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Date: March 31, 2023
Our Ref: 30169301.RPTI4
30126046.NAVI4
Subject: 2022 Annual Operation Maintenance and Monitoring Report
Operable Unit 2, Northrop Grumman Systems Corporation and Naval Weapons Industrial Reserve Plant (NWIRP) Sites, Bethpage, New York.

Dear Jason,

On behalf of Northrop Grumman, Arcadis is providing the NYSDEC with one electronic PDF copy of the Operable Unit 2 (OU2) 2022 Annual Operation Maintenance and Monitoring Report (enclosed). As we have transitioned to electronic submittals (via PDF) in line with NYDEC's paper reduction program, hard copies of the report can be provided on request.

This report was prepared to document the operation, maintenance, and monitoring (OM&M) activities conducted for the on-site portion of the OU2 groundwater remedy and the results of ongoing volatile organic compound (VOC) and inorganic monitoring of groundwater to meet the applicable remedial objectives set forth in the March 2001 OU2 Record of Decision (ROD).

Please contact us if you have any questions or comments.

Sincerely,
Arcadis of New York, Inc.

Christopher D. Engler

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Enclosures

Northrop Grumman

2022 ANNUAL OPERATION, MAINTENANCE AND MONITORING REPORT

Operable Unit 2 - Groundwater

Bethpage, New York

NYSDEC Sites # 1-30-003A and 1-30-003B

March 31, 2023

2022 Annual Operation, Maintenance and Monitoring Report

March 31, 2023

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Acronyms and Abbreviations

AERMAP	Terrain Processor for AERMOD
AERMOD	Air Quality Dispersion Model
AGCs	Annual Guideline Concentrations
AOC	Administrative Order on Consent
Arcadis	Arcadis of New York, Inc.
AROD	Amended ROD
BPOW	Bethpage Outpost Well
BWD	Bethpage Water District
CFR	Code of Federal Regulations
COCs	constituents of concern
current period	Fourth Quarter 2022
DAR	Division of Air Resources
DCA	Dichloroethane
DCE	Dichloroethene
DMRs	Discharge Monitoring Reports
DON	Department of Navy
EDD	electronic data deliverable
ESD	Explanation of Significant Differences
ft bls	Feet below land surface
ft/day	Feet per day
G&M	Geraghty and Miller
gpm	gallons per minute
GWMP	Groundwater Monitoring Plan
GWTP	Groundwater Treatment Plant
HTAC	High Toxicity Air Contaminant
lbs	pounds

MEK	2-Butanone
Methylene Chloride	Dichloromethane
MG	million gallons
MW	Monitoring Well
NAVD	North American Vertical Datum
NED	Nation Elevation Dataset
now Northrop Grumman	Grumman Aerospace Corporation
NWIRP	Naval Weapons Industrial Reserve Plant
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operation, Maintenance and Monitoring
ONCT	On-Site Containment
OU2	Operable Unit 2
OXY	Occidental Chemical Corporation
PCE	tetrachloroethene
PLT 1	Plant 1
PPZ	potassium permanganate-impregnated zeolite
PWSCP	Public Water Supply Contingency Plan
RAOs	Remedial Action Objectives
RE	Resolution
reporting period	Year 2022
RIs	Remedial Investigations
ROD	Record of Decision
RUCO	referred to throughout this report as the OXY Site
RVPGAC	regenerable vapor-phase granular activated carbon
RW	Remedial Well
SCADA	Supervisory Control and Data Acquisition
SCGs	Standards, Criteria and Guidance

SGC	Short term Guideline Concentrations
Site	Northrop Grumman, Bethpage, New York facility and the former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, New York
SPDES	State Pollutant Discharge Elimination System
T96	Tower 96
TCA	Trichloroethane
TCE	trichloroethylene
TICs	Tentatively Identified Compounds
TMS	Silenol,Trimethyl
TVOC	Total Volatile Organic Compound
µg/L	Micrograms per liter
USEPA	United States Environmental Protection Agency
VC	vinyl chloride
VOC	Volatile Organic Compound
VPGAC	vapor-phase granular activated carbon
VPB	vertical profile borings

Executive Summary

Introduction and Overview

Arcadis of New York, Inc. (Arcadis), on behalf of Northrop Grumman, has prepared this Operable Unit 2 (OU2) 2022 Annual Operation, Maintenance and Monitoring (OM&M) Report to document OM&M activities conducted for the on-site portion of the OU2 groundwater remedy for the former Northrop Grumman, Bethpage, New York facility and the former Naval Weapons Industrial Reserve Plant (NWIRP), Bethpage, New York (Site).

Groundwater sampling conducted as part of the Remedial Investigations (RIs) for the former Northrop Grumman site, NWIRP, and Occidental Chemical Corporation (OXY)/Hooker Chemical Corporation/RUCO Polymer Corporation site (referred to throughout this report as the OXY Site) (NYSDEC Site # 1-30-0004) indicates that past chemical usage/storage and/or waste disposal practices at each of these sites has resulted in impacts to groundwater. Total Volatile Organic Compound (TVOC) concentrations discussed in this report are the sum of the 21 “Site-related” VOCs identified in **Appendix A**. The overall remedial goals for groundwater, as stated in the OU2 2001 New York State Department of Environmental Conservation (NYSDEC) Record of Decision (ROD), is to meet Standards, Criteria and Guidance values (SCGs) and be protective of human health and the environment.

This report describes the performance, compliance, and effectiveness monitoring completed for the On-Site Containment (ONCT) system for the Fourth Quarter 2022 (current period) and the Year 2022 (reporting period). This report uses various lines of evidence to evaluate the effectiveness of the ONCT system, a method that is consistent with the United States Environmental Protection Agency (USEPA) (2008) “A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems” report. The ONCT system was designed to create an effective hydraulic barrier to prevent the off-site migration of OU2 Volatile Organic Compound (VOC)-impacted groundwater. Throughout this report the terms “prevent off-site migration”, “containment,” and “capture” are used interchangeably.

The data presented throughout this report confirms the ONCT system is operating as designed.

Operation and Maintenance

O&M of the ONCT system was conducted in accordance with the OM&M Manual (Arcadis 2014).

The remedial wells extracted a total of 2,093 million gallons (MG) of groundwater for treatment in 2022 (**Table 3**), approximately 5% more than the model design annual flow volume needed to maintain on-site containment of VOC-impacted groundwater. The ONCT system had an operating uptime for 2022 of greater than 90% and a treatment efficiency of 99.9%.

Summary of Monitoring Completed

Throughout 2022, ONCT system performance, compliance and environmental effectiveness monitoring was conducted to assess whether Remedial Action Objectives (RAOs) identified in the ROD (NYSDEC 2001) were achieved.

Remedial System Performance and Compliance

The ONCT system is operating as designed, from a compliance and performance perspective, and complied with applicable NYSDEC SCGs for ONCT system emissions (i.e., treated water and air emissions). A calculated 4,412 pounds (lbs) of TVOCs were removed from the aquifer and treated by the ONCT system in 2022. Since full-time startup of the ONCT system in November 1998, approximately 225,000 lbs of VOCs have been removed from the aquifer and treated by the ONCT system.

Remedial System Environmental Effectiveness

The groundwater quality trend analysis and hydraulic effectiveness monitoring along with additional lines of evidence, were reviewed to assess the environmental effectiveness of the ONCT system. The results demonstrate that the ONCT system maintained horizontal and vertical capture of on-site OU2 VOC-impacted groundwater during 2022 via groundwater extraction from the five ONCT remedial wells and discharge/recharge of treated water to the south and west recharge basins. The assessments conducted to develop this conclusion conform with the lines of evidence and evaluation process recommended in USEPA's A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (USEPA 2008) report. (See **Table ES-1** for a summary of the lines of evidence).

Specifically, the capture zone created via operation of the ONCT system encompasses the area of on-site OU2 VOC-impacted groundwater and creates an effective hydraulic barrier to its off-site migration.

The groundwater quality data from wells located immediately downgradient of the hydraulic barrier at the southern boundary of the Site have, as expected, continued to exhibit downward TVOC concentration trends over time.

As operation of the ONCT system continues over time, bifurcation of TVOC-impacted groundwater, and an associated clean water area, will continue to expand downgradient of the ONCT system and with depth as on-site VOC-impacted groundwater continues to be removed from the aquifer by pumping the remedial wells, treated water continues to be discharged/recharged at the south recharge basins, and natural precipitation/recharge to the aquifer continues.

Zones 1, 2, 3 and 4 (See **Figures 20, 21, 22**, and **23**) show the clean water area that has developed to date.

Additional Groundwater Quality Data

VOCS – Further Downgradient of the ONCT System

Results are also presented in this report for monitoring of VOCs in areas further downgradient of the ONCT system where Department of Navy (DON) is conducting remedial activities (i.e., initiation of Phase 1 remediation in vicinity of the RE108 area by, pumping of Well RW4 and Well RE137, and continuation of GM-38 system OM&M) and in areas of former outpost well monitoring south of Hempstead Turnpike.

Cadmium and Chromium (Former Plants 1 and 2)

At former Plant 1, results for total chromium remain elevated above the SCG for the Fourth Quarter 2022 (current period) and Year 2022 (reporting period), except for Monitoring Well PLT1MW-04. PLT1 MW-05 has shown a generally decreasing trend over the period of record (i.e., time period for which we have groundwater quality data which varies depending on well); however, variations in concentrations continue to occur year to year. Well GM-15SR exhibits an overall decreasing trend since 2010 although significant variations in concentrations continue to occur year to year.

At former Plant 2, total cadmium exceedances did not occur in 2022; however, over the period of record Well N-10631 has periodically been above the SCG while the remaining two wells have been below the SCG. For chromium Monitoring Well MW-02GF has shown widely varying concentrations for the period of record and more recently increasing concentrations above the SCG from 2018 through 2021. In addition, Well N-10631, which has had exceedances above the SCG prior to September 1999 and once in 2018, was observed to be filled with 22 feet of sediment and is no longer able to be sampled. Northrop Grumman is working to replace this well in the near future. The other three monitoring wells at this location have been below the SCG for their period of record.

Table ES-1
Lines of Evidence to Determine if On-Site Containment of VOC-impacted Groundwater is Being Achieved
Operable Unit 2
Northrop Grumman
Bethpage, New York

Line of Evidence	Is Line of Evidence Achieved? Yes or No	If not why not?	Remarks
Water Levels- Hydraulic Capture			
Water Table Map-is mounding evident along south recharge basins?	Yes		
Potentiometric Surface Map (Zone 3 500-700 foot depth)-is capture of VOC-impacted groundwater area indicated?	Yes		
Vertical hydraulic gradients (VHGs)-are substantial majority of VHGs in the same direction as model predicted VHGs?	Yes		
Calculations/Modeling – does modeling of the capture zone under 2022 operating conditions show capture of the on-site portion of the plume?	Yes		Based on reviewing and applying previous annual capture zone modeling results that considered ONCT remedial well pumping rates/uptimes compared to previous years.
Improvements in Groundwater Quality-Volatile Organic Compounds			
WQ trends upgradient-are substantial majority of trends downward?	Yes		
WQ trends proximate- are substantial majority of trends downward?	Yes		
WQ trends near central downgradient- are substantial majority of trends downward?	Yes		
Percent TVOC reduction upgradient-do a substantial majority of wells and average of all wells show reductions of >75%?	Yes		
Percent TVOC reduction proximate- do a substantial majority of wells and average of all wells show reductions of >75%?	Yes		
Percent TVOC reduction near central downgradient- do a substantial majority of wells and average of all wells show reductions of >75%?	Yes		
Zone 1-is a clean water area evident?	Yes		
Zone 2-is a clean water area evident?	Yes		
Zone 3-is a clean water area evident?	Yes		
Zone 4-is a clean water area evident	Yes		
Weight of Above Evidence			
Does it indicate onsite containment of VOC-impacted groundwater ?	Yes		

1 Introduction

Arcadis, on behalf of Northrop Grumman, has prepared this OU2 2022 Annual Operation, Maintenance and Monitoring (OM&M) Report to document OM&M activities conducted for the on-site portion of the OU2 groundwater remedy (also referred to as the OU2 On-Site Containment [ONCT] system) for the former Northrop Grumman, Bethpage, New York facility (Site No. 1-30-003A) and the former NWIRP, Bethpage, New York (Site No. 1-30-003B) (herein referred to as the “Site”). This report has been prepared in accordance with the OU2 Administrative Order on Consent (AOC) (New York State Department of Environmental Conservation [NYSDEC 2015a)] Index # W1-118-14-12, the March 2001 OU2 ROD, the December 2019 Amended ROD (AROD), the OU2 ONCT System OM&M Manual (Arcadis 2014), and the latest (June 2016) Updated Groundwater Monitoring Plan (GWMP) (Arcadis 2016).

This report describes the performance and effectiveness monitoring completed for the ONCT system for the Fourth Quarter 2022 (current period) and the Year 2022 (reporting period) and provides the basis for the annual engineering certification of the ONCT system, as required by the OU2 AOC, Section 1.B. In this report, the current period data is compared to data from the previous three 2022 quarterly reports (Arcadis 2022a; 2022b; 2022c) and to longer-term data trends for the period of record, as applicable.

Monitoring of on and off-site groundwater impacted to some extent by Site-related VOCs (referred to as the OU2 Plume, though there are multiple plumes within this single plume), is also included and discussed in this report to the extent undertaken by Northrop Grumman and supplemented by groundwater analytical data reported by the Department of Navy (DON) from 56 wells located north of Hempstead Turnpike. This report does not describe the activities conducted by DON at the former NWIRP property nor the Navy ROD/Explanation of Significant Differences (ESD) document-required off-site components of the groundwater remedial program, as these activities are separately managed, maintained, and reported by DON. DON activities include monitoring of the GM-38 Hotspot, OM&M of the GM-38 groundwater extraction and treatment system, monitoring and remediation of VOC-impacted groundwater identified in the vicinity of DON’s Vertical Profile Borings (VPB) VBP-139 and VPB-142 (also referred to as the RE108 hot spot), off-site groundwater investigation and remediation downgradient of the RE108 hot spot, and components of the public water supply contingency plan (i.e., additional outpost well installation and monitoring).

To evaluate the effectiveness of the ONCT system, this report uses various lines of evidence, a method that is consistent with the USEPA (2008) “A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems” report, to sequentially evaluate hydraulic and water quality data to assess whether the lines of evidence are supportive of the ONCT system design goals of establishing and maintaining effective horizontal and vertical hydraulic containment of on-site OU2 VOC-impacted groundwater that prevents, its off-site migration. Throughout this report the terms “prevent off-site migration,” “on-site containment,” and “capture” are used interchangeably.

The ONCT system was designed to:

- Create an effective hydraulic barrier that prevents, off-site migration of on-site OU2 VOC-impacted groundwater.
    - An element of an effective hydraulic barrier is a collective capture zone that encompasses the area of on-site OU2 VOC-impacted groundwater.

  - Evidence of an effective hydraulic barrier includes documentation of a "collective zone of capture" (area of lowered water levels generated by remedial well pumping) and downward vertical hydraulic gradients, particularly near the remedial wells.
- Develop a clean water area (i.e., an area of less than 5 micrograms per liter (µg/L) total VOCs in groundwater) downgradient of the ONCT system that is a direct result of the collective capture zone and hydraulic barrier described above.
  - A clean water area would initially develop shallow and near the Site and would expand further downgradient and deeper over time, as on-site VOC-impacted groundwater is removed from the aquifer via the remedial wells, and treated water is discharged/recharged at the south recharge basins.
  - Evidence for the development of a clean water area includes separation (i.e., bifurcation) of the VOC-impacted groundwater plume on Site from off Site and decreasing concentrations in monitoring wells.

The data presented in this report confirms that the ONCT system is operating as designed.

2 Site Overview

This section provides a brief description of the Site, relevant history, main features/components of the ONCT system, associated remedial program and describes the RAOs specified in the OU2 ROD.

2.1 Description of Site

The Grumman Aerospace Corporation (now Northrop Grumman) (NYSDEC Site # 1-30-003A) formerly occupied approximately 638 acres in east-central Nassau County, in the Hamlet of Bethpage, Town of Oyster Bay, New York and, within this area, the former NWIRP (NYSDEC Site # 1-30-003B) occupied approximately 105 acres. The Site was bounded by Stewart Avenue to the north, South Oyster Bay Road to the west, Route 107 to the southwest, Central Avenue to the south and various residential and commercial areas to the east. **Figure 1** depicts the former property boundaries of the Site.

Additionally, the former OXY Site is located adjacent to the northwest portion of the Site and is generally hydraulically upgradient of the former Northrop Grumman site.

2.2 Nature and Extent of Impacted Groundwater

Groundwater sampling conducted as part of the Remedial Investigations (RIs) for the former Northrop Grumman, NWIRP, and OXY sites indicates that past chemical usage/storage and/or waste disposal practices at each of these sites have resulted in impacts to groundwater (i.e., the upper glacial and Magothy aquifers).

Exhibit A, **Table 1** of NYSDEC's AROD (2019) (provided as **Appendix A** of this Report) identifies the 21 VOC constituents of the OU2 Site plume (excluding total chromium and 1,4-dioxane). The primary groundwater constituents of concern (COCs) within the OU2 plume include trichloroethylene (TCE); tetrachloroethene (PCE); 1,1,1-trichloroethane (1,1,1-TCA); 1,2-dichloroethene (1,2-DCE); 1,1-dichloroethene (1,1-DCE); and 1,1-dichloroethane (1,1-DCA). As used in this report, TVOC concentrations are the sum of the 21 "site-related" VOCs identified in **Appendix A**. Groundwater associated with the former OXY site contains these primary COCs as well as vinyl chloride monomer (VC). The 1994 RI Report (Geraghty and Miller 1994) described the overall extent (on-site and off-site) of groundwater impacts prior to initiation of remedial activities.

Additionally, chromium and cadmium/chromium are COCs in groundwater in the vicinity of the former Northrop Grumman Plants 1 and 2, respectively.

Acetone, 2-Butanone (MEK), and Dichloromethane (Methylene Chloride), which are recognized lab contaminants, are not included on the list of COCs in **Appendix A** and, therefore, are not included in the plume and cross section depictions within this report. Furthermore, although 1,4-dioxane was identified as a COC in the AROD (2019), it is not a constituent used to evaluate the ONCT system effectiveness; although 1,4-dioxane is co-located with VOCs and would be captured by the ONCT system, the captured groundwater is not currently treated for 1,4-dioxane.

