/L	ND (1.0)	N/A	ND (1.0)	ND (1.0)
1,1-Dichloroethene	5	µg/L	1.9	N/A	1.9	ND (1.0)
cis 1,2-Dichloroethene	5	µg/L	11.2	N/A	11.2	ND (1.0)
trans 1,2-Dichloroethene	5	µg/L	ND (1.0)	N/A	ND (1.0) J	ND (1.0)
Tetrachloroethene	5	µg/L	36.2	N/A	36.2	ND (1.0)
1,1,1-Trichloroethene	5	µg/L	1.3	N/A	1.3	ND (1.0)
Trichloroethene	5	µg/L	143	N/A	143	ND (1.0)
Vinyl Chloride	2	µg/L	0.45 J	N/A	0.45 J	ND (2.0)
Mercury	0.00025	mg/L	ND (0.00050)	N/A	ND (0.00050)	ND (0.00050)
Total Suspended Solids (TSS)	N/A	mg/L	ND (5)	N/A	ND (5)	ND (5)

**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

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

N/A - Not Applicable

(1) 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. To maintain the integrity of RW-3 for potential future use, approximately 200 gallons per minute of water are pumped for a 1-hour period from the well on a monthly basis. RW-3 will be sampled semi-annually, consistent with the groundwater monitoring program. Influent concentrations presented above are therefore equivalent to RW-1 concentrations only.

**GM-38 Area Groundwater Remediation  
Groundwater Treatment Plant  
Naval Weapons Industrial Reserve Plant - Bethpage, NY  
Air Sampling Results  
December 2015**

DAR Parameters	Units	Discharge Goal <sup>(1)</sup>	December 2015	
			Influent	Effluent
Process Stream				
Sampling Date	N/A	N/A	12/7/15	
Average Flowrate	CFM	N/A	NR	9,591
Total Flow	ft <sup>3</sup>	N/A	NR	428,142,240
Total Flow	m <sup>3</sup>	N/A	NR	12,123,638
1,2-Dichloroethane	µg/m <sup>3</sup>	N/A	3.0 J	ND
cis 1,2-Dichloroethene	µg/m <sup>3</sup>	> 100,000 <sup>(2)</sup>	130	ND
trans 1,2-Dichloroethene	µg/m <sup>3</sup>		ND	ND
1,2-Dichloroethene (total)	µg/m <sup>3</sup>	>100,000	130	ND
Toluene	µg/m <sup>3</sup>	N/A	2.4 J	1.1 J
Total Xylene	µg/m <sup>3</sup>	N/A	ND	ND
1,1,2-Trichloroethane	µg/m <sup>3</sup>	N/A	2.6 J	ND
Trichloroethene	µg/m <sup>3</sup>	2,600	2,000	18
Vinyl Chloride	µg/m <sup>3</sup>	560	4.3	1.9 J
Tetrachloroethene	µg/m <sup>3</sup>	5,100	440	8.2

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 2015**

<b>DAR Parameters</b>	<b>Units</b>	<b>Discharge Goal <sup>(1)</sup></b>	<b>December 2015</b>
Sampling Date	N/A	N/A	12/7/15
Average Flowrate	CFM	N/A	9,591
Total Flow	ft <sup>3</sup>	N/A	428,142,240
Total Flow	m <sup>3</sup>	N/A	12,123,638
Trichloroethene	lb/hr	0.09	0.00065
Vinyl Chloride	lb/hr	0.02	0.00007
1,2 Dichloroethene	lb/hr	11	0.00000
1,2-Dichloroethane	lb/hr	N/A	0.00000
Toluene	lb/hr	N/A	0.00004
Total Xylene	lb/hr	N/A	0.00000
1,1,2-Trichloroethane	lb/hr	N/A	0.00000
Tetrachloroethene	lb/hr	0.18	0.00029

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, 12<sup>th</sup> 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 1-30-003 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<sup>™</sup> 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<sup>™</sup> 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, 11<sup>th</sup> 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:

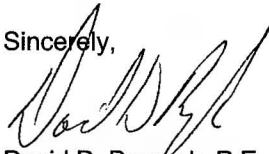
On behalf of the Navy, please find enclosed a copy of the subject document. This document presents an evaluation of current concentrations of off gas VOCs from the GM-38 groundwater treatment plant air-stripping tower (prior to treatment with granular activated carbon). Maximum emission rates were re-evaluated 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) <sup>(1)</sup>	Equivalent Existing Discharge Goals ( $\mu\text{g}/\text{m}^3$ ) <sup>(2)</sup>	Actual Jan-Mar 2011 Concentration ( $\mu\text{g}/\text{m}^3$ ) <sup>(3)</sup>	Actual VOC Loading Pre-Off Gas Treatment (lbs/hour) <sup>(4)</sup>	Proposed Discharge Loading Rate (lbs/hour) <sup>(5)</sup>	Equivalent Proposed Discharge Goal ( $\mu\text{g}/\text{m}^3$ ) <sup>(5)</sup>
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:**

<sup>(1)</sup>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.

<sup>(2)</sup>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).

<sup>(3)</sup>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.

<sup>(4)</sup>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.

<sup>(5)</sup>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"/> Renewal	<input type="checkbox"/> Minor Modification	General Permit Title: _____		<input type="checkbox"/> New
<input checked="" type="checkbox"/> Application involves construction of new facility		<input type="checkbox"/> Application involves construction of new emission unit(s)		
				<input type="checkbox"/> Modification
				General Permit Title: _____

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	

New York State Department of Environmental Conservation  
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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"> <li><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.</li> <li><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.</li> <li><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.</li> </ul>	

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 III - Facility Information (continued)**

Facility Compliance Certification						N/A	<input type="checkbox"/> Continuation Sheet(s)				
Rule Citation											
Title	Type	Part	Sub Part	Section	Sub Division	Paragraph	Sub Paragraph	Clause	Sub Clause		
<input type="checkbox"/> Applicable Federal Requirement		<input type="checkbox"/> Capping		CAS No.			Contaminant Name				
<input type="checkbox"/> State Only Requirement											
Monitoring Information											
<input type="checkbox"/> Ambient Air Monitoring		<input type="checkbox"/> Work Practice Involving Specific Operations				<input type="checkbox"/> Record Keeping/Maintenance Procedures					
Description											
Work Practice		Process Material					Reference Test Method				
Type	Code	Description									
Limit			Limit Units								
Upper	Lower	Code	Description								
Averaging Method			Monitoring Frequency			Reporting Requirements					
Code	Description		Code	Description		Code	Description				

Facility Emissions Summary					<input type="checkbox"/> Continuation Sheet(s)	
CAS No.	Contaminant Name	PTE			Actual (lbs/yr)	
		(lbs/yr)	Range Code			
NY075 - 00 - 5	PM-10					
NY075 - 00 - 0	PARTICULATES					
7446 - 09 - 5	SULFUR DIOXIDE					
NY210 - 00 - 0	OXIDES OF NITROGEN					
630 - 08 - 0	CARBON MONOXIDE					
7439 - 92 - 1	LEAD					
NY998 - 00 - 0	VOC	117				
NY100 - 00 - 0	HAP	110				
0079 - 01 - 6	Trichloroethylene	99				
00075 - 01 - 4	Vinyl Chloride	3.7				
00540 - 59 - 0	1,2-Dichloroethylene	7.3				
-	-					
-	-					

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**Section IV - Emission Unit Information**

<b>Emission Unit Description</b>										<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.										

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

<b>Emission Point</b>							<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	

<b>Emission Source/Control</b>								<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		P R 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		Manufacturer Name/Model No.									
Code	Description										
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					/				
										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				
-					-					-					-					-				
-					-					-					-					-				



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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): \_\_\_\_\_ ( \_\_\_\_ / \_\_\_\_ / \_\_\_\_ )  
 \_\_\_\_\_ ( \_\_\_\_ / \_\_\_\_ / \_\_\_\_ )  
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**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 m<sup>3</sup>/hr  
Water Flow Including Recycle 1,200 gpm: max or normal  
273 m<sup>3</sup>/hr  
Air Flow 8,000 cfm  
13,592 m<sup>3</sup>/hr  
A/W vol ratio 50

EXAMPLE EMISSION CALC: Vinyl Chloride  
4.8 ug/L x 1000 L/m<sup>3</sup> x 250 m<sup>3</sup> water/13,623 m<sup>3</sup> air = 88 ug/m<sup>3</sup>