2.3 Remedial Action Objectives

The overall remedial goals for groundwater, as stated in the OU2 ROD, is to meet Standards, Criteria and Guidance values (SCGs) and be protective of human health and the environment.

Consistent with the overall remedial goals selected for the Site, RAOs identified in the OU2 ROD, either in whole or in part, are to:

- Eliminate, to the extent practicable, site-related constituents from the affected public water supplies and prevent, to the extent practicable, the future impacts to public water supplies.
- Eliminate, to the extent practicable, exposures to impacted groundwater.
- Eliminate, to the extent practicable, off-site migration of impacted groundwater and, where practicable, restore the groundwater to pre-disposal conditions.
- Eliminate, to the extent practicable, the off-site migration of soil impacts entering the groundwater.
- Eliminate, to the extent practicable, exceedances of applicable environmental quality standards related to releases of constituents to the waters of the state.
- Comply with applicable NYSDEC SCGs for ONCT system treated water and air.

The AROD primarily focuses on COCs that exceed SCGs in off-site groundwater and, as such, the AROD RAOs do not specifically relate to the operation of the ONCT system.

2.4 Main Features/Components of the Remedy

Based on the OU2 ROD, and as shown on **Figures 2 and 3**, the following are the major elements of the remedial program and current components of the OU2 On-Site Groundwater Remedy:

- Operation, maintenance, and monitoring of the ONCT system, which currently consists of:
    - o Five Remedial Wells (Remedial Wells 1, 3R, 17, 18, and 19) with design pumping rates (based on current groundwater model) of 800 gallons per minute (gpm), 700 gpm, 1,000 gpm, 800 gpm and 500 gpm, respectively. Current 2022 operational flow rates are discussed in **Section 3.2**.

- Two treatment systems (Tower 96 and Tower 102), each consisting of a packed-tower air stripper to remove VOCs from extracted groundwater, and vapor emission treatment. Tower 102 consists of a regenerable vapor-phase granular activated carbon (RVPGAC) system, with on-site steam regeneration via on-site boilers, to remove VOCs from the air strippers' off-gas emissions. The RVPGAC system formerly operated at Tower 96 was reconfigured to bypass the RVPGAC components on 3/15/22. Currently the air stripper off-gas is treated through the exterior VPGAC emission control units.
- A pressurized discharge main to accept the treated water discharge, which is also available for limited non-potable reuse.
- Two sets of recharge basins (the south recharge basins and the west recharge basins) accept the treated water from the clear wells, which drain by gravity to the basins. A minimum design groundwater model-based discharge rate of 2,231 gallons per minute (gpm) exists for the south recharge basins and any remaining volume is directed to the west recharge basins, as necessary.

- A groundwater monitoring program to assess the overall ONCT system's environmental effectiveness and a performance and compliance monitoring program at the treatment plants. The groundwater monitoring program also includes monitoring further off-site and upgradient of public water supply wells. These wells were initially installed to serve as outpost wells (i.e., to warn of the advance of the OU2 plume) and were sampled in accordance with the Public Water Supply Contingency Plan (PWSCP) (Arcadis G&M, Inc., 2003). However, these wells were repurposed as plume monitoring wells in 2015. The monitoring and former outpost wells included in Northrop Grumman's OU2 groundwater monitoring program, for which Northrop Grumman is responsible for reporting, and additional wells in the Site vicinity are shown on **Figure 1**. Select DON wells used to supplement Northrop Grumman data for evaluating remedial system effectiveness and downgradient groundwater quality are also shown on **Figure 1**.

3 Operation and Maintenance

The following subsections summarize routine/non-routine operation and maintenance activities completed during the 2022 reporting period and the operational performance of the ONCT system.

3.1 Summary of Completed O&M Activities

O&M of the ONCT system was conducted in accordance with the OM&M Manual (Arcadis, 2014), and consisted of the following:

- Daily routine site visits by Northrop Grumman personnel to visually check the system for proper operation, leaks or potential emergency situations. Additionally, the ONCT system was continuously monitored by the Supervisory Control and Data Acquisition (SCADA) system. Daily site visit logs (paper forms and electronically collected data) are included in **Appendix B**.
- Weekly routine site checks by Northrop Grumman personnel to monitor and record key process parameters to confirm proper system operation, to assess whether a process parameter is changing, and to provide information that may be helpful later in the event of an operational problem. A summary of the

weekly monitoring data collected for Tower 96 and Tower 102 is provided in **Tables 1A and 1B**, respectively.

- Routine equipment maintenance by Northrop Grumman personnel in accordance manufacturers' specifications or otherwise, as needed, and per the routine maintenance schedule and checklist provided in the OM&M Manual (Arcadis, 2014). It should be noted that the OM&M Manual is continually updated, as needed, as various components get replaced/repaired over time to support effective and efficient operation of the ONCT system.
- Routine off-site disposal of solvent recovered by the RVPGAC system (a hazardous waste). As a part of routine system operation, recovered solvent is drummed, temporarily staged in an on-site hazardous waste storage area, and properly transported and disposed off-site by a Northrop Grumman subcontractor in accordance with applicable regulations. Copies of the completed hazardous waste manifests are included in **Appendix C**.
- Non-routine equipment and system component maintenance by Northrop Grumman personnel or their subcontractors in response to alarm conditions, physical damage, or systems parameters operating outside of their normal operating ranges.

A detailed summary of the non-routine maintenance activities completed during the 2022 annual period is provided in **Table 2**, and a summary of the relatively larger-scale maintenance activities occurring in 2022 is provided below:

- The Tower 96 system was reconfigured to bypass the regenerative vapor-phase GAC components and treat air stripper effluent directly through the exterior Vapor Phase Granular Activated Carbon (VPGAC) emission control units on 3/15/22.
- VPGAC within the Tower 96 exterior VPGAC units was replaced on 4/15/22. VPGAC within the Tower 96 lead exterior VPGAC unit was replaced again on 9/29/22. VPGAC within the Tower 96 lag exterior VPGAC unit was replaced again on 11/17/22. Enhanced vapor screening and monitoring (monthly) conducted following by-pass of the T96 RVPGAC components supported VPGAC media replacements in 2022; monitoring results are presented **in Section 5**.
- Tower 102 shut down multiple times on 12/17/22 through 12/29/22 due to blower inner bearing high temperature and blower low pressure alarms. The blower belt, bearing, and electrical feed lines were replaced.

Despite the downtime events identified above, the ONCT system maintained capture of the on-site portions of the OU2 plume. Further analysis of ONCT system capture through 2022 is provided in **Section 6**.

3.2 Summary of System Operational Performance

This subsection provides an evaluation of ONCT system operational performance throughout 2022.

As described below and summarized in **Table 3**, current model design flow rates are as follows: Well 1 (800 gpm); Well 3R (700 gpm); Well 17 (1,000 gpm); Well 18 (800 gpm); and Well 19 (500 gpm). Flow rates at Wells 3R and 18 were increased for extended periods of 2022 in response to remedial well and system downtime, as further detailed below.

An operational summary of remedial well and system uptimes, system discharges and treatment system efficiencies for 2022 are provided in **Table 3** and are summarized below along with additional operational performance considerations:

- The remedial wells operated at "uptimes" of 94% or greater throughout 2022, calculated as a percentage of the reporting period. Well uptime is generally an indication of system uptime (**Table 3**).
- Based on system operational logs/reports, the remedial wells extracted a total of 2,093 MG of groundwater for treatment in 2022 (**Table 3**), approximately 5% more than model design annual flow volume based on individual remedial well flow rates needed to maintain on-site containment. In general, this is due to pumping some remedial wells at rates greater than 100% of design to compensate for remedial well and system downtime (e.g., Wells 3R and 18).
- The water treatment components of the ONCT system (air stripper/clear well) performed within acceptable operating ranges for this reporting period, as indicated by the following:
  - The air stripper VOC removal efficiencies were greater than 99.9% (**Table 3**).
  - The air stripper effluent water discharge complied with applicable SCGs; additional details regarding system water monitoring for compliance are discussed in **Section 5**.
- The air treatment components of the ONCT system (RVPGAC/solvent recovery) performed within acceptable operating ranges during this reporting period. The RVPGAC stack discharges complied with applicable SGCs/AGCs and discharge limits; additional details regarding system air monitoring for compliance are discussed in **Section 5**.
- Additional maintenance and assessment of the ONCT system's critical alarms, SCADA system functionality, and set points were conducted during the reporting period and continued through March 2023.

4 Summary of Monitoring Completed

In accordance with the above-referenced plans, the following monitoring was completed during 2022:

- Quarterly remedial system performance monitoring:
  - Remedial well water quality monitoring was completed to monitor the performance of the ONCT system and assess VOC mass removal.
  - Water quality monitoring of treatment system effluent (Towers 96 and 102) was completed to monitor the performance of the groundwater treatment components of the ONCT system.
  - Air quality monitoring of treatment system influent, mid-effluent and effluent (Towers 96 and 102), as appropriate, was completed to monitor the performance of the air treatment components of the ONCT system.
  - Results are presented and evaluated in **Section 5** along with key findings that support overall conclusions and suggestions related to remedial system performance.
- Remedial system compliance monitoring:

- Water and air quality monitoring of treatment system influent, mid-train, and effluent, as appropriate, was completed to gauge quarterly TCE mass removal for the Tower 96 and 102 treatment systems.
- Quarterly air monitoring and modeling was completed to determine the compliance status of the vapor-phase effluent discharged from the Tower 96 and 102 treatment systems.
- Monthly State Pollutant Discharge Elimination System (SPDES) monitoring was completed to verify that water discharged to the south recharge basins (i.e., Outfall 005) and west recharge basins (i.e., Outfall 006) met permit equivalency requirements. Monitoring was performed in accordance with the terms and conditions of Northrop Grumman's SPDES Permit Equivalent No. NY0096792 and discharge limits, per the SPDES permit equivalency, most recently amended on September 15, 2022, and issued by the NYSDEC to Northrop Grumman on September 19, 2022. SPDES discharge monitoring data are documented on a monthly basis by Northrop Grumman in Discharge Monitoring Reports (DMRs) that are transmitted to the NYSDEC under separate cover. Copies of DMRs completed during this reporting period are provided in **Appendix D**.
- Results are presented and evaluated in **Section 5** along with key findings that support overall conclusions and suggestions related to remedial system compliance.

- Remedial system environmental effectiveness monitoring:
  - Groundwater hydraulic (water-level) monitoring was completed to determine, monitor, and document local and regional groundwater flow patterns during operation of the ONCT system, including the vertical and horizontal extent of the cumulative capture zone created by operation of the ONCT system.
  - Groundwater quality monitoring was completed at and immediately downgradient of the Site to assess the effectiveness of the ONCT system with respect to containment and removal of OU2 VOC-impacted groundwater and preventing its off-site migration.
  - Groundwater quality results associated with the First, Second, and Third Quarters of 2022 have been previously submitted to the NYSDEC in Quarterly Reports and are also included in this report for completeness. Copies of completed Groundwater Sampling Logs and Chain of Custody Records are provided in **Appendix E**.
  - Results are presented and evaluated in **Section 6** along with key findings that support overall conclusions and suggestions related to remedial system environmental effectiveness.
- Additional groundwater quality monitoring:
  - Groundwater quality monitoring was also completed for VOCs in areas further downgradient of the ONCT system and for metals (cadmium and chromium) at former Northrop Grumman Plants 1 and 2.
  - Results are presented and evaluated in **Section 7** along with key findings that support overall conclusions and suggestions, as warranted.
  - **Section 7** also presents and evaluates results related to tentatively identified compounds, 1,4-dioxane, and vinyl chloride.

Arcadis performed validation of treatment system vapor and water samples, and groundwater quality data in accordance with the updated GWMP (Arcadis 2016), following the contract laboratory program and applying relevant NYSDEC and USEPA protocols. The quality of the data is considered acceptable with the qualifiers indicated in the data summary tables presented in the following sections.

The analytical data associated with the monitoring completed in 2022 and presented in the following sections were and continue to be submitted to the NYSDEC on a quarterly basis in electronic data deliverable (EDD) format, in compliance with requirements outlined in Section 1.15(a) (Electronic Submissions) of NYSDEC's May 2010 DER-10 guidance document (NYSDEC 2010).

Data for select DON monitoring wells is included in Section 6 and Section 7, as noted, to supplement evaluations related to remedial system effectiveness and groundwater quality with respect to VOCs in areas further downgradient of the ONCT system.

The vertical groundwater zonation approach (i.e., depth interval below land surface) used in this report is a refinement of the previous hydrogeologic vertical zonation used in prior reports and has been adapted to be consistent with DON's depth interval structure. Specifically, the hydrogeological vertical zones used in this report are: Zone 1 (0 to 300 feet [ft] below land surface [bls]); Zone 2 (300 to 500 ft bls); Zone 3 (500 to 700 ft bls); and Zone 4 (more than 700 ft bls).

5 Remedial System Performance and Compliance

Results of remedial system performance and compliance monitoring completed during the reporting period are presented and evaluated in the following subsections.

5.1 Remedial System Performance

The ONCT system remedial well influent concentrations, VOC mass recovered, VOC mass removal rates, and TVOC trends over time are provided in **Tables 3 and 4,** shown on **Figures 4, 5, 6, and 7,** and summarized below:

- Remedial well TVOC influent concentrations ranged from 11.6 µg/L (Remedial Well 19 in Q2 2022) to 713 µg/L (Remedial Well 1 in Q1 2022) (**Table 4**). TCE and PCE were the VOCs detected at the highest concentrations in all remedial wells, except for Well 19, where TCE and cis-1,2-dichlorothene (cis-1,2-DCE) were detected at the highest concentrations.
- Well 1 had the greatest mass removal rate in 2022 (and since 2015) compared to the other remedial wells. Historically, Well 3 had the highest mass removal rate until 2015 (**Figure 4**).
- Although the remedial wells generally exhibit a slight to moderate increase in TVOC concentrations compared to 2021, TVOC concentrations in remedial wells continue to exhibit an overall decreasing or stable trend since 2016 (**Figure 7**).
- VC was only detected in Remedial Well 3R (**Table 4**), as its pumping rate was established to capture/contain VC entering the Site from the OXY site. OXY operates a biosparge system (per USEPA ROD) to reduce VC in groundwater upgradient (northwest) of Remedial Well 3R. Additional information on vinyl chloride is presented in **Section 7**.

- A calculated 4,412 lbs of TVOCs were removed from the aquifer and treated by the ONCT system in 2022 (**Table 3** and **Figure 5**). The majority of VOC mass was recovered by Remedial Well 1 (56% of the total mass). The VOC mass removed in 2022 was similar to the mass removed in the previous 5 years. However, since 2006, the overall mass removal rate has been generally declining, appearing to stabilize in the past 5 years. Since the remedial wells have been generally operated at the same rate and uptime, this trend is expected as ONCT system capture results mass removed resulting in improvements in on-site groundwater quality.
- Since full-time startup of the ONCT system in November 1998, approximately 224,784 lbs of VOCs have been removed from the aquifer and treated by the ONCT system (**Table 3 and Figure 6**). The cumulative mass removal trend has become increasingly more stable, reflective of the overall declining mass removal rate, and resulting improvements in on-site groundwater quality as mass is removed.
- Based on the influent and effluent TCE concentrations, the treatment system achieved TCE removal rates of greater than 99.9% for both Tower 96 and T102 air strippers (**Table 3).**

5.2 Remedial System Compliance

5.2.1 Water Discharge

Treated groundwater effluent from the ONCT system met SPDES permit equivalent limits during the reporting period (see **Table 7** and **Appendix D** for detail). The measured concentrations of individual VOCs, nitrogen and pH levels in the treated effluent were below/within applicable discharge limits.

5.2.2 Air Discharge

Tower 96 and Tower 102 emissions were evaluated for the reporting period to determine compliance with the DAR-1 Guidelines for The Evaluation and Control of Ambient Air Contaminants (NYSDEC 2021), under 6 CRR-NY 212 (Rule 212).

- As shown in **Table 5A** (Tower 96 vapor-phase analytical data for 2022), TCE (an A-rated compound) exhibited the highest concentrations of a single VOC compound in influent air by more than an order of magnitude at Tower 96.
- As shown in **Table 5B** (Tower 102 vapor-phase analytical data), TCE exhibited the highest concentration of a single VOC compound in influent air by close to an order of magnitude at Tower 102.

Pursuant to 6 CRR-NY 212-2.1, for an air contaminant listed in Section 212-2.2 Table 2 – High Toxicity Air Contaminant (HTAC) list, the facility owner or operator shall either limit the actual annual emissions from all process operations at the facility so as to not exceed the mass emission limit listed for the individual HTAC, or demonstrate compliance with the air cleaning requirements for the HTAC, as specified in Subdivision 212-2.3(b), Table 4 – Degree of Air Cleaning Required for Non-Criteria Air Contaminants of this Subpart for the environmental rating assigned to the contaminant by the NYSDEC. For each non-HTAC air contaminant, dispersion modeling will not be required if the actual annual emission rate is less than 100 pounds per year at each individual system. Actual annual emission rates used for comparison can take control devices into account and must meet the provisions of 212-1.5(g). Emission rates were calculated using the average of 2022 ambient air concentrations of the compounds identified in **Tables 5A and 5B** and are summarized in **Tables 6A and 6B** for Towers 96 and 102, respectively. All detected compounds were below the compound specific mass emission limit for the reporting period and therefore, no further analysis was required.

6 Remedial System Environmental Effectiveness

This report section evaluates ONCT remedial system environmental effectiveness monitoring results as they relate to the achievement of the ONCT remedial system RAOs of containing on-site OU2 VOC-impacted groundwater and preventing its off-site migration. As mentioned in **Section 1**, this evaluation takes a line-of-evidence approach consistent with USEPA (2008) “A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems” report. Hydraulic capture and improvements in groundwater quality are the two main categories used in this approach. Hydraulic Capture is assessed by multiple lines of evidence, including groundwater flow patterns (water table configuration and potentiometric surface) and vertical hydraulic gradients. Improvement in groundwater quality are also assessed by multiple lines of evidence, including TVOC concentration trends in different areas in and around the ONCT system and TVOC plume distribution. These lines of evidence are evaluated in **Sections 6.1 and 6.2** against the following expected conditions.

If the ONCT system is effectively preventing the off-site movement of VOC-impacted groundwater it would be expected that a capture zone would develop that would envelop, in three dimensions, the VOC-impacted groundwater on-site and near-Site downgradient. Furthermore, vertical hydraulic gradients would develop that would be oriented downward within the established capture zone.

Also, a clean water area (an area of less than 5 µg/L total VOCs) would develop as a result of bifurcation of the plume (splitting of the plume into two parts on-Site and off-site with a defined area of less than 5 µg/L total VOCs water between the two parts of the plume). This bifurcation is a direct result of hydraulic capture. This clean water area would develop at the water table near the Site and over time would expand further hydraulically downgradient of the Site and deeper in the aquifer. As part of this capture, one would expect monitoring well graphs of TVOCs versus time to show downward trends in areas proximate to and near central downgradient of the ONCT (see **Figure 1** for definition of these areas). In this Section, the available data is reviewed, and a determination is made as to whether the data supports the expectations described immediately above.

Once remedial wells are pumping continuously at the rates required to establish containment, the propagation of drawdown occurs quickly as a pressure response to pumping and hydraulic capture is achieved and can be documented in a relatively short time measured in weeks or months. However, improvement in groundwater quality (in this case volatile organic compounds) occurs more slowly as it depends on groundwater movement, which is relatively slow on the order of approximately 1 foot/day (ft/day) on Long Island; therefore, improvements in groundwater quality could take years to reflect the hydraulic capture that is occurring. Due to the different time frames described above, hydraulic capture is considered a leading indicator of remedial effectiveness and improvement in groundwater quality is considered a lagging indicator of remedial effectiveness.

6.1 Hydraulic Capture

During ONCT operation, “mounding” of the water table (i.e., a localized increase in groundwater elevation) resulting from the concentrated discharge of treated water to on-site recharge basins is expected to be most evident in Zone 1 where the water table occurs. Furthermore, ONCT system remedial well pumping, which generates “a cumulative zone of capture” (i.e., an area of lowered groundwater levels within which groundwater moves to and is withdrawn by one of the remedial wells), is expected to be most evident in Zone 3, where the remedial pumping wells are screened. The combination of shallow discharge and deep pumping leads to the expectation that groundwater flow in the vicinity of the ONCT system would have a downward vertical component from the shallower portions of the aquifer to the deeper portions of the aquifer. As further discussed below, these expectations are being realized, as documented in previous annual reports and throughout 2022.

Tables 8 and 9, respectively, provide the water-level measurement data for the Second and Fourth Quarters of 2022 and are the basis for the ONCT hydraulic capture evaluation provided below. The ONCT system operated consistently during these measurement periods at or above design pumping rates. **Table 10** summarizes vertical hydraulic gradients for key monitoring well pairs in the vicinity of the ONCT system (which were calculated using the Second Quarter 2022 water-level measurements) and compares these gradients to groundwater model-predicted gradients (for the ONCT system operating at current design flow rates) resulting in capture of the VOC-impacted groundwater on-site. **Figures 8 and 9** depict groundwater elevations and flow directions in Zones 1 and 3, respectively, during operation of the ONCT system in May 2022.

Figure 8 shows that mounding of the water table occurs in Zone 1 beneath the west recharge basins and south recharge basins, which extends across the Site southern boundary and locally prevents shallow water from moving off Site. This mounding also creates a downward hydraulic gradient toward the deeper zone where pumping is occurring. Data summarized in **Table 10** indicates that vertical hydraulic gradients are reflective of mounding and deeper pumping and data from 16 of the 18 monitoring well clusters that were measured show downward gradients consistent with modeling results (one of the two remaining clusters showed the measured gradient to be downward where the model predicted an upward gradient suggesting better than modeled conditions). Therefore, gradients are consistent with the expectation of vertical groundwater flow stated above and verify attainment of the hydraulic capture line of evidence from the EPA document (USEPA 2008) because the model predicted vertical gradients are for when capture is being achieved.

Figure 9 shows that the ONCT system remedial wells have developed a cumulative zone of capture in Zone 3 that encompasses the Site and extends downgradient of the Site (see groundwater divide depicted on **Figure 9**, in the area just south of Central Avenue). This capture zone prevents the off-site migration of the on-site VOC-impacted groundwater and the remedial wells creating the capture zone also remove contaminant mass from the aquifer.

To support the evaluation of the hydraulic effectiveness of the ONCT system during periods in 2022 when portions of the OU2 ONCT system were shut down (i.e., partial system shutdown) for routine and non-routine maintenance (primarily to bypass the regenerative VPGAC treatment at Tower 96 and replace it with VPGAC emission control units, and for blower repairs at Tower 102), Arcadis reviewed current and historical ONCT system operational criteria **(Table 11)**. Despite the partial ONCT system downtime experienced during portions of 2022, the percent of modeled design flow for the ONCT system in 2022 **(Table 11)** was greater than the percent of modeled design flow for the ONCT system in 2019, and since modeling completed for 2019 confirmed on-site plume capture, it is logical to conclude that on-site plume capture was maintained throughout 2022.

Hydraulic data discussed so far confirms that the on-site VOC-Impacted groundwater is being contained on-site by the hydraulic barrier developed and maintained by the ONCT system. In the sections below, ground water quality data is reviewed and evaluated relative to the expectations of on-site containment and development of a clean water area.

6.2 Improvements in Groundwater Quality - Volatile Organic Compounds

This report section evaluates the groundwater quality monitoring data collected during 2022 and in prior years to support the evaluation of groundwater quality trends.

Time-concentration graphs depicting the TVOC concentration trends in key wells, grouped by proximity to the hydraulic barrier created by ONCT system operation, are shown on **Figures 10, 11 and 12.** The key wells selected for graphing are representative of overall conditions within the OU2 plume (both on-site and immediately downgradient of the Site) over time, both horizontally and vertically, and are considered surrogates for other wells that were not graphed.

For clarity, the key groundwater focus areas relative to the ONCT system are described below and discussed in the following subsections of this report:

- **Upgradient of the ONCT System**: Generally, north of the ONCT system and within the capture zone created by it.
- **Proximate to the ONCT System**: Generally, in the vicinity of the ONCT remedial wells and south recharge basins, inclusive of the resulting capture zone and clean water area created by the ONCT system.
- **Near Central Downgradient of the ONCT System**: Generally downgradient of the proximate area and slightly south of the clean water area but showing groundwater quality improvements suggesting the continued propagation of the clean water area to the south.

Discussion of these key areas is then further organized by the hydrogeologic zones described in **Section 6**, where necessary. In general, as described below, the majority of the OU2 plume mass is within Zone 3. This section also provides updated assessment of the three-dimensional distribution of TVOC concentrations (by hydrogeologic zone) and evaluates the current TVOC plume distribution to assess the development of a clean water area downgradient of the ONCT system.

Well locations are shown on **Figure 1**, with Northrop Grumman program wells depicted in black and supplemental Navy wells depicted in gray. Also included on **Figure 1** are brackets depicting the general locations of the upgradient, proximate, and near central downgradient areas in relation to the Site.

6.2.1 Upgradient of the ONCT System

Seven wells screened within Zone 1 and one well screened in Zone 2 are located in the area upgradient of the ONCT system. The identity of and groundwater quality results for these wells are summarized in **Table 12**. Three of the seven wells (HN-24I, GM-13D, and MW3-1) exhibited exceedances of SCGs for VOCs; however, these wells continue to exhibit overall decreasing TVOC concentration trends since startup of the OU2 system (**Figure 10** and **Table 17**). Collectively, the upgradient monitoring wells currently exhibit a 99.7% decrease in TVOC concentrations from their highest historical values to current values (**Table 17**) and the water quality data is improving as anticipated.

These eight wells are located within the capture zone of the ONCT system; therefore, groundwater in this area is hydraulically contained and, over time, will be extracted and treated via the continued operation of the ONCT system. Although upgradient wells, due to their location, do not provide direct evidence of the ability of the ONCT system to contain VOC-impacted groundwater on-site, their declining TVOC trends and overall substantial decrease in TVOC concentrations with time reflect removal of VOC mass from the impacted aquifer zones. These decreasing TVOC concentration trends in groundwater and the well locations within the capture zone support the conclusion that the ONCT system is operating as designed and per expectations (as summarized in **Section 1**).

6.2.2 Proximate to the ONCT System

The identity of and groundwater quality results for the 31 monitoring wells located in the area proximate to the ONCT system and screened within Zones 1 through 3 are summarized in **Table 13.** The trends for a representative subset of wells in this area are shown in **Figure 11.**

Zone 1

Seventeen Zone 1 wells are located proximate to the ONCT system. Except for Monitoring Well GM-79D, VOCs were either not detected or were detected at concentrations below SCGs in these wells. Monitoring Well GM-79D had an exceedance of the TCE SCG (**Table 13**); however, this well continues to have an overall decreasing TVOC concentration trend since startup of the OU2 system (**Figure 11**), with an overall reduction in TVOC concentrations of 90.2.% from its highest historical value (**Table 17**).

Zone 2

Seven Zone 2 wells are located proximate to the ONCT system and two of these wells (GM-39DB and GM-73D) exhibited exceedances of the SCGs (**Table 13**). However, these wells exhibited overall reductions in TVOC concentrations of 76.8% and 96.8%, respectively, from their highest historical values (**Table 17**).

Zone 3

Eight Zone 3 wells are located proximate to the ONCT system. Five of these wells (GM-15D2, GM-21D2, GM-33D2, GM-73D2 and GM-74D2) exhibited exceedances of the SCGs (**Table 13**). However, these wells exhibited overall reductions in TVOC concentrations of 76.4%, 98.1%, 99.9%, 92.0%, and 48.7%, respectively, from their highest historical values (**Table 17**). In addition, Well GM-21D2, located immediately south of the Site within the proximate area, continues to steadily show decreases in TVOC concentrations (**Figure 11**)**,** with TCE concentrations only slightly above 5 µg/L in the Fourth Quarter 2022 (TVOCs in this well were slightly below 5 µg/L in 2021). This continued decline in TVOCs is to be expected, as the clean water area (see Section 6.2.4) continues to expand within the GM-21 area south of the southern site boundary and beyond.

Zone 4

DON Well RE123D3 is the only well in Zone 4 in the proximate area and is screened from 815 to 835 ft bls. Although this well showed an apparent increase to 15.2 µg/L TVOC from a historical high of 0.95 µg/L, this data is a suspected anomaly, which will be further investigated through additional sampling of this well.

In summary, wells located in proximity to the ONCT system continue to show either VOCs less than SCGs or overall decreasing trends in TVOC concentrations since startup of the system (**Figure 11)**. Additionally, the wells show a collective decrease in TVOC concentrations of 98.4% from their highest historical values in all monitored hydrogeologic zones (**Table 17**). Groundwater in this proximate area is hydraulically contained by the ONCT system, both horizontally and vertically, and over time, will be extracted and treated via the continued operation of the ONCT system. These decreasing TVOC concentration trends in groundwater and the well locations within the capture zone supports the conclusion that the ONCT system is operating as designed and per expectations (as summarized in **Section 1**).

6.2.3 Near Central Downgradient of the ONCT System

A total of 10 wells (4 Northrop Grumman and 6 DON) are located in the near central downgradient area south of the Site, which extends from the “proximate” area to approximately 1,300 feet south of the Site. The identity and analytical results associated with the four Northrop Grumman wells are provided on **Table 14**, while TVOC trends for some of these wells are provided on **Figure 12**.

Two wells (GM37D [Zone 1] and GM-75D2 [Zone 3]) in this area exhibited slight VOC exceedances of the SCGs (**Table 14)**; however, these wells show declining trends in TVOC concentrations over their period of record and have also exhibited overall reductions in TVOC concentrations of 46.8% and 99.2% respectively, from their highest historical concentrations (**Table 17**). In addition, TVOC concentrations above SCGs were noted in DON Well Clusters RE109 and RE126, which is to be expected as the majority and higher concentrations of TVOCs were identified within wells in Zone 3 in this area.

The RE126 well cluster is located approximately 800 feet downgradient of the “proximate” GM-21 well cluster (maximum TVOC concentration of 5.4 µg/L at Well GM-21D2 in 2022). Well RE126D2 (screened 555 to 575 ft bls) exhibited the highest TVOC concentration in this cluster, and in the near central downgradient area, at approximately 312.94 µg/L **(Figure 12)**. Well RE109D3 (screened at 580 to 600 ft bls and) and located to the east of the RE126 cluster, exhibited the highest TVOC concentration in this cluster of approximately 31.59 µg/L **(Figure 12)**. In contrast, GM-75D2 (screened at 505 to 525 ft bls) and located west of the RE126 cluster exhibited a maximum TVOC concentration of approximately 15.4 µg/L **(Figure 12)**. It appears that although Zone 3 has the highest TVOC impacts in the near central area, these impacts vary noticeably based on specific screen zones and locations within Zone 3.

Although TVOC concentrations within Well RE126D2 are higher than those in adjacent Wells GM-75D2 and RE109D3, Well RE126D2 is exhibiting a declining trend over the period of record while the other two wells in that cluster show low and flat/declining trends (**Figure 12**). Wells RE126D2, RE109D3, and GM-75D2 exhibited overall reductions in TVOC concentrations of 86.4%, 65.3% and 99.2% respectively, consistent with their declining trends.

For comparison purposes, “proximate” area Well GM-21D2 located at the edge of the clean water area, located approximately 800 feet north /upgradient of the Well RE126 cluster and screened approximately 50 to 80 feet shallower than the RE126 wells (though still within Zone 3) exhibited a maximum TVOC concentration of 5.4 µg/L, as indicated above. TVOC concentrations in Well GM-21D2 have exhibited an overall decrease of almost 98.1% from the highest historical value. Given that Well GM-21D2 is located upgradient of the Well RE109 and RE126 clusters, it is expected that similar decreases will be observed at these well clusters over time, as the clean water area propagates through this vicinity and depth downgradient of the Site.

In summary, wells located in the near central area downgradient of the ONCT system continue to show either VOCs less than SCGs or overall decreasing trends or low flat/declining trends in TVOC concentrations since startup of the system (**Figure 12)**. Additionally, the wells show a collective decrease in TVOC concentrations of 79.7% from their highest historical values in all monitored hydrogeologic zones (**Table 17)**. These decreasing TVOC concentration trends in groundwater supports the conclusion that the ONCT system is operating as designed and per expectations.

6.2.4 Overall TVOC Distribution/Clean Water Area

This section provides an updated assessment of the three-dimensional distribution of TVOC concentrations (as indicated previously in this report, TVOC concentrations are the sum of 21 identified “Site-related” VOCs) and the clean water area in the OU2 portion of the upper glacial and Magothy aquifers. This assessment was developed by comparing the 2021 TVOC distribution to the most recently available data from monitoring wells, remedial wells, vertical profile borings, and public water supply wells collected in 2022. This evaluation focuses on the distribution of TVOCs on-site and extending downgradient from the Site to slightly south of Hempstead Turnpike. The maps and cross-sections discussed below supplement the discussions in **Sections 6.1** and **6.2.1, 6.2.2,** and **6.2.3**.

Figures 13 through 19 provide the 2022 updated three-dimensional interpretation of the plume and clean water area based on analytical data included in this report collected from multiple OU2 on-site and off-site Northrop Grumman monitoring and remedial wells, supplemented with available 2022 analytical data from on and off-site DON monitoring wells and vertical profile borings (VPB), and Bethpage Water District public supply wells. Five plan and two cross-sectional view figures (perpendicular and parallel to the regional ambient groundwater flow direction) were updated. These figures provide a comprehensive three-dimensional interpretation of TVOC concentrations and the clean water area in Zones 1 through 4 at and downgradient of the Site extending to slightly south of Hempstead Turnpike (the furthest south location where data was considered as part of determining ONCT system effectiveness). However, the further downgradient southern area is beyond the ONCT system capture zone and its resulting area of plume bifurcation and developing clean water area.

The locations of all wells and VPBs used to define the plume contours and clean water area are shown on the maps as data points for context. Key wells within the plume and clean water area are discussed herein and are labelled on the plan view and cross-section figures for convenience of review. Based on a review of the current figures and comparing them to those in the 2021 report, current plume conditions have changed somewhat as compared to 2021, and these changes are described below.

Figure 13 depicts a 2022 plan view of the overall TVOC distribution (i.e., the maximum concentrations in all zones were combined on one figure to show maximum OU2 plume extent) at and downgradient of the Site and the locations of the two cross-sections: A to A’, oriented in a west-east direction along the former Northrop Grumman Site southern boundary and perpendicular to regional ambient groundwater flow; and B to B’, oriented in a northwest-southeast direction from the southernmost portion of the Site to the Bethpage Water District Well Field 6, downgradient from the Site, and approximately parallel to regional ambient groundwater flow. **Figures 14 and 15** respectively, provide A to A’ and B to B’ cross-sectional vertical interpretations of 2022 TVOC concentrations in groundwater and the clean water area from the water table to the top of the Raritan confining unit, which is the bottom of the Magothy aquifer. **Figures 16 through 19** provide plan-view interpretations of maximum 2022 TVOC concentrations in Zone 1, Zone 2, Zone 3 and Zone 4, respectively.

Key findings based on review of **Figures 13 through 19** are summarized below:

- Plan-view **Figures 13** (all depths compiled onto one map, indicating maximum plume extents) **and 16 through 18 (**depicting the OU2 plume for specific depth horizons [**Figures 16 (Zone 1), 17 (Zone 2), and 18 (Zone 3)** all show bifurcation of the plume and a clean water area as evidenced by an area of less than 5 µg/L TVOCs on-site and immediately south of the Site. As pumping continues, bifurcation of the plume and the associated clean water area will continue to expand downgradient of the ONCT system as on-site VOC-impacted groundwater continues to be removed from the aquifer by pumping the remedial wells and treated water continues to be recharged at the south recharge basins. **Figure 19** (Zone 4) does not show plume bifurcation as there is no Site-related VOC-impacted groundwater on-site in this zone however, there is an area of clean water that extends from the Site to approximately 2,000 feet south of it.