Name	CAS Number	Toxicity: H/M/L <sup>2</sup>	VOC <sup>3</sup>	HAP <sup>4</sup>	GW Conc. <sup>1</sup>		Effluent Conc. <sup>1</sup>		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 <sup>3</sup>	Avg ug/m <sup>3</sup>
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 m<sup>3</sup>/hr  
Water Flow Including Recycle 1,200 gpm: max or normal  
273 m<sup>3</sup>/hr  
Air Flow 8,000 cfm  
13,592 m<sup>3</sup>/hr  
A/W vol ratio 50

Name	CAS Number	Toxicity: H/M/L <sup>2</sup>	VOC <sup>3</sup>	HAP <sup>4</sup>	Control by GAC	Controlled Stripper Exhat			
						Max lb/day	Avg lb/day	Max gm/sec	Avg 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 <sup>(1)</sup>	Current Maximum Concentration (µg/m <sup>3</sup> ) <sup>(2)</sup>	Current Chemical Emission Rate Prior to Treatment (lb/hour) <sup>(3)</sup>	Current Chemical Emission Rate Prior to Treatment (lb/year) <sup>(3)</sup>	Calculated Discharge Goal (lb/hr) <sup>(4)</sup>	Calculated Discharge Goal (lb/year) <sup>(4)</sup>	Maximum Allowable Concentration (µg/m <sup>3</sup> ) <sup>(4)</sup>
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:**

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

<sup>(2)</sup>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.

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

<sup>(4)</sup>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 <sup>(1)</sup> (lb/hour)	0.3444	0.2342	0.0026	0.0258	0.0258
Emission Rate Prior to Treatment <sup>(1)</sup> (lb/year)	3,017	2,052	22.93	226.0	226.0
Maximum Concentration of Untreated Off Gas ( $\mu\text{g}/\text{m}^3$ ) <sup>(1)</sup>	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 <sup>(2)</sup>	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

<sup>(1)</sup> 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.

<sup>(2)</sup> "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:

```

*****
NWIRP BETHPAGE GM-38 AREA          BETHPAGE          OYSTER BAY, NEW
EMISSION POINT =          TOTAL          CAS NUMBER = 00079-01-6          SIC = 0
AGC =          0.5000000000 ug/m3          SGC =          14000.00000000 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          0.3444000000 lbs/hour.
** Reported Annual Emission Rate <Qa> is equal to          3017.00000000 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:

```

*****
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 ft<sup>4</sup>/sec<sup>2</sup>.

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:

```

*****
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.

```

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 <sup>-2</sup> (ug/m3) for 00079-01-6													09/08/11
AGC =													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.
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## **APPENDIX C**

### **FIELD LOGS**

Date: 10/29/15



**Groundwater Level Measurement Sheet**

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

Water Level Meter: Heron Dipper T 1000  
 Weather: partly cloudy ~ 55°F  
 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	0952	37.34	435 / 395-435	---	Measured Depth 447.4
RW1-MW2	0837	40.80	435 / 395-435	---	<del>550.40</del> 449.3
RW1-MW3	1120	30.15	435 / 395-435	---	447.3 (444.ish)
RW2-MW1	0917	40.05	510 / 470-510	---	524.6
RW2-MW2	0938	39.40	510 / 470-510	---	521.4
RW2-MW3	0927	39.11	510 / 470-510	---	527.3
RW3-MW1	1005	38.91	350 / 330-350	---	349.90
RW3-MW2	1010	40.00	495 / 475-495	---	503.2
RW3-MW3	1034	40.30	340 / 320-340	---	340.50
RW3-MW4	1041	40.78	495 / 475-495	---	507.6
TP1	0824	35.59	470 / 450-470	---	485.40
IW1-MW1	0905	38.00	470 / 450-470	---	150.78
RW-1	0845	GOOD	Open vault and check integrity of piping, etc.		
RW-3	Not online, check next time online		Open vault and check integrity of piping, etc.		
<p>RW3-MW2 - pulled extra tubing extension of well - sensor must have degraded permanently          Total depths without a handheld reading are approximate - called out for the bottom          of well previously due to depth &amp; weight of tape</p>					

Signature: [Handwritten Signature]

Date: 10/29/15