- Based on **Figure 13,** the on-site northern extent of the greater than 1,000 µg/L TVOC portion of the plume does not extend as far to the north as it did in 2021 and the southern on-site greater than 1,000 µg/L TVOC portion of the plume is narrower than in 2021.The off-site greater than 1,000 µg/L TVOC portion of the plume is narrower in 2022 compared to 2021.
    - It is recognized that there could be more than one VOC source impacting groundwater at the RE107 well cluster and, as such, results associated with the RE107 well cluster are not further discussed in this report; however, as a conservative measure, RE107 is included in the plume update.
    - VOC-impacted groundwater detected at RE106 appears to be from a source other than OU2 (see 2021 annual report (Arcadis 2022d), for a detailed discussion on this) and, accordingly, data from DON well cluster RE106 was not included in mapping the OU2 plume for this report.
- To review the plume in more detail, depictions of the plume in each zone are provided in the following figures and changes from 2021 are discussed:
    - Based on **Figure 16** - Zone 1**,** compared to 2021 on-site, the western greater than 1,000 µg/L plume lobe has disappeared, and the eastern lobe has reduced in extent by approximately one half and does not extend as far north as in 2021. Off-Site the plume appears similar to 2021.
    - Based on **Figure 17** - Zone 2, compared to 2021 on-site, the western greater than 1,000 µg/L plume lobe has a slightly lesser extent to the north and is narrower. The greater than 5 µg/L portion of the plume on-site has reduced to the north. Off-Site the greater than 500 µg/L area has reduced in size.
    - Based on **Figure 18** - Zone 3, on-site the greater than 5 µg/L area has reduced in size and does not extend as far north as in 2021 and the greater than 1,000 µg/L area is slightly narrow than in 2021. Off-Site the greater than 500 µg/L and greater than 1,000 µg/L areas are generally narrower than in 2021.
    - Based on **Figure 19** - Zone 4, the 2022 and 2021 plumes look similar.
- In addition, monitoring well GM-33D2, located a short distance off-site and west of Remedial Well 17, has exhibited a decline in TVOCs of over 99% since 1994, while monitoring Well GM-75D2, located off-site approximately 1,300 feet downgradient of the ONCT system, has also exhibited a decline in TVOCs of over 99%. These TVOC reductions would not be possible if TVOCs were still migrating from the Site.
- Based on the west-east A to A' cross-sectional interpretation shown on **Figure 14**, Remedial Wells 17 through 19 continue to intercept on-site VOC-impacted groundwater at the southern boundary of the Site. The section documents the large volume of clean groundwater between the water table and generally -290 feet North American Vertical Datum 1988 (NAVD), where TVOCs less than 5 µg/L occur due to operation of the ONCT system. Deeper groundwater at -540 feet NAVD and below is also less than 5

µg/L and documents that the ONCT system is preventing further vertical migration of VOC-impacted groundwater. This cross-section is similar in appearance to the one for 2021 except that in 2022 the greater than 50 µg/L vertical section is thinner than last year at Well 18.

- The northwest-southeast B to B' cross-sectional interpretation shown on **Figure 15** shows TVOCs less than 5 µg/L throughout a vertical section downgradient of Well 17 and indicates plume bifurcation and a clean water area. The northernmost area of the plume, where concentrations are greater than 5 µg/L (which is intercepted on-site by Remedial Well 17), and the southernmost downgradient area of concentrations greater than 5 µg/L are separated by the clean water area. The deepest portion of the aquifer did not exhibit TVOC concentrations in excess of 5 µg/L, including beneath the ONCT system remedial wells. The 2021 and 2022 cross-sections appear similar except that in 2022 the greater than 1,000 µg/L area does not extend around and past Bethpage Water District Well 6-2, likely due to reduced pumpage at this well.

As the majority of pumping and enhanced recharge (concentrated in the south recharge basins) occurs near the southern Northrop Grumman property boundary, the resulting clean water area initially developed in Zone 1 in this area continues to propagate deeper and downgradient away from the Site in response to the prevailing regional ambient horizontal groundwater flow direction and vertical downward groundwater flow gradient. The clean water area is largest in Zone 1 (see **Figure 16**), as expected, as this is where it first developed. Over time, the clean water area will continue to expand from Zone 1 to the more geologically complex deeper aquifer zones (Zones 2 through 3) while also expanding further from the Site. This expansion in shown in **Figures 17** and **18** where a clean water area is also shown that is less than in Zone 1 but slightly larger in Zone 2 than Zone 3, which is to be expected as the clean water area expands deeper and to the south. In Zone 4, bifurcation of the plume is not shown as VOC impacts in this zone are not present on-site; however, the clean water area in this zone extends approximately 2,000 feet downgradient of the Site.

The clean water area created and maintained by the ONCT system is evident based on review of the water level maps, vertical hydraulic gradients, plume maps, cross-sections, monitoring well analytical data and associated trend graphs included herein. These lines of evidence and evaluations are consistent with those in USEPA (2008) "A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems" report. The continued expansion of the clean water area and associated reductions in TVOC concentrations could not have been achieved without the ONCT system effectively capturing and preventing the off-site movement of VOC-impacted groundwater.

7 Summary of Additional Groundwater Quality Data

7.1 Volatile Organic Compounds – Further Downgradient of the ONCT System

This section summarizes the VOC analytical results associated with the downgradient portion of Northrop Grumman's monitoring program for 2022 in the Far Central Downgradient area of the Site, followed by a discussion of VOC analytical results associated with the Former Outpost Monitoring Wells and the GM-38 Area (**Figure 1**). As one reviews the sections below, please realize that differences in rates of TVOC reductions in groundwater quality are not unexpected as the clean water area takes time to propagate with distance and depth.

7.1.1 Far Central Downgradient Area

The far central area south of the Site extends from the southern edge of the near central area (approximately 1,300 feet south of the Site) southward to approximately Hempstead Turnpike (**Figure 1**). This area is currently too far south to show propagation of the clean water area; however, given enough time this area would be expected to show the clean water area although such development can be impacted and possibly delayed by pumping of public supply or other wells. As such, differences in rates of TVOC reductions in groundwater quality are not unexpected as the clean water area takes time to propagate with distance and depth. In this area the higher concentrations of TVOCs were generally identified within the DON wells in Zone 3. Also in this area, the DON has installed and is currently operating Remedial Wells RW4 and RE137 to remove mass where the high concentration core of the OU2 off-site plume (TVOCs above 1,000 µg/L- “hot spot”) are located. Their continued operation will improve groundwater quality in this area. Furthermore, the DON has installed/is installing Remedial Wells 5A/B, 6A/B, and 7A/B further to the south of Hempstead Turnpike to more fully remediate the RE108 “hot spot”. As these wells begin to operate the DON will evaluate their progress in remediating this “hot spot” through their own effectiveness monitoring program.

A total of 12 wells are located in the far central area. Identification of and analytical results for the Northrop Grumman wells in this area are provided on **Table 14**; TVOC trends for DON and Northrop Grumman wells and Bethpage Water District Well BWD 6-2, are provided on **Figure 20**.

Five wells (GM-34D [Zone 2], GM-34D2 [Zone 3], GM-35D2 [Zone 3], GM-70D2 [Zone 2], and GM-71D2 [Zone 2]) in this area exhibited VOC exceedances of the SCGs (**Table 14**); however, these wells have also exhibited an overall reduction in TVOC concentrations of 92.7%, 95.8%, 92.4%, 97.6%, and 54.7%, respectively, from their highest historical concentrations (**Table 17).**

The RE122 well cluster is located downgradient of the clean water area, approximately 1,000 feet southeast (downgradient) of near central downgradient well GM-75D2. Well RE122D2 (screened at 590 to 610 (ft bls)), with the highest TVOC concentrations in this cluster, exhibited TVOCs of approximately 4,128 µg/L (**Table 17** and **Figure 20**). In addition, the Well RE108 cluster is located approximately 500 feet east of the RE122 cluster, and Well RE108D2 (screened at 630 to 650 ft bls), with the highest TVOC concentration in this cluster, exhibited a TVOC concentration of 2,300 µg/L (**Table 17** and **Figure 20**). Well RE122 D3, which exhibited a TVOC concentration of 1.5 µg/L, is screened within Zone 4 (from 715 to 735 feet below grade). The multiple depths of the “RE” well clusters provide a snapshot of the vertical extents of the plume. In this case, Well RE122 D3 delineates the lower vertical extent of the plume in this area.

Although elevated relative to nearby upgradient Well GM-75D2 discussed in the previous subsection, TVOC concentrations within Wells RE122D2 and RE108D2 exhibit decreasing trends over their period of record (**Figure 20**). For comparison, Well GM-75D2 (screened approximately 90 to 140 feet shallower than RE122D2 and RE108D2, respectively) exhibited a TVOC concentration of 13 µg/L and has shown an overall decrease in TVOC concentrations of over 99% from its highest historical value. Given that Well GM-75D2 is located upgradient of the Well RE108 and RE122 clusters, it is expected that similar decreases will be observed at these well clusters over time, as the clean water areas continues to propagate through this vicinity and depth downgradient of the Site.

The variable pumping (well shutdown or operation at increased or decreased flow rates) of Bethpage Water District Well 6-2 (BWD 6-2) over time may also have an influence on water quality in this far central downgradient area, and consequently the continued downgradient development of the clean water area. The operation of BWD 6-2 locally affects the groundwater flow direction and based on the water quality trends in BWD 6-2, may influence at least a portion of the OU2 plume to move east/southeast towards BWD 6-2, resulting in highly variable VOC concentrations in this well over time (**Figure 20**). Given the locations of Wells RE108D2 and RE122D2, approximately 2,000 feet northwest and generally upgradient of BWD 6-2, there is a potential that water quality at these wells is affected by the variable pumping of BWD 6-2, as illustrated by variable TVOC concentrations over time in Wells RE108D2 and RE122D2 similar to those in BWD 6-2 (**Figure 20**).

Operation of the ONCT system will continue to result in declining TVOC concentrations downgradient of the Site, as the clean water area continues to propagate and expand both further downgradient and at depth. As DON continues operating their Remedial Wells RW4 and RE137, further groundwater quality improvements are expected in this area and should be evidenced as DON evaluates the progress in remediating the RE108 “hot spot”.

7.1.2 GM-38 Area

DON operates an off-site groundwater extraction and treatment system at the GM-38 hotspot area located downgradient and approximately 0.75 miles southeast of the Site. OM&M reports for the GM-38 Area Remedy are submitted to NYSDEC by DON under separate cover, and Arcadis reviews these reports to supplement evaluation of off-site groundwater conditions. A summary of the GM-38 Area Remedy is provided below.

In April 2022, pumping was initiated at recovery Well RW-4, following its connection to the GM-38 Groundwater Treatment Plant (GWTP). At that time, pumping at RW-3 was to be suspended, and RW-1 and RW-4 were planned to be pumped at an average combined flow rate of up to 1,100 gpm with treated water discharged to the Arthur Avenue recharge basin. Based on the reporting available for review, the RW-4 pumping rate varied from less than 310 gpm to 489 gpm during the year and, as pumping increased, the rate of RW-1 was to be reduced by the amount of the RW-4 rate so that the total rate remained at approximately 1,000 gpm (so as to not exceed the GWTP or Arthur Avenue recharged basin capacity). The treated combined effluent from RW-1 and RW-4 is routinely sampled for VOCs and 1,4-dioxane by DON.

As summarized in **Table 14**, Monitoring Wells GM-38D and GM-38D2 exhibited SCG groundwater exceedances of TCE, which is consistent with VOC data from previous quarters.

Figure 21 depicts TVOC trends for Zone 1 and 2 wells in the off-site GM-38 Area. The TVOC concentrations in Wells GM-38D and GM-38D2 have decreased since 2006 and 2002, respectively, except for a short-term increase in TVOCs observed in GM-38D2 beginning in late 2015 after Well RW3 was turned off in July 2015. In June 2018 Well RW3 was turned back on and subsequently the TVOCs in GM-38D2 decreased to pre-July 2015 levels.

7.1.3 Former Outpost Wells

Fifteen former outpost monitoring wells were repurposed at the end of 2015 as OU2 plume monitoring wells and continue to monitor the VOC plume upgradient of certain public supply wellfields. Due to their proximity to nearby drinking water supply wells, samples from the outpost monitoring wells continue to be analyzed using methods appropriate for water supply wells; USEPA Method 524.2 for VOCs and USEPA Method 522 for 1,4-dioxane. Well Cluster Bethpage Outpost Wells (BPOW 1) is used to monitor Wellfield 1 of the South Farmingdale Water District; Well Cluster BPOW 2 is used to monitor Wellfield 3 of the South Farmingdale Water District; Well Cluster BPOW 3 is used to monitor New York American Water’s Seaman’s Neck wellfield; and Well Cluster BPOW 4 is used to monitor Well N-5303 of the Town of Hempstead/Levittown Water District.

As summarized in **Table 14**, only three of the 15 former outpost wells (BPOW 3-4, BPOW 4-1R, and BPOW 4-2R) in Zones 3 and 4 exhibited VOC exceedances of the SCGs in 2022. These exceedances at BPOW 3-4 were for TCE and 1,1-Dichloroethene, while the exceedances at BPOW 4-1R and BPOW 4-2R were for Freon-113.

Figure 22 highlights the downward or stable trend in TVOC concentrations for the BPOW 1 cluster (Wells BPOW 1-1 and BPOW 1-2, respectively). Well BPOW 1-3 shows an initial declining trend through late 2010 and after that time the well has a flat trend with mostly non-detect values. BPOW 1-4 has a flat trend with mostly non-detect values. BPOW 1-5 and BPOW 1-6 were non-detect for TVOCs and were, therefore, not graphed. **Figure 23** shows the increasing trends for outpost Wells BPOW 3-4, BPOW 4-1R, and BPOW 4-2R and the stable trend and mostly non-detects for BPOW 3-3. Wells BPOW 3-1 and BPOW 3-2 were non-detect for TVOCs for their period of record and, therefore, were not graphed. Well Cluster BPOW 2 has not exhibited exceedances of the SCGs since 2007 and was not graphed.

7.2 Cadmium and Chromium

Representative wells located in proximity to former Northrop Grumman Plants 1 and 2 are sampled for laboratory analysis of total and dissolved cadmium (Plant 2 only) and chromium (Plants 1 and 2). Analytical results for the Second and Fourth Quarters of 2022 are provided in **Table 15**. As a conservative approach, only total (unfiltered) metals concentrations are discussed below and depicted on the corresponding figures. Results are summarized below.

7.2.1 Former Northrop Grumman Plant 1

Exceedances of total chromium were detected in three of four wells (GM-15SR, PLT1 MW-05, PLT1 MW-06) associated with Plant 1 (PLT 1) during 2022 as indicated in the **Table 15**.

As depicted on **Figure 24**, total chromium in Well PLT1 MW-05 has shown a generally decreasing trend over the period of record; however, significant variations in concentrations continue to occur year to year. Well GM-15SR is exhibiting a downward trend in concentration since late 2010 although significant variations in concentrations continue to occur year to year.

Well PLT1 MW-06 shows an overall steady decline in concentrations for the period of record. However, these three wells have all been above the SCG for the period of record.

There have been no detections of total chromium in Well PLT1 MW-04 for the period of record with the exception of one detection in 2003.

7.2.2 Former Northrop Grumman Plant 2

As shown in **Table 15,** total cadmium exceedances of the SCG were not detected in the five wells associated with Plant 2 during 2022. However, Well N-10631 has periodically been above the SCG over the period of record; no other wells at Plant 2 have been above the SCG for the period of record (**Figure 25**).

As shown in **Table 15,** total chromium exceedances of the SCG were detected in one of five wells associated with Plant 2 during 2022; total chromium was detected at concentrations above the SCG in MW-02GF. As depicted on **Figure 26**, monitoring Well MW-02GF has shown widely varying concentrations for the period of record, with more recently increasing concentrations above the SCG from 2018 through 2022. As described above, Well N-

10631 (where total chromium was previously detected above the SCG prior to September 1999 and once in 2018) was observed to be filled with sediment and was no longer able to be sampled. For the period of record, samples from Wells GM-78S, GM-78I, and MW-01GF have been below the SCG.

7.3 Tentatively Identified Compounds

Consistent with previous Annual Groundwater Monitoring Reports, this section summarizes Tentatively Identified Compounds (TICs). A few compounds were tentatively detected in 2022 (Silanol, trimethyl- [TMS], chlorodifluoromethane, carbon dioxide, and 1,2 dichlorobenzene) in one or more samples from a small number of wells (BPOW1-1, BPOW1-1, BPOW4-1R, FW-03, and GM-17I). As in previous years, TICs continue to be sporadic and isolated and do not appear persistent. For example, although TMS was identified as a TIC in 2022, it was tentatively detected in different wells.

7.4 1,4-Dioxane

1,4-dioxane is a constituent analyzed for in the remedial, monitoring, and plume monitoring wells sampled under the OU2 groundwater monitoring program. As described in **Section 4.1**, 1,4-dioxane was analyzed using USEPA Method 8270D SIM CLLE for monitoring wells and remedial wells, while samples collected from former outpost wells continue to be analyzed using USEPA Method 522. The results of 1,4-dioxane analysis of groundwater samples obtained from all four quarters of sampling in 2022 are provided in **Table 16**, organized by hydrogeologic zone.

Out of a total of 160 samples collected from former outpost wells, monitoring wells, and remedial wells in 2022, including replicates, 13 samples were non-detect for 1,4-dioxane. Detected concentrations ranged from 0.111 µg/L (BPOW1-3) to 16 µg/L (MW-3-1). The highest 1,4-dioxane concentrations detected in the 2022 reporting period were generally observed in the vicinity of the ONCT system remedial wells.

7.5 Vinyl Chloride

VC is routinely detected in Remedial Well 3R and adjacent Monitoring Well MW-3-1, which are both located in the northwestern portion of the former Site. VC was detected in quarterly influent samples at Remedial Well 3R at concentrations ranging from 2.0 to 3.4 µg/L in 2022 (**Table 4**), while groundwater samples collected from monitoring Well MW-3-1 exhibited VC concentrations ranging from 1.1 to 21.7 µg/L in 2022 (**Table 13**). Groundwater remediation (i.e., biosparge system) to address VC upgradient (northwest) of Remedial Well 3R and Monitoring Well MW-3-1 is ongoing by OXY under USEPA oversight. USEPA allowed OXY to submit a work plan for a trial/partial shutdown of the biosparge system and they also allowed OXY to conduct the trial/partial shutdown. Northrop Grumman believes it is premature to allow OXY to conduct a trial/partial shutdown of their system considering that the SCG for VC was exceeded in both Well MW3-1 and Remedial Well 3R.

8 Conclusions

The following conclusions are provided regarding the performance and ability of the ONCT system to achieve the RAOs for the Site for the 2022 reporting period:

- The ONCT system maintained horizontal and vertical containment of on-site OU2 VOC-impacted groundwater during 2022. The evaluations conducted to support this conclusion conform with the lines of evidence and evaluation process recommended in the USEPA's A Systematic Approach for Evaluation of Capture Zones at Pump and Treat Systems (USEPA 2008) document.
  - The capture zone created via operation of the ONCT system encompasses the area of on-site OU2 VOC-impacted groundwater and creates an effective hydraulic barrier to its off-site migration.
  - The groundwater quality data from wells located immediately downgradient of the hydraulic barrier at the southern boundary of the Site have, as expected, continued to exhibit downward TVOC concentration trends over time due to the continued effectiveness of the ONCT system.
  - Groundwater quality data indicates that bifurcation of the VOC plume and propagation of the clean water area continues to expand south of the hydraulic barrier at the southern boundary of the Site.
- The ONCT system is operating as designed from a compliance and performance perspective:
  - The ONCT system complied with applicable NYSDEC SCGs for ONCT system emissions (i.e., treated water and air emissions).
- At former Plant 1, results for total chromium remain elevated above the SCG for the period of record, except for Monitoring Well PLT1 MW-04. PLT1 MW-05 has shown a generally decreasing trend over the period of record; however, variations in concentrations continue to occur year to year. Well GM-15SR exhibits an overall decreasing trend since 2010 although significant variations in concentrations continue to occur year to year.
- At former Plant 2, over the period of record Well N-10631 has sporadically been above the SCG for cadmium while the remaining two wells have been below the SCG, but total cadmium exceedances did not occur in 2022. For chromium, Monitoring Well MW-02GF has shown widely varying concentrations for the period of record and more recently increasing concentrations above the SCG from 2018 through 2021. In addition, Well N-10631, which has had exceedances above the SCG prior to September 1999 and once in 2018, was observed to be filled with 22 feet of sediment and is no longer able to be sampled. Northrop Grumman is coordinating to replace this well in the near future. The other three monitoring wells at this location have been below the SCG for their period of record.

9 Suggestions

Based on the findings and conclusions presented herein, the following suggestions are provided:

- The ONCT system should continue to be operated as designed to meet remedial objectives and maintain/expand the clean water area created by the system.
- Groundwater monitoring should continue as previously specified in the GWMP (2016) with the following exception: Northrop Grumman has elected and will continue to sample Monitoring Well GM-21D2 on a quarterly sampling frequency, as proposed in the 2018 Annual Report (2019a). Other sampling frequency modifications suggested in the 2018 (2019a) and 2019 (2020a) Annual Reports are currently

being revisited in coordination with DON from a more comprehensive perspective and will incorporate a similar optimization approach that will be proposed to NYSDEC for approval separately in the future.

- Groundwater quality and hydraulic monitoring in the vicinity of the ONCT system should continue to be enhanced by incorporating data obtained from DON monitoring well clusters RE123, RE126 and RE109, and by supplementing, as needed, with data obtained from DON monitoring well clusters RE107, RE108 and RE122. Given that these DON well clusters are generally located in critical areas nearby/downgradient of the clean water area and are screened at multiple depth horizons, they provide useful information to supplement Northrop Grumman well data to better monitor contaminant concentrations in these areas. These wells should continue to be evaluated as part of the routine annual system evaluation/certification process.
- Coordinate for the replacement of Well N-10631 so monitoring the historically declining cadmium and chromium concentrations within this well can continue.

10 Certification Statement

For each institutional or engineering control identified for the OU2 On-Site Groundwater Remedy, I certify that all of the following statements are true:

a. The engineering control employed for the OU2 On-Site Groundwater Remedy is unchanged from the date the control was put in place, or last approved by New York State Department of Environmental Conservation Division of Environmental Remediation (DER).

b. Nothing has occurred that would impair the ability of such control to protect public health and the environment.

c. Nothing has occurred that would constitute a violation or failure to comply with any operation, maintenance, and monitoring plan for this control.

d. Access to the OU2 On-Site Groundwater Remedy will continue to be provided to DER to evaluate the remedy, including access to evaluate the continued maintenance of this control.

Christopher Engler, P.E.
Engineer of Record
New York License # 069748

11 References

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Tables

Table 1A
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	WELL 1					WELL 3R					Air Stripper			
	Extracted Groundwater			VFD		Extracted Groundwater			VFD		Influent Water Flow			Ambient Influent Air Temperature
	Flow Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Amperage (Amps)	Flow Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Amperage (Amps)	Flow Recorder Rate (gpm)	Flow Meter Rate (gpm)	Totalizer (x100) (gal)	(°F)
1/4/2022	820	890,606	51	49	91.0	825	4,440,658	30	46.64	85.0	1,654	1,670	23,248,012	19
2/21/2022	827	944,332	52	49.3	91.6	806	4,747,184	30	44.13	80.9	1,619	1,604	24,261,322	50
3/8/2022	828	963,344	58	49.3	91.5	802	9,205	30	44.1	80.6	1,637	1,622	24,613,986	48
4/19/2022	830	1,012,573	44	49.3	92.3	804	54,374	30	44.13	81.0	1,635	1,617	430,631	50
5/17/2022	813	1,045,917	55	48.97	91.0	804	85,959	30	44.13	80.8	1,621	1,605	1,054,752	63
6/14/2022	850	1,085,032	60	52.63	103.0	716	115,197	30	42.18	75.4	1,649	1,627	1,714,032	67
7/26/2022	820	1,141,982	46	49.14	91.2	724	157,179	30	44.13	80.7	1,621	1,602	2,670,535	71
8/30/2022	823	1,184,332	47	49.3	91.9	758	104,689	30	44.13	80.7	1,624	1,606	3,453,164	74
9/26/2022	812	1,216,662	47	49.08	91.5	819	225,082	30	45.65	84.9	1,617	1,600	4,071,278	64
10/4/2022	813	1,224,629	48	49.18	91.6	815	233,133	30	45.49	84.2	1,610	1,596	4,228,496	49
11/22/2022	809	1,281,206	48	49.16	91.3	813	290,298	30	45.77	85.0	1,616	1,602	5,346,723	40
12/13/2022	812	1,305,673	46	49.14	91.0	817	314,994	30	45.77	85.0	1,619	1,605	5,831,043	27

Notes and Abbreviations on last page

Table 1A
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	HEAT EXCHANGER		PROCESS BLOWER				CONDENSER Condenser Cooling Water		
	Air Inlet Pressure (iwc)	Steam Inlet Pressure (psig)	Air Inlet Vacuum (iwc)	Air Effluent Temperature (°F)	Air Effluent Pressure (iwc)	Calculated Differential Blower Pressure (iwc)	Influent Temperature (°F)	Effluent Temperature (°F)	Temperature Differential (°F)
1/4/2022	6.0	14	5.4	80	1.8	3.6	56	79	23
2/21/2022	5.9	14	5.3	82	1.7	3.6	56	79	23
3/8/2022	5.8	14	5.3	80	1.7	3.6	56	81	25
4/19/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
5/17/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
6/14/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
7/26/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
8/30/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
9/26/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
10/4/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
11/22/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
12/13/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]

Notes and Abbreviations on last page

Table 1A
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	SEPARATOR		AIR COMPRESSOR	SUPPLEMENTAL AIR TREATMENT SYSTEM		WEST RECHARGE BASINS			
	Condensed Steam Water			Influent Blower	Total System Effluent	North		South	
	Separator Temperature (°F)	Separator Vent Temperature (°F)	Delivery Pressure (psig)	Pressure (iwc)	Pressure (iwc)	Basin Water Height (ft)	Status[3] (On/Off)	Basin Water Height (ft)	Status[3] (On/Off)
1/4/2022	90	96	115	-2.5	6	4	On	5.5	On
2/21/2022	89	96	92	-3.0	6	2.8	On	6.4	On
3/8/2022	90	96	93	-3.0	6	3.8	On	5.9	On
4/19/2022	NA[4]	NA[4]	NA[4]	NR	NR	6.0	On	6.5	On
5/17/2022	NA[4]	NA[4]	NA[4]	NR	NR	NR	On	NR	On
6/14/2022	NA[4]	NA[4]	NA[4]	NR	NR	3.8	On	5.8	On
7/26/2022	NA[4]	NA[4]	NA[4]	-3.0	6.0	4.0	On	6.0	On
8/30/2022	NA[4]	NA[4]	NA[4]	-2.8	5.0	3.8	On	5.8	On
9/26/2022	NA[4]	NA[4]	NA[4]	-2.6	5.9	4.5	On	6.0	On
10/4/2022	NA[4]	NA[4]	NA[4]	-3.0	5.8	6.5	On	8.0	On
11/22/2022	NA[4]	NA[4]	NA[4]	-3.0	5.0	3.8	On	5.6	On
12/13/2022	NA[4]	NA[4]	NA[4]	-2.9	4.5	3.5	On	4.8	On

Notes and Abbreviations on last page

Table 1A
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	REGENERATIVE VAPOR PHASE TREATMENT UNITS								
	Adsorb				Desorb				
	Flow (cfm)	Pressure (iwc)	Temperature (°F)	Flow (scfm)	Desorb Bed (A/B)	Time into cycle (min)	Influent Steam Pressure (psig)	Effluent Steam Temperature (°F)	Effluent Temperature (°F)
1/4/2022	4,920	0.3	86	4,779	B	52	14	198	86
2/21/2022	4,940	0.2	85	4,806	A	53	14	198	87
3/8/2022	4,930	0.3	85	4,798	A	50	14	217	87
4/19/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
5/17/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
6/14/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
7/26/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
8/30/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
9/26/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
10/4/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
11/22/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]
12/13/2022	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]	NA[4]

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Table 1A
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Operational data collected weekly by Northrop Grumman and supplemented by monthly Arcadis measurements, as needed. For clarity, data shown is considered to be representative of monthly conditions collected during a single weekly Northrop Grumman site visit or monthly Arcadis visit.

(2) Instantaneous values from field-mounted instruments, except otherwise noted.

(3) Status indicates if the basin was accepting water (on) or not accepting water (off).

(4) Regenerative VPAC treatment system was taken offline on 3/15/2022 and treatment system was updated to once pass-through VPAC treatment. Regenerative equipment parameters are no longer collected.

°F	degrees Fahrenheit
Amps	amperes
cfm	cubic feet per minute
ft	feet
gal	gallons
gpm	gallons per minute
Hz	hertz
iwc	inches of water column
min	minutes
psig	pounds per square inch, gauge
scfm	standard cubic feet per minute
NA	Not Available
NC	Not Calculated
NR	Not Recorded
RVPGAC	Regenerative Vapor Phase Granular Activated Carbon
SCADA	Supervisory Control and Data Acquisition
SPDES	State Pollutant Discharge Elimination System
VFD	Variable Frequency Drive

Table 1B
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	WELL 17				WELL 18				WELL 19			
	Extracted Groundwater			VFD	Extracted Groundwater			VFD	Extracted Groundwater			VFD
	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Pressure (psig)	Frequency (Hz)
1/4/2022	1,001	3,541,308	55	51.4	1,010	2,617,831	62	52.3	513	1,112,169	52	42.5
2/15/2022	1,002	3,600,199	54	51.3	1,009	2,672,648	59	52.1	515	1,142,365	51	41.5
3/22/2022	1,002	3,649,777	54	51.3	1,008	2,720,558	60	51.9	510	1,167,931	51	41.5
4/5/2022	999	3,669,978	55	51.3	1,009	2,740,261	61	51.9	513	1,178,223	51	41.3
5/31/2022	1,000	3,748,789	56	51.3	1,008	2,817,514	60	52.0	515	1,218,420	51	41.5
6/7/2022	999	3,758,868	56	51.4	1,010	2,827,374	60	52.0	508	1,224,546	51	41.5
7/5/2022	1,003	3,797,609	57	51.0	1,006	2,865,405	60	51.0	510	1,243,849	58	41.0
8/2/2022	1,000	3,837,985	59	51.5	1,009	2,904,741	60	51.9	513	1,264,496	51	51.6
9/6/2022	1,000	3,887,049	56	51.4	1,010	2,953,580	60	52.0	512	1,290,223	51	41.5
10/25/2022	1,000	3,957,204	56	51.4	1,006	3,022,512	55	52.1	510	1,326,157	51	41.7
11/8/2022	999	3,977,317	60	51.5	1,010	3,042,006	60	52.0	514	1,336,478	51	41.5
12/6/2022	1,001	4,016,327	56	51.6	1,010	3,080,291	59	52.1	510	1,356,866	52	41.8

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Table 1B
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	AIR STRIPPER					HEAT EXCHANGER			
	Influent Water Flow				Ambient Influent Air Temperature (°F)				
	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Influent Water Temperature (°F)	Influent Water Pressure (psig)		Air Inlet Temperature (°F)	Steam Inlet Pressure (psig)	Air Outlet Temperature (°F)	Calculated Differential Between Inlet Air and Outlet Air Temperatures (°F)
1/4/2022	2,578	92,345,489	59	30	60	60	24	80	20
2/15/2022	2,530	93,782,954	59	30	60	60	26	80	20
3/22/2022	2,430	94,963,177	59	30	46	60	18	80	20
4/5/2022	2,424	95,455,973	60	30	40	60	22	80	20
5/31/2022	2,406	97,369,079	59	30	73	60	16	80	20
6/7/2022	2,423	97,614,395	59	30	60	60	22	80	20
7/5/2022	2,402	98,555,829	59	30	76	60	20	82	22
8/2/2022	2,420	99,537,793	59	30	70	60	22	80	20
9/6/2022	2,418	100,749,163	59	30	73	60	22	80	20
10/25/2022	2,427	102,457,346	59	30	60	60	32	80	20
11/8/2022	2,418	102,947,695	59	30	47	60	32	80	20
12/6/2022	2,416	103,894,278	59	30	45	60	34	80	20

Notes and Abbreviations on last page

Table 1B
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	PROCESS BLOWER TO RVPGAC TREATMENT UNITS				CONDENSER				AIR COMPRESSOR
					Cooling Water			Condensed Steam Water	
	Blower Influent Pressure (iwc)	VIV Position (% open)	Blower Effluent Pressure (iwc)	Calculated Blower Static Pressure (iwc)	Influent Temperature[3] (°F)	Effluent Temperature (°F)	Calculated Temperature Increase (°F)	Decanter Vent Temperature (°F)	Delivery Pressure (psig)
1/4/2022	8	95	22	14	59	82	23	87	110
2/15/2022	8	95	22	14	60	83	23	89	101
3/22/2022	8	95	22	14	60	83	23	81	98
4/5/2022	8	95	22	14	60	82	22	86	98
5/31/2022	8	95	22	14	59	85	26	90	102
6/7/2022	8	95	22	14	59	83	24	91	98
7/5/2022	8	65	22	14	60	82	22	88	110
8/2/2022	8	95	22	14	60	82	22	87	96
9/6/2022	8	95	22	14	60	83	23	84	95
10/25/2022	8	95	22	14	60	82	22	87	103
11/8/2022	8	95	22	14	59	83	24	85	103
12/6/2022	8	95	22	14	60	80	20	83	120

Notes and Abbreviations on last page

Table 1B
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date	T102 VAPOR DISCHARGE		T102 WEIR		FORCE MAIN	REGENERATIVE VAPOR PHASE TREATMENT UNITS					
	Effluent Treated Vapor		Effluent Treated Groundwater			Desorb					
	Flow (cfm)	Temperature (°F)	Flow Meter Rate (gpm)	Totalizer (x1000) (gal)	Distribution System Pressure (psig)	Desorb Bed (A/B)	Time Into Cycle (min)	Influent Steam Pressure (psig)	Influent Steam Temperature (°F)	Desorb Bed Temperature (°F)	Effluent Steam Temperature (°F)
1/4/2022	7,460	85	0	676,467	70.8	A	42	3.5	247	173	201
2/15/2022	7,860	88	NA[4]	NA[4]	70.4	A	30	3.4	253	172	201
3/22/2022	8,080	83	2,637	NA[4]	72	A	51	3.5	248	175	201
4/5/2022	7,820	83	2,622	NA[4]	71	A	132	3.5	247	173	201
5/31/2022	7,960	85	2,657	NA[4]	71.1	B	108	3.5	250	176	201
6/7/2022	7,780	93	2,578	4,205	70.0	A	114	3.5	249	172	201
7/5/2022	7,820	86	2,589	NA[4]	70.0	A	73	3.3	238	170	201
8/2/2022	8,050	83	2,574	NA[4]	67	A	35	3.5	249	172	200
9/6/2022	7,640	82	2,651	NA[4]	71.4	A	136	3.3	245	171	201
10/25/2022	7,340	81	2,637	NA[4]	71	B	63	3.5	245	171	200
11/8/2022	7,820	85	2,611	NA[4]	67.4	B	120	3.5	242	171	201
12/6/2022	7,960	84	2,662	NA[4]	71.8	B	31	3.5	242	170	200

Notes and Abbreviations on last page

Table 1B
Summary of Weekly Monitoring Data for 2022[1,2]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Operational data collected weekly by Northrop Grumman and supplemented by monthly Arcadis measurements, as needed. For clarity, data shown is considered to be representative of monthly conditions collected during a single weekly Northrop Grumman site visit or monthly Arcadis visit.

(2) Instantaneous values from field-mounted instruments, except otherwise noted.

(3) Measurement collected with infrared temperature gun.

(4) Data not available due to weir flow meter malfunction.

°F	degrees Fahrenheit
ft	feet
gal	gallons
gpm	gallons per minute
Hz	hertz
iwc	inches of water column
min	minutes
psig	pounds per square inch, gauge
scfm	standard cubic feet per minute
NA	Not Available
NC	Not Calculated
NR	Not Recorded
RVPGAC	Regenerative Vapor Phase Granular Activated Carbon
SCADA	Supervisory Control and Data Acquistion
SPDES	State Pollutant Discharge Elimination System
T102	Tower 102
VFD	Variable Frequency Drive
VIV	Variable Influent Vane

Table 2
Summary of Non-Routine Maintenance for 2022
Tower 96 and Tower 102 Treatment Systems
Operable Unit 2
Northrop Grumman
Bethpage, New York

Date Completed	Maintenance Item[1]	Description/Comments
01/07/22	Well 18 VFD	Phase sensing relay replacement.
01/12/22	Tower 96 Supplemental VPGAC	VPGAC Vessel steam valve actuator replacements.
01/12/22	Tower 102 Dristribution Pipeline	The differential pressure meter on wall mount distribution flow recorder replaced.
01/12/22	Tower 102 Knockout Tank	The level sensor/transmitter on the polyethylene moisture knockout tank replaced.
1/16/22 - 1/17/22	Well 18	Shutdown due to communication issues between the Well 18 and Tower 102.
1/29/22 - 1/30/22	Tower 102	System shutdown due to blizzard.
02/01/22	Well 3R	Flow meter was replaced.
2/6/22 - 2/8/22	Tower 96 System	System shutdown due to exterior air compressor air line freezing.
2/15/22 - 2/16/22	Well 18	Well shutdown to complete diagnosis if VFD issues and associated repairs.
02/23/22	Tower 102	Weir Meter was replaced.
03/15/22	Treatment System Modifications	Bypassed the Regen VPGAC vessels and heat exchanger and modified the ductwork to treat air from stripper tower once-through the existing exterior VPGAC units. Mist eliminator kept in ductwork to limit moisture in treated air.
03/17/22	Tower 96 System	System shutdown to eliminate sensors/alarms associated with the bypassed regnerative VPGAC.
4/8/22 - 4/9/22	Tower 102 System	System shutdown due to a Well 19 fault code. VFD was reset.
04/13/22	Well 19	Ethernet Cable was replaced.
04/15/22	Tower 96 Exterior VPGAC	Replaced VPGAC in both exterior units.
04/19/22	Tower 102	Install temperature gauges for blower effluent temperature and VPGAC units effluent temperature.
5/14/22 - 5/15/22	Tower 96 & 102	System shutdown due to planned power shutdown for maintenance at a substation.
05/20/22	VPGAC Unit Pressure Gauges	Installed vacuum gauges on influent/effluent piping for VPGAC units.
06/01/22	VPGAC Unit Sample Ports	Installed PVC sample port valves on influent/effluent piping for VPGAC units.
7/3/22 - 7/5/22	Well 3R	Well shutdown due to VFD repairs.
07/20/22	Regenerative VPGAC System	Removed regenerative VPGAC equipment from building.
8/4/22 -8/5/22	Tower 96	System shutdown due to maintenance to remove original skid control panel.
09/04/22	Air Compressor	The air compressor safety relief valve was replaced due to a fault in the valve.
09/07/22	Tower 102	System shutdown due to water line installation.
09/15/22	Tower 96 Flex Duct	Replaced the flex duct on the air duct between the stripping tower and the blower.
9/28/2022 - 9/29/22	Tower 96 Exterior VPGAC	Replaced VPGAC in the lead exterior unit.
11/16/22	Tower 96	System shutdown due to influent water sampling valve repairs.
11/17/22	Tower 96 Exterior VPGAC	Replaced VPGAC in the lag exterior unit.
11/18/22 - 11/19/22	Tower 102	System shutdown to dry damp carbon beds to bring the air flow back to design levels.
12/17/2022 - 12/29/22	Tower 102 Blower	Tower 102 was shut down due to a blower inner bearing high temperature alarm. Blower belt, bearing, and electrical feed lines were replaced.

Notes and Abbreviations:

[1] Maintenance items were recorded based on Arcadis observations of the treatment systems during routine weekly or quarterly site visits and does not necessarily include all downtime associated with each maintenance item.

RVPGAC	Regenerative Vapor Phase Granular Activated Carbon
SCADA	Supervisory Control and Data Acquisition
T96	Tower 96 Treatment System
T102	Tower 102 Treatment System
VFD	Variable Frequency Drive
ONCT	On-Site Containment System
NG	Northrop Grumman Systems Corporation
RVPGAC	Regenerative Vapor Phase Granular Activated Carbon

Table 3
Operational Summary for the Treatment System
Fourth Quarter and Annual 2022[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

	Fourth Quarter Flow Rates (gpm)		Quarterly Flow Volumes (MG)			Annual Flow Volumes (MG)			Fourth Quarter VOC Concentrations (µg/L)	
	Current Model Design [2]	Current Operational Flow [3,4,14]	Design [2]	Actual [3,4]	% of Design	Design [2]	Actual [3,4]	% of Design	TCE [5]	TVOC [5,6]
Influent Groundwater [7]										
Well 1	800	810	106	107	101%	420.5	425.9	101%	538	566
Well 3R [16]	700	809	93	106	114%	367.9	395.4	107%	157	211
Well 17	1,000	1,010	132	116	88%	525.6	510.1	97%	124	137
Well 18	800	1,010	106	116	109%	420.5	505.0	120%	25.5	40.0
Well 19	500	514	66	59	89%	262.8	256.2	97%	65.1	79.3
Total [8]	**3,800**	**4,153**	**503**	**504**	**100%**	**1,997**	**2,093**	**105%**	**--**	**--**
Effluent Groundwater [9]										
Calpine	100 - 400	137	--	18	--	--	68.2	--	--	--
OXY Biosparge [10]	2 - 42	0	--	0	--	--	0.0	--	--	--
West Recharge Basins	1,112 - 1,455	1,354	--	179	--	--	855.4	--	--	ND
South Recharge Basins [10]	2,231	2,322	296	308	104%	1,172.6	1,168.9	100%	--	1.02
Total [11]	**--**	**3,813**	**--**	**505**	**--**	**--**	**2,093**	**--**		
Additional Flow to South Recharge Basins										
Storm Water Runoff Contributing to South Recharge Basins Flow Volume [11]	--	--	--	20	--	--	63.8	--	--	--
Total Flow Volume to South Recharge Basins [10,11,12]			**296**	**328**	**111%**	**1,172.6**	**1,232.7**	**105%**		
Treatment Efficiencies [13,15]										
Tower 96 System:	>99.9%									
Tower 102 System:	>99.9%									

Notes and Abbreviations on last page

Table 3
Operational Summary for the Treatment System
Fourth Quarter and Annual 2022[1] Reporting Period
Operable Unit 2
Northrop Grumman
Bethpage, New York

	VOC Mass Removed (lbs)				Fourth Quarter Remedial Well Uptime (%)	Annual Remedial Well Uptime (%)
	Fourth Quarter	Annual	Percent of Annual Mass Removal	Cumulative		
Influent Groundwater [7]						
Well 1	506	2,483	56%	56,813	99.4%	96%
Well 3R [16]	187	772	17%	94,524	99.2%	96%
Well 17	133	697	16%	56,202	87.0%	94%
Well 18	39	238	5%	7,516	87.0%	94%
Well 19	39	222	5%	9,729	87.0%	94%
Total [8]	**904**	**4,412**	**100%**	**224,784**		
Effluent Groundwater [9]						
Calpine	--	--		--	--	--
OXY Biosparge [10]	--	--		--	--	--
West Recharge Basins	--	--		--	--	--
South Recharge Basins [10]	--	--		--	--	--
Total [11]						
Additional Flow to South Recharge Basins						
Storm Water Runoff Contributing to South Recharge Basins Flow Volume [11]	--	--		--	--	--
Total Flow Volume to South Recharge Basins [10,11,12]						
Treatment Efficiencies [13,15]						
Tower 96 System:						
Tower 102 System:						

Notes and Abbreviations on last page

Notes and Abbreviations:

(1) Quarterly reporting period: October 01, 2022 through December 31, 2022. Annual reporting period: January 1, 2022 through December 31, 2022.

(2) "Current Model Design" flow rates were determined for the five remedial wells and for the South Recharge Basin based on computer modeling (ARCADIS G&M, Inc. 2002, updated in 2021). Flow rates for Calpine Power Plant (Calpine), Occidental Chemical (OXY) Biosparge, and West Recharge Basin flow rates are typical flow rates and are provided for reader information. "Design" flow volumes represent the volume of water that is expected to be pumped/discharged during the reporting period and is calculated by multiplying the design rate by the reporting period duration.

(3) Actual flow rates for the remedial wells represent the average actual pumping rates when the pumps are operational and do not take into account the time that a well is not operational. Actual monthly flow volumes are calculated from instantaneous flow rates transmitted to SCADA from local flow meters. The actual monthly flow volumes for quarterly and annual reporting are subsequently taken from monthly SPDES reports.

(4) "Actual" flow rates for the system discharges represent the average flow rate during the reporting period and are determined by dividing the total flow recorded during the reporting period by the reporting period duration.

(5) The TCE and TVOC concentrations are from the quarterly sampling events performed during this reporting period on November 22, 2022.

(6) The TVOC concentration for the two sets of recharge basins are their respective average monthly Outfall SPDES concentrations for the current quarter.

(7)Tower 102 shutdown for approximately 2 days from 11/18/22 through 11/19/22 for non-routine maintenance and for an additional 12 days in December for blower repairs. Tower 96 shutdown for 1 day for non-routine maintenance in November and for 1 day in November to replace VPGAC in once-through air treatment unit.

(8) Total pumpage/recharge rates are accurate to ±15% based on available information and expected or typical precision/accuracy factors for the gauges and meters.

(9) There are four possible discharges for the effluent groundwater: South Recharge Basins, West Recharge Basins, Calpine, and the OXY Biosparge system. Treated water is continuously discharged to the south and west recharge basins during routine operation, and is available "on-demand" to both Calpine for use as make-up water, and the OXY Biosparge remediation system. For this quarter, the quarterly flow rates to the south and west recharge basins (SRB and WRB, respectively) were calculated using the remedial well flow rates and available additional information and assumptions provided by Northrop Grumman regarding flow distribution, as follows: the Tower 96 system (Remdial Wells 1 and 3R) discharges effluent water to the WRB, less Calpine usage and less 119 gpm of Tower 102 steam condenser usage (15.8 MG); the Tower 102 system (Remedial Wells 17 through 19), including the Tower 102 steam condenser usage (15.8 MG), discharges effluent water to the SRB.

(10) Oxy has not reported any water usage for the OXY Biosparge system since May 2016.

(11) Storm water runoff volume is calculated by multiplying the adjusted tributary area and NOAA precipitation data for the reporting periods. The tributary area is adjusted by the runoff coefficient to exclude the infiltration volume from the total rainfall volume. The tributary area, runoff coefficient, and adjusted tributary area are from Dvirka and Bartilucci Consulting Engineers' Storm Water Permit Evaluation Report (January, 28, 2010). The NOAA precipitation data are calculated as a sum of NOAA daily precipitation data for the reporting period. NOAA precipitation data are retrieved from Station GHCND:USW00054787 - FARMINGDALE REPUBLIC AIRPORT, NY US for October, November, and December 2022.

(12) Total Flow Volume to South Recharge Basins is estimated as a sum of flow volumes contributed by the treated effluent discharge to South Recharge Basins and from storm water runoff to South Recharge Basins. Fourth Quarter 2022 calculated South Recharge Basin flow volumes is within historical operating volumes.

(13) Treatment System Efficiencies are calculated by dividing the difference between the remedial well flow weighted influent and effluent TVOC concentrations by the remedial well flow weighted influent concentration.

(14) The flow rate for Remedial Well 18 was generally maintained at an average rate of 1,000 gpm throughout 2022, above its current model design flow rate of 800 gpm, as a means to enhance on-site capture of the OU2 plume.

(15) Q4 VOC removal efficiencies are consistent with the first three quarters of 2022.

(16) Remedial Well 3R was brought online in 2013 to replace Remedial Well 3 due to its declining specific capacity which is a measure of the well's production efficiency.

--	Not Applicable
µg/L	micrograms per liter
gpm	gallons per minute
lbs	pounds
MG	million gallons
NOAA	National Oceanic and Atmospheric Administration
SCADA	Supervisory Controls and Data Acquisition
SPDES	State Pollution Discharge Elimination System
TCE	trichloroethene
TVOC	total volatile organic compounds
VOC	volatile organic compounds

Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents(1) (units in µg/L)	Location ID: / Sample ID: / Sample Date:	WELL 1 / WELL 1 / 2/16/2022	WELL 1 / WELL 1 / 5/17/2022	WELL 1 / WELL 1 / 8/18/2022	WELL 1 / WELL 1 / 11/22/2022
Volatile Organic Compounds (VOCs)(2)	NYSDEC SCGs(3)				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.92 J**	**0.87 J**	< 1.0	**0.65 J**
1,1-Dichloroethene	5	**2.2**	**1.8**	**2.0**	**2.2**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	**4.2**	**3.3**	**3.0**	**2.8**
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.50 UB**	< 0.50	**0.64**	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**6.7**	**6.0**	**4.9**	**5.6**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**16.6**	**14.0**	**11.5**	**14.1**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**678 D**	**538**	**478**	**538**
Trichlorotrifluoroethane (Freon 113)	5	**3.6**	**3.2**	**2.1**	**2.5**
Vinyl Chloride	2	< 0.50	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs(4)		**713**	**564**	**502**	**566**
1,4-Dioxane(2)	NS	**6.8**	**7.2**	**7.5**	**8.8**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents[1] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	WELL 3R / WELL 3R / 2/16/2022	WELL 3R / WELL 3R / 5/17/2022	WELL 3R / WELL 3R / 8/18/2022	WELL 3R / WELL 3R / 11/22/2022
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	**0.57**	**0.54 J**	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**1.7**	**1.5**	**1.4**	**1.3**
1,1-Dichloroethene	5	**5.3**	**4.2**	**4.1**	**4.2**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.51 UB**	< 0.50	< 0.50	< 1.0
Chloromethane	5	< 1.0 J	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**4.1**	**3.2**	**3.0**	**2.9**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**46.0**	**41.0**	**36.4**	**42.0**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**199**	**159**	**148**	**157.0**
Trichlorotrifluoroethane (Freon 113)	5	**0.57**	**2**	**2.0**	**1.7**
Vinyl Chloride	2	**3.4**	**2.5**	**2.2**	**2.0**
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**261**	**214**	**197**	**211**
1,4-Dioxane[2]	NS	**11**	**8.9**	**12**	**7.2**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents[1] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	96 EFFLUENT / 96 EFFLUENT / 2/16/2022	96 EFFLUENT / 96 EFFLUENT / 5/17/2022	96 EFFLUENT / 96 EFFLUENT / 8/18/2022	96 EFFLUENT / 96 EFFLUENT / 11/22/2022
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0 J	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	< 0.50	< 0.50	**0.27**	< 0.50
Trichlorotrifluoroethane (Freon 113)	5	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride	2	< 0.50 J	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**ND**	**ND**	**0.27**	**ND**
1,4-Dioxane[2]	NS	**8.7**	**6.7**	**8**	**7.8**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Constituents[1] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	WELL 17 / WELL 17 / 2/16/2022	WELL 17 / WELL 17 / 5/17/2022	WELL 17 / WELL 17 / 8/18/2022	WELL 17 / WELL 17 / 11/22/2022
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.70 J**	**0.62 J**	< 1.0	< 1.0
1,1-Dichloroethene	5	**1.3**	**1.00**	**0.85**	**0.81**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	**1.1 J**	**0.84 J**	**0.88**	**0.88**
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**2.7**	**2.4**	**1.9**	**2.0**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0 J	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**15.7**	**14.0**	**11.8**	**12.5**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**157**	**131**	**119**	**124.0**
Trichlorotrifluoroethane (Freon 113)	5	**2.4**	**1.7**	**1.4**	**1.3**
Vinyl Chloride	2	< 0.50 J	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**180**	**152**	**135**	**137**
1,4-Dioxane[2]	NS	**6.9**	**4.2**	**8.4**	**10**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents[1] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	WELL 18 / WELL 18 / 2/16/2022	WELL 18 / WELL 18 / 5/17/2022	WELL 18 / WELL 18 / 8/18/2022	WELL 18 / WELL 18 / 11/22/2022
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50 J	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	**1.6**	**1.4**	**1.2**	**1.2**
1,1-Dichloroethene	5	**2.3**	**2.2**	**2.1**	**1.9**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0 J	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**3.1**	**2.5**	**2.3**	**2.3**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**16.7**	**15.0**	**13.4**	**14.5**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**35.6**	**27.3**	**26.2**	**25.5**
Trichlorotrifluoroethane (Freon 113)	5	**1.1**	**0.88**	**0.66**	**0.63**
Vinyl Chloride	2	< 0.50 J	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**60.4**	**47.9**	**45.2**	**40.0**
1,4-Dioxane[2]	NS	**4.8**	**4.8**	**4.8**	**4.5**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Constituents[1] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	WELL 19 / WELL 19 / 2/16/2022	WELL 19 / WELL 19 / 5/17/2022	WELL 19 / WELL 19 / 8/18/2022	WELL 19 / WELL 19 / 11/22/2022
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	**1.3**	**1.0**	**0.86**	**0.94**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50 UB	< 0.50	**0.38 J**	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**12.6**	**9.8**	**8.7**	**8.9**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**6.3**	< 0.50	**4.6**	**5.3**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**90.2**	< 0.50	**61.7**	**65.1**
Trichlorotrifluoroethane (Freon 113)	5	**1.1**	**0.82**	**0.78**	**0.73**
Vinyl Chloride	2	< 0.50 J	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**111.5**	**11.6**	**76.2**	**79.3**
1,4-Dioxane[2]	NS	**4.2**	**3.7**	**3.8**	**3.8**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents[(1)] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	WELL 3R / REP-021622-KC-1 / 2/16/2022	WELL 3R / REP-051722-KC-1 / 5/17/2022	WELL 19 / REP-081822-KC-1 / 8/18/2022	WELL 1 / REP-112222-KC-1 / 11/22/2022
Volatile Organic Compounds (VOCs)[(2)]	NYSDEC SCGs[(3)]				
1,1,1-Trichloroethane	5	**0.59**	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	**1.2 J**	**0.69 J**
1,1-Dichloroethene	5	**1.7**	**1.3**	**1.9**	**2.3**
1,2-Dichloroethane	5	**5.0**	**4.1**	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	**2.6**
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	**0.50 UB**	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	**4.2**	**3.2**	**2.2**	**5.6**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**45.1**	**38.4**	**13.0**	**14.5**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	**197.0**	**151**	**25.7**	**529.0**
Trichlorotrifluoroethane (Freon 113)	5	**2.60**	**1.7**	**0.75**	**2.4**
Vinyl Chloride	2	**3.3**	**2.4**	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[(4)]		**260.0**	**200.8**	**44.0**	**549.8**
1,4-Dioxane[(2)]	NS	**4.4**	**4.0**	**3.1**	**3.0**

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Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents[1] (units in µg/L)	Location ID: / Sample ID: / Sample Date:	102 EFFLUENT / 102 EFFLUENT / 2/16/2022	102 EFFLUENT / 102 EFFLUENT / 5/17/2022	102 EFFLUENT / 102 EFFLUENT / 8/18/2021	102 EFFLUENT / 102 EFFLUENT / 11/22/2022
Volatile Organic Compounds (VOCs)[2]	NYSDEC SCGs[3]				
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10 J	< 10	< 10	< 10
2-Hexanone (MBK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
4-methyl-2-pentanone (MIK)	50	< 5.0 J	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 1.0 J	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0
Methylene Chloride	5	< 0.50	< 0.50	< 0.50	< 0.50
Styrene	5	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethylene	5	< 0.50	< 0.50	< 0.50	< 0.50
Trichlorotrifluoroethane (Freon 113)	5	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl Chloride	2	< 0.50 J	< 0.50	< 0.50	< 0.50
Xylene-o	5	< 1.0	< 1.0	< 1.0	< 1.0
Xylene-m,p	5	< 1.0	< 1.0	< 1.0	< 1.0
Total VOCs[4]		**ND**	**ND**	**ND**	**ND**
1,4-Dioxane[2]	NS	**3.6 J**	**5.6**	**4.6**	**4.8**

Notes and Abbreviations on last page

Table 4
Summary of Volatile Organic Compounds and 1,4-Dioxane in 2022 Remedial Well Influent and Treatment System Effluent
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016c).

(2) VOC samples analyzed using USEPA Method 8260C. 1,4-Dioxane samples analyzed using USEPA Method 8270D-SIM-CLLE.

(3) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

(4) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.

[boxed cell]	Compound detected in exceedance of NYSDEC SCG Criteria
2.0	Bold value indicates a detection
< 0.50	Compound is not detected above its laboratory quantification limit
µg/L	micrograms per liter
CLLE	Continuous Liquid-Liquid Extraction
J	Constituent value is estimated
ND	Not detected
NS	None Specified
NYSDEC	New York State Department of Conservation
OU2	Operable Unit 2
REP	blind replicate sample
TOGs	Technical and Operational Guidance Series
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2022[2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Location ID: / Sample ID: / Constituents (Units in µg/m³)	96 INFLUENT 96 INFLUENT 2/16/2022	96 MID-EFFLUENT 96 MID-EFFLUENT 2/16/2022	96 EFFLUENT 96 EFFLUENT 2/16/2022 [3]	96 INFLUENT 96 INFLUENT 4/26/2022	96 MID-EFFLUENT 96 MID-EFFLUENT 4/26/2022	96 EFFLUENT 96 EFFLUENT 4/26/2022
Volatile Organic Compounds (VOCs)[1]						
1,1,1-Trichloroethane	**12**	**3.5**	**2.8**	**14**	< 1.1	< 1.1
1,1,2,2-Tetrachloroethane	< 0.55	< 0.58	< 0.55	< 10	< 1.4	< 1.4
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	**89.7**	**25**	**21**	**77**	< 6.1	< 6.1
1,1,2-Trichloroethane	**56.2**	**6.5**	< 0.44	< 8.2	< 1.1	< 1.1
1,1-Dichloroethane	**41.3**	**11**	**9.3**	**37**	< 0.81	< 0.81
1,1-Dichloroethene	**120**	**32**	**25**	**94**	**1.7**	< 0.79
1,2-Dichloroethane	**1.9**	**0.61 J**	**0.53 J**	< 6.1	< 0.81	< 0.81
1,2-Dichloropropane	**490 D**	**11 D**	**45**	**66**	**7**	< 0.92
Benzene	**1.9**	**0.8**	**0.42 J**	< 4.8	< 0.64	< 0.64
Bromodichloromethane	**7.4**	< 0.57	< 0.54	< 10	< 1.3	< 1.3
Bromoform	< 0.33	< 0.35	< 0.33	< 16	< 2.1	< 2.1
Bromomethane	< 0.62	< 0.66	< 0.62	< 5.8	< 0.78	< 0.78
Carbon Disulfide	< 0.50	< 0.53	< 0.50	< 47	< 6.2	< 6.2
Carbon Tetrachloride	**2.4**	**0.88**	**0.69**	< 9.4	< 1.3	< 1.3
Chlorobenzene	< 0.74	< 0.78	< 0.74	< 6.9	< 0.92	< 0.92
Chloroethane	**4**	**1**	**0.71**	< 4.0	**3.1**	**4.8**
Chloroform	**14**	**4**	**3.3**	**13**	< 0.98	< 0.98
Chloromethane	**2.5**	**1.2**	**1.2**	< 6.2	< 0.83	< 0.83
cis-1,2-Dichloroethene	**167 D**	**46.4**	**38**	**150**	**9**	< 0.79
cis-1,3-Dichloropropene	< 0.73	< 0.77	< 0.73	< 6.8	< 0.91	< 0.91
Dibromochloromethane	< 0.68	< 0.72	< 0.68	< 13	< 1.7	< 1.7
Ethylbenzene	**0.48 J**	< 0.74	< 0.69	< 6.5	< 0.87	< 0.87
Methylene Chloride	**2.2**	**1.2**	**20**	< 52	< 6.9	< 6.9
Styrene	< 0.68	< 0.72	< 0.68	< 6.4	< 0.85	< 0.85
Tetrachloroethene	**475 D**	**140 D**	**2**	**890**	**11**	< 1.4
Toluene	**75.4 D**	**5.7**	**44.8**	< 5.7	**1.7**	< 0.75
trans-1,2-Dichloroethene	**1.9**	**0.52 J**	**0.44 J**	< 5.9	< 0.79	**1.6**
trans-1,3-Dichloropropene	< 0.73	< 0.77	< 0.73	< 6.8	< 0.91	< 0.91
Trichloroethene	**5,430 D**	**2,580 D**	**10,900 D**	**16,000**	**1,200**	**7.4**
Vinyl chloride	**46.8**	**13**	**8.9**	**40**	**32**	**51**
Xylene-o	**0.41 J**	< 0.74	< 0.69	< 6.5	< 0.87	< 0.87
Xylenes-m,p	**1.3**	< 0.74	< 0.69	< 13	< 1.7	< 1.7
Total VOCs [2,4,5]	**7,044**	**2,884**	**11,125**	**17,381**	**1,266**	**65**

Notes and Abbreviations on last page

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2022[2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Location ID:	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT
Sample ID:	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT
Constituents (Units in µg/m^3)	5/17/2022	5/17/2022	5/17/2022	6/17/2022	6/17/2022	6/17/2022
Volatile Organic Compounds (VOCs)[1]						
1,1,1-Trichloroethane	< 1.1	< 2.2	< 0.55	< 22	**3.6**	< 0.44
1,1,2,2-Tetrachloroethane	< 1.4	< 2.7	< 0.69	< 27	< 1.4	< 0.55
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	**2.4**	< 3.1	< 0.77	**89.7**	**87.4**	**4.8**
1,1,2-Trichloroethane	< 1.1	< 2.2	< 0.55	< 22	< 1.1	< 0.44
1,1-Dichloroethane	**1.1 J**	< 3.2	< 0.81	**34**	**37**	**7.3**
1,1-Dichloroethene	**2.6**	**7.9**	**5.6**	**105**	**128**	**71**
1,2-Dichloroethane	< 1.6	< 3.2	< 0.81	< 32	**0.97 J**	< 0.65
1,2-Dichloropropane	**1.9**	**1.8 J**	< 0.92	**47.1**	< 1.8	< 0.74
Benzene	< 1.3	< 2.6	< 0.64	< 26	< 1.3	< 0.51
Bromodichloromethane	< 1.3	< 2.7	< 0.67	< 27	< 1.3	< 0.54
Bromoform	< 0.83	< 1.7	< 0.41	< 17	< 0.83	< 0.33
Bromomethane	< 1.6	< 3.1	< 0.78	< 31	< 1.6	< 0.62
Carbon Disulfide	< 1.2	< 2.5	< 0.62	< 25	< 1.2	< 0.50
Carbon Tetrachloride	< 0.50	< 1.0	< 0.25	< 10	< 0.50	< 0.20
Chlorobenzene	< 1.8	< 3.7	< 0.92	< 37	< 1.8	< 0.74
Chloroethane	< 1.1	< 2.1	**3.4**	< 21	**2.9**	**3.2**
Chloroform	< 2.0	< 3.9	< 0.98	< 39	**13**	**0.93**
Chloromethane	**1.2**	**1.4 J**	**1.1**	< 17	**0.89**	**0.91**
cis-1,2-Dichloroethene	**4**	**4.4**	**0.48**	**151**	**134**	**5.9**
cis-1,3-Dichloropropene	< 1.8	< 3.6	< 0.91	< 36	< 1.8	< 0.73
Dibromochloromethane	< 1.7	< 3.4	< 0.85	< 34	< 1.7	< 0.68
Ethylbenzene	< 1.7	< 3.5	< 0.87	< 35	< 1.7	< 0.69
Methylene Chloride	< 1.4	< 2.8	**1.9**	< 28	**1.7**	**2.8**
Styrene	< 1.7	< 3.4	< 0.85	< 34	< 1.7	< 0.68
Tetrachloroethene	**25**	**3.8**	< 0.27	**437**	**1.1**	**1.4**
Toluene	**1.2 J**	**1.7 J**	**6.4**	< 30	< 1.5	**1.2**
trans-1,2-Dichloroethene	< 1.6	< 3.2	< 0.79	< 32	**1.6**	< 0.63
trans-1,3-Dichloropropene	< 1.8	< 3.6	< 0.91	< 36	< 1.8	< 0.73
Trichloroethene	**434**	**449**	**4.5**	**13,400**	**742**	**24**
Vinyl chloride	**0.84**	**5.1**	**39.9**	**35.3**	**28.4**	**33.5**
Xylene-o	< 1.7	< 3.5	< 0.87	< 35	< 1.7	< 0.69
Xylenes-m,p	< 1.7	< 3.5	< 0.87	< 35	< 1.7	< 0.69
Total VOCs [2,4,5]	**474**	**475**	**62**	**14,299**	**1,180**	**157**

Notes and Abbreviations on last page

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2022[(2)]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Location ID:	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT
Sample ID:	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT
Constituents (Units in µg/m^3)	7/14/2022	7/14/2022	7/14/2022	8/18/2022	8/18/2022	8/18/2022
Volatile Organic Compounds (VOCs)[(1)]						
1,1,1-Trichloroethane	< 44	**13**	< 0.44	< 22	**14**	< 0.44
1,1,2,2-Tetrachloroethane	< 55	< 14	< 0.55	< 27	< 14	< 0.55
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	**98.9**	**111**	**22**	**57**	**147**	**56**
1,1,2-Trichloroethane	< 44	< 11	< 0.44	< 22	< 11	< 0.44
1,1-Dichloroethane	**46.5 J**	**59.1**	**35**	**24 J**	**59.9**	**49 D**
1,1-Dichloroethene	**124**	**146**	**143**	**75.3**	**142**	**118**
1,2-Dichloroethane	< 65	< 16	< 0.65	< 32	< 16	**0.45 J**
1,2-Dichloropropane	**92**	< 18	< 0.74	**37 J**	**15 J**	< 0.74
Benzene	< 51	< 13	< 0.51	< 26	< 13	< 0.51
Bromodichloromethane	< 54	< 13	< 0.54	< 27	< 13	< 0.54
Bromoform	< 33	< 8.3	< 0.33	< 17	< 8.3	< 0.33
Bromomethane	< 62	< 16	< 0.62	< 31	< 16	< 0.62
Carbon Disulfide	< 50	< 12	< 0.50	< 25	< 12	< 0.50
Carbon Tetrachloride	< 20	< 5.0	< 0.20	< 10	< 5.0	< 0.20
Chlorobenzene	< 74	< 18	< 0.74	< 37	< 18	< 0.74
Chloroethane	< 42	< 11	**3.2**	< 21	< 11	**3.2**
Chloroform	< 78	**23**	**6.3**	< 39	**23**	**13**
Chloromethane	< 33	< 8.3	**0.93**	< 17	< 8.3	**1.1**
cis-1,2-Dichloroethene	**193**	**277**	**61.1**	**105**	**236**	**153**
cis-1,3-Dichloropropene	< 73	< 18	< 0.73	< 36	< 18	< 0.73
Dibromochloromethane	< 68	< 17	< 0.68	< 34	< 17	< 0.68
Ethylbenzene	< 69	< 17	< 0.69	< 35	< 17	< 0.69
Methylene Chloride	< 56	< 14	**1.7**	< 28	< 14	**6.6**
Styrene	< 68	< 17	< 0.68	< 34	< 17	< 0.68
Tetrachloroethene	**1,110**	< 5.4	**0.26**	**593**	**48**	**1.1**
Toluene	< 60	< 15	< 0.60	< 30	< 15	**4.5**
trans-1,2-Dichloroethene	< 63	< 16	**0.99**	< 32	< 16	**2**
trans-1,3-Dichloropropene	< 73	< 18	< 0.73	< 36	< 18	< 0.73
Trichloroethene	**18,100**	**4,540**	**45**	**9,890**	**6,290 D**	**64.5**
Vinyl chloride	< 8.2	< 2.0	**32.5**	**24**	**36.8**	**38.1**
Xylene-o	< 69	< 17	< 0.69	< 35	< 17	**0.48 J**
Xylenes-m,p	< 69	< 17	< 0.69	< 35	< 17	**0.87**
Total VOCs [(2,4,5)]	**19,764**	**5,169**	**352**	**10,805**	**7,012**	**512**

Notes and Abbreviations on last page

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2022[(2)]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Location ID:	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT
Sample ID:	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT	96 INFLUENT	96 MID-EFFLUENT	96 EFFLUENT
Constituents (Units in µg/m^3)	9/8/2022	9/8/2022 [(6)]	9/8/2022	11/22/2022	11/22/2022	11/22/2022
Volatile Organic Compounds (VOCs)[(1)]						
1,1,1-Trichloroethane	< 76	< 76	**3.3**	**9.8**	< 22	< 0.44
1,1,2,2-Tetrachloroethane	< 96	< 96	< 0.55	< 2.7	< 27	< 0.55
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	< 110	**153**	**130**	**59**	**116**	**1.1**
1,1,2-Trichloroethane	< 76	< 76	< 0.44	< 2.2	< 22	< 0.44
1,1-Dichloroethane	< 110	**66.8 J**	**82.2**	**32**	**51.8**	**0.61 J**
1,1-Dichloroethene	**133**	**161**	**173**	**77.7**	**127**	**2.6**
1,2-Dichloroethane	< 110	< 110	**2**	**1.9 J**	< 32	< 0.65
1,2-Dichloropropane	**72.1 J**	< 120	**0.41 J**	**41**	**18 J**	< 0.74
Benzene	< 86	< 86	**0.27 J**	**1.3 J**	< 26	< 0.51
Bromodichloromethane	< 94	< 94	< 0.54	< 2.7	< 27	< 0.54
Bromoform	< 56	< 56	< 0.33	< 4.1	< 41	< 0.83
Bromomethane	< 100	< 100	< 0.62	< 3.1	< 31	< 0.62
Carbon Disulfide	< 84	< 84	< 0.50	< 2.5	< 25	< 0.50
Carbon Tetrachloride	< 34	< 34	**0.55**	< 1.0	< 10	< 0.20
Chlorobenzene	< 120	< 120	< 0.74	< 3.7	< 37	< 0.74
Chloroethane	< 71	< 71	**4**	**2.3**	< 21	**2.9**
Chloroform	< 130	< 130	**23**	**12**	**21 J**	< 0.78
Chloromethane	< 56	< 56	**0.99**	**1.2 J**	< 17	**0.74**
cis-1,2-Dichloroethene	**176**	**218**	**232**	**119**	**205**	**1.7**
cis-1,3-Dichloropropene	< 120	< 120	< 0.73	< 3.6	< 36	< 0.73
Dibromochloromethane	< 120	< 120	< 0.68	< 3.4	< 34	< 0.68
Ethylbenzene	< 120	< 120	< 0.69	< 3.5	< 35	**0.48 J**
Methylene Chloride	< 94	< 94	**4.5**	**15**	< 28	**4.5**
Styrene	< 110	< 110	< 0.68	< 3.4	< 34	< 0.68
Tetrachloroethene	**909**	< 37	**1.5**	**712**	< 11	**57**
Toluene	< 100	< 100	**0.94**	**2.4 J**	< 30	**6**
trans-1,2-Dichloroethene	< 110	< 110	**3.1**	**1.6 J**	< 32	< 0.63
trans-1,3-Dichloropropene	< 120	< 120	< 0.73	< 3.6	< 36	< 0.73
Trichloroethene	**15,700**	**16,300**	**166**	**10,700**	**9,300**	**68.8**
Vinyl chloride	**45**	**35.3**	**46**	**22**	**28.6**	**28.1**
Xylene-o	< 120	< 120	< 0.69	< 3.5	< 35	< 0.69
Xylenes-m,p	< 120	< 120	< 0.69	< 3.5	< 35	**1.7**
Total VOCs [(2,4,5)]	**17,035**	**16,934**	**835**	**11,810**	**9,867**	**176**

Notes and Abbreviations on last page

Table 5A
Influent, Mid-Effluent, and Effluent Air Concentrations for 2022[1,2]
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.

(2) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.

(3) The elevated T96 effluent vapor-phase contaminant concentrations are potentially related to malfunctioning steam actuator valves operated during the regenerative vapor-phase granular activated carbon (RVPGAC) process. Impacted air stream may have commingled with treated vapor-phase effluent. It should be noted that there were no SGC or AGC air emission exceedances associated with these sample events, and the malfunctioning steam actuator valves were repaired.

(4) The system was reconfigured to bypass the regenerative vapor-phase GAC components and treat air stripper effluent directly through the exterior VPGAC emission control units on 3/15/22.

(5) During the second and third quarter reporting periods, monthly air samples were collected for laboratory analysis of VOCs as part of an enhanced sampling program implemented to more closely monitor T96 following its reconfiguration to eliminate the regenerative VPGAC components of the system.

(6) Based on September 2022 sample results at the midfluent location, the VPGAC was changed out on 9/28/22 and 9/29/22. Effluent data indicates that breakthrough did not occur.

21	Bold value indicates a detection
D	Diluted sample analysis
J	Compound detected below its reporting limit; value is estimated
$\mu g/m^3$	Micrograms per cubic meter
ELAP	Environmental Laboratory Approval Program
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound

Table 5B
Influent and Effluent Air Concentrations for 2022[1]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Location ID: Sample ID: Constituents (Units in µg/m³)	102 INFLUENT 102 INFLUENT 2/16/2022	102 EFFLUENT 102 EFFLUENT 2/16/2022	102 INFLUENT 102 INFLUENT 5/17/2022	102 EFFLUENT 102 EFFLUENT 5/17/2022
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**6.5**	< 0.44	< 11	< 0.55
1,1,2,2-Tetrachloroethane	< 0.55	< 0.55	< 14	< 0.69
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	**41**	**26**	**36**	**23**
1,1,2-Trichloroethane	**8.2**	< 0.44	< 11	< 0.55
1,1-Dichloroethane	**34**	**22**	**32**	**15**
1,1-Dichloroethene	**63**	**40.8**	**48**	**27**
1,2-Dichloroethane	**1.9**	< 0.65	< 16	< 0.81
1,2-Dichloropropane	**129**	< 0.74	**15 J**	< 0.92
Benzene	**1.2**	< 0.51	< 13	**0.73**
Bromodichloromethane	**1.3**	< 0.54	< 13	< 0.67
Bromoform	< 0.33	< 0.33	< 8.3	< 0.41
Bromomethane	< 0.62	< 0.62	< 16	< 0.78
Carbon Disulfide	< 0.50	**0.24 J**	< 12	< 0.62
Carbon Tetrachloride	**3.5**	< 0.20	< 5.0	< 0.25
Chlorobenzene	< 0.74	< 0.74	< 18	< 0.92
Chloroethane	< 0.42	< 0.42	< 11	< 0.53
Chloroform	**8.3**	**3.1**	< 20	**1.7**
Chloromethane	**1**	**1.5**	< 8.3	**1.2**
cis-1,2-Dichloroethene	**228 D**	**29**	**137**	**13**
cis-1,3-Dichloropropene	< 0.73	< 0.73	< 18	< 0.91
Dibromochloromethane	< 0.68	< 0.68	< 17	< 0.85
Ethylbenzene	< 0.69	< 0.69	< 17	**0.78 J**
Methylene Chloride	**9.7**	**1.5**	< 14	**2.5**
Styrene	< 0.68	< 0.68	< 17	< 0.85
Tetrachloroethene	**315 D**	**1.3**	**391**	**0.62**
Toluene	**5.3**	**1.8**	< 15	**5.3**
trans-1,2-Dichloroethene	**3.3**	**0.44 J**	< 16	< 0.79
trans-1,3-Dichloropropene	< 0.73	< 0.73	< 18	< 0.91
Trichloroethene	**3,510 D**	**11**	**3,040**	**12**
Vinyl chloride	< 0.082	**0.26**	< 2.0	< 0.10
Xylene-o	< 0.69	< 0.69	< 17	**3.1**
Xylenes-m,p	< 0.69	**0.61 J**	< 17	**10**
Total VOCs [2]	**4,430**	**140**	**3,699**	**116**

Notes and Abbreviations on last page

Table 5B
Influent and Effluent Air Concentrations for 2022[1]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Location ID: Sample ID: **Constituents** **(Units in µg/m³)**	102 INFLUENT 102 INFLUENT 8/18/2022	102 EFFLUENT 102 EFFLUENT 8/18/2022 [3]	102 INFLUENT 102 INFLUENT 11/22/2022	102 EFFLUENT 102 EFFLUENT 11/22/2022
Volatile Organic Compounds (VOCs)[1]				
1,1,1-Trichloroethane	**5.3 J**	**24.00**	**6**	**1.5**
1,1,2,2-Tetrachloroethane	< 6.9	< 6.9	< 6.9	< 0.55
1,1,2-trichloro-1,2,2-trifluoroethane (Freon 113)	**38**	**226**	**38**	**32**
1,1,2-Trichloroethane	< 5.5	< 5.5	< 5.5	< 0.44
1,1-Dichloroethane	**27**	**162**	**27**	**23**
1,1-Dichloroethene	**49.2**	**286**	**41.6**	**45.2**
1,2-Dichloroethane	< 8.1	**11**	< 8.1	**0.61 J**
1,2-Dichloropropane	**12**	**10**	**12**	< 0.74
Benzene	< 6.4	< 6.4	< 6.4	< 0.51
Bromodichloromethane	< 6.7	< 6.7	< 6.7	< 0.54
Bromoform	< 4.1	< 4.1	< 10	< 0.83
Bromomethane	< 7.8	< 7.8	< 7.8	**2.1**
Carbon Disulfide	< 6.2	< 6.2	< 6.2	< 0.50
Carbon Tetrachloride	< 2.5	**13**	< 2.5	**0.82**
Chlorobenzene	< 9.2	< 9.2	< 9.2	< 0.74
Chloroethane	< 5.3	< 5.3	< 5.3	< 0.42
Chloroform	**6.3 J**	**39**	**6.8 J**	**4.8**
Chloromethane	< 4.1	**5**	< 4.1	**0.91**
cis-1,2-Dichloroethene	**119**	**781**	**108**	**63.4**
cis-1,3-Dichloropropene	< 9.1	< 9.1	< 9.1	< 0.73
Dibromochloromethane	< 8.5	< 8.5	< 8.5	< 0.68
Ethylbenzene	< 8.7	< 8.7	< 8.7	**0.40 J**
Methylene Chloride	< 6.9	**8**	< 6.9	**4.2**
Styrene	< 8.5	< 8.5	< 8.5	< 0.68
Tetrachloroethene	**333**	**4.8**	**625**	**190**
Toluene	< 7.5	< 7.5	**7.5**	**2.3**
trans-1,2-Dichloroethene	< 7.9	**7.1 J**	< 7.9	**0.83**
trans-1,3-Dichloropropene	< 9.1	< 9.1	< 9.1	< 0.73
Trichloroethene	**2,610 D**	**2,120**	**2,480**	**33**
Vinyl chloride	< 1.0	< 1.0	< 2.6	< 0.20
Xylene-o	< 8.7	< 8.7	< 8.7	< 0.69
Xylenes-m,p	< 8.7	< 8.7	< 8.7	**1.3**
Total VOCs [2]	**3,200**	**3,471**	**3,352**	**406**

Notes and Abbreviations on last page

Table 5B
Influent and Effluent Air Concentrations for 2022[1]
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

[1] Vapor samples collected by Arcadis on the dates shown and submitted to a NYSDOH ELAP certified laboratory for VOC analyses per Modified USEPA Method TO-15.
[2] TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least numerical precision (decimal place), including whole numbers with no decimal place.
[3] The elevated T96 effluent vapor-phase contaminant concentrations are potentially related to malfunctioning steam actuator valves operated during the regenerative vapor-phase granular activated carbon (RVPGAC) process. Impacted air stream may have commingled with treated vapor-phase effluent. It should be noted that there were no SGC or AGC air emission exceedances associated with these sample events, and the malfunctioning steam actuator valves were repaired.

1.7	Bold value indicates a detection
D	Diluted sample analysis
J	Compound detected below its reporting limit; value is estimated
$\mu g/m^3$	Micrograms per cubic meter
ELAP	Environmental Laboratory Approval Program
NA	Not Applicable
NYSDOH	New York State Department of Health
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

Table 6A
2022 Rule 212 Applicability and Evaluation
Tower 96 Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Project VOCs	CAS#	HTAC?[1]	2022 Tower 96 Treatment System Average Effluent Conc. (ug/m3)[2]	2022 Tower 96 Emissions (lb/yr)[4]	Rule 212 Limit (lb/yr)[5]	Rule 212 Applicability[6]	Further evaluation Required?[6]
1,1,1-Trichloroethane	71-55-6	No	3.1	0.499	100	Less than limit, Rule 212 compliant	N
1,1-Dichloroethane	75-34-3	No	30.57	4.917	100	Less than limit, Rule 212 compliant	N
1,1-Dichloroethene	75-35-4	No	76.9	12.368	100	Less than limit, Rule 212 compliant	N
1,2-Dichloroethane	107-06-2	Yes	0.99	0.159	100	Less than limit, Rule 212 compliant	N
1,2-Dichloropropane	78-87-5	No	22.71	3.653	100	Less than limit, Rule 212 compliant	N
Benzene	71-43-2	Yes	0.35	0.056	100	Less than limit, Rule 212 compliant	N
Carbon Tetrachloride	56-23-5	Yes	0.62	0.100	100	Less than limit, Rule 212 compliant	N
Chloroethane	75-00-3	No	3.18	0.511	100	Less than limit, Rule 212 compliant	N
Chloroform	67-66-3	Yes	9.31	1.497	100	Less than limit, Rule 212 compliant	N
Chloromethane	74-87-3	No	1.00	0.161	100	Less than limit, Rule 212 compliant	N
cis-1,2 Dichloroethene	156-59-2	No	70.31	11.308	100	Less than limit, Rule 212 compliant	N
Ethylbenzene	100-41-4	No	0.48	0.077	100	Less than limit, Rule 212 compliant	N
Methylene Chloride	75-09-2	No	6.0	0.965	100	Less than limit, Rule 212 compliant	N
Tetrachloroethene	127-18-4	Yes	10.54	1.695	1000	Less than limit, Rule 212 compliant	N
Toluene	108-88-3	No	10.64	1.711	100	Less than limit, Rule 212 compliant	N
trans-1,2-Dichloroethene	156-60-5	No	1.63	0.262	100	Less than limit, Rule 212 compliant	N
Trichloroethylene	79-01-6	Yes	1,410.0	226.778	500	Less than limit, Rule 212 compliant	N
Trichlorotrifluoroethane (Freon 113)	76-13-1	No	39.2	6.305	100	Less than limit, Rule 212 compliant	N
Vinyl Chloride	75-01-4	Yes	34.8	5.597	100	Less than limit, Rule 212 compliant	N
Xylenes (Total) (3)	1330-20-7	No	1.77	0.285	100	Less than limit, Rule 212 compliant	N

Flowrate

Description	Flow (cfm)
Tower 96	4,912

Notes:

1. High toxicity air contaminant (HTAC) based on 6 CRR-NY Rule 212-2.2, Table 2 – High Toxicity Air Contaminant List.
2. Average effluent concentrations based on sampling performed in 2022. Average concentrations from all sampling events during the reporting period are noted for each compound. Compounds not detected above the laboratory reporting limit are excluded from the air quality impact analysis summary.
3. Total for xylenes m, o, and p
4. Emission rate calculated based on average effluent concentration and maximum air flow rates measured during the sampling events. Emission rate standardized at 70 ^{o}F and 1 atm.

Trichloroethylene (lb/yr) = Trichloroethylene [µg/m^3] x Air Flow Rate [ft^3/min] x (1 m^3/35.3147 ft^3) x (60 min/hr) x (0.000001 g/1 µg) x (0.0022 lb/g) x 8,760 hrs/yr

5. 100 lb/yr for non-HTACs, and mass emission limits based on Rule 212-2.2, Table 2 for HTACs.
6. For HTACs, no further demonstration is required if the actual emissions are less than mass emission limit at each invidual system. For non-HTACs, no further demonstration is required if the actual emissions are less than 100 lbs/yr at each individual system.

Table 6B
2022 Rule 212 Applicability and Evaluation
Tower 102 Treatment System
Operable Unit 2
Northrop Grumman

Project VOCs	CAS#	HTAC?[1]	2022 Tower 102 Treatment System Average Effluent Conc. (ug/m3)[2]	2022 Tower 102 Emissions (lb/yr)[4]	Rule 212 Limit (lb/yr)[5]	Rule 212 Applicability[6]	Further evaluation Required?[6]
1,1,1-Trichloroethane	71-55-6	No	12.8	3.131	100	Less than limit, Rule 212 compliant	N
1,1-Dichloroethane	75-34-3	No	56	13.697	100	Less than limit, Rule 212 compliant	N
1,1-Dichloroethene	75-35-4	No	99.8	24.410	100	Less than limit, Rule 212 compliant	N
1,2-Dichloroethane	107-06-2	Yes	5.81	1.421	100	Less than limit, Rule 212 compliant	N
1,2-Dichloropropane	78-87-5	No	10	2.446	100	Less than limit, Rule 212 compliant	N
Benzene	71-43-2	Yes	0.73	0.179	100	Less than limit, Rule 212 compliant	N
Bromomethane	74-83-9	No	2.1	0.514	100	Less than limit, Rule 212 compliant	N
Carbon Disulfide	75-15-0	No	0.24	0.059	100	Less than limit, Rule 212 compliant	N
Carbon Tetrachloride	56-23-5	Yes	6.91	1.690	100	Less than limit, Rule 212 compliant	N
Chloroform	67-66-3	Yes	12.2	2.984	100	Less than limit, Rule 212 compliant	N
Chloromethane	74-87-3	No	2.15	0.526	100	Less than limit, Rule 212 compliant	N
cis-1,2 Dichloroethene	156-59-2	No	221.6	54.202	100	Less than limit, Rule 212 compliant	N
Ethylbenzene	100-41-4	No	0.59	0.144	100	Less than limit, Rule 212 compliant	N
Methylene Chloride	75-09-2	No	4.1	1.003	100	Less than limit, Rule 212 compliant	N
Tetrachloroethene	127-18-4	Yes	49.2	12.034	1000	Less than limit, Rule 212 compliant	N
Toluene	108-88-3	No	3.1	0.758	100	Less than limit, Rule 212 compliant	N
trans-1,2-Dichloroethene	156-60-5	No	2.79	0.682	100	Less than limit, Rule 212 compliant	N
Trichloroethylene	79-01-6	Yes	544	133.058	500	Less than limit, Rule 212 compliant	N
Trichlorotrifluoroethane (Freon 113)	76-13-1	No	77	18.834	100	Less than limit, Rule 212 compliant	N
Vinyl Chloride	75-01-4	Yes	0.26	0.064	100	Less than limit, Rule 212 compliant	N
Xylenes (Total) [(3)]	1330-20-7	No	7.07	1.729	100	Less than limit, Rule 212 compliant	N

Flowrate

Description	Flow (cfm)
Tower 102	7,470

Notes:

1. High toxicity air contaminant (HTAC) based on 6 CRR-NY Rule 212-2.2, Table 2 – High Toxicity Air Contaminant List.

2. Average effluent conctrations based on sampling performed in 2022. Average concentrations from all sampling events during the reporting period are noted for each compound. Compounds not detected above the laboratory reporting limit are excluded from the air quality impact analysis summary.

3. Total for xylenes m, o, and p

4. Emission rate calculated based on average effluent concentration and maximum air flow rates measured during the sampling events. Emission rate standardized at 70 ^{o}F and 1 atm.

Trichloroethylene (lb/yr) = Trichloroethylene [µg/m^3] x Air Flow Rate [ft^3/min] x (1 m^3/35.3147 ft^3) x (60 min/hr) x (0.000001 g/1 µg) x (0.0022 lb/g) x 8,760 hrs/yr

5. 100 lb/yr for non-HTACs, and mass emission limits based on Rule 212-2.2, Table 2 for HTACs.

6. For HTACs, no further demonstration is required if the actual emissions are less than mass emission limit at each invidual system. For non-HTACs, no further demonstration is required if the actual emissions are less than 100 lbs/yr at each invidual system.

Table 7
Summary of SPDES Equivalency Effluent Water[1] Sample Analytical Results 2022
ONCT Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

PARAMETER	Units	Discharge Limit[2]	Location ID:	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06
			Sample ID:	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06	OUTFALL 06
			Sample Date:	1/12/2022	2/16/2022	3/8/2022	4/13/2022	5/17/2022	6/13/2022	7/14/2022	8/4/2022	9/8/2022	10/18/2022	11/10/2022	12/12/2022
Volatile Organic Compounds (VOCs)[3]															
1,1,1-Trichloroethane (TCA)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 2.0	< 1.0
1,1-Dichloroethene (1,1-DCE)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,2-dichloroethene	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroform	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene (PCE)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-dichloroethene	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene (TCE)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.45 J**	< 0.50
Vinyl Chloride	µg/L	2		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0
TVOCs[4]				0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.45**	0.0
Semivolatile Organic Compounds (SVOCs)[6]															
1,4-Dioxane	µg/L	NA / Monitor		**5.7**	**5.8**	**6.0**	**8.4**	**8.2**	**7.0**	**9.3**	**5.6**	**5.9**	**5.4**	**8.2**	**5.0**
Anions[5]															
Iron	µg/L	600		< 100	**104**	< 100	< 100	**141**	< 100	< 100	< 100	**363**	< 100	< 100	**137**
Manganese	µg/L	600		< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	**34.6**	< 15	< 15	**18.5**
Nitrogen, (Nitrate+Nitrite)	mg/L	NA		**4.4**	**5.0**	**4.8**	**4.9**	**5.3**	**4.6**	**4.9**	**4.0**	**3.9**	**4.5**	**4.8**	**5.7**
Nitrogen, Total Kjeldahl	mg/L	NA		< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	**0.14 J**	< 0.20	< 0.20	**0.17 J**	**0.18 J**
Total Nitrogen	mg/L	10		**4.4**	**5.0**	**4.8**	**4.9**	**5.3**	**4.6**	**4.9**	**4.1**	**3.9**	**4.5**	**5.0**	**5.9**
pH - Intake (Tower 96)	S.U.	NA		5.8	4.9	5.4	4.8	4.5	5.2	4.5	5.4	6.5	5.5	5.7	5.2
pH - Effluent	S.U.	5.0 - 8.5		6.9	6.1	6.3	6.1	6.6	6.6	6.5	6.9	6.8	6.6	7.0	6.8

Notes and Abbreviations on last page

Table 7
Summary of SPDES Equivalency Effluent Water[(1)] Sample Analytical Results 2022
ONCT Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

			Location ID:	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05
		Discharge	Sample ID:	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05	OUTFALL 05
PARAMETER	Units	Limit[(2)]	Sample Date:	1/12/2022	2/16/2022	3/8/2022	4/13/2022	5/17/2022	6/13/2022	7/14/2022	8/4/2022	9/15/2022	10/13/2022	11/10/2022	12/12/2022
Volatile Organic Compounds (VOCs)[(3)]															
1,1,1-Trichloroethane (TCA)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-Trichlorotrifluoroethane (Freon 113)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 2.0	< 1.0
1,1-Dichloroethene (1,1-DCE)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,2-dichloroethene	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroform	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methylene Chloride	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene (PCE)	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-dichloroethene	µg/L	5		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene (TCE)	µg/L	5		**0.90**	**1.0**	**0.99**	0.63	**1.0**	**0.83**	**0.79**	**0.71**	**0.94**	**1.1**	**0.85**	**1.1**
Vinyl Chloride	µg/L	2		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0	< 1.0
TVOCs[(4)]				**0.90**	**1.0**	**0.99**	**0.63**	**1.0**	**0.83**	**0.79**	**0.71**	**0.94**	**1.1**	**0.85**	**1.1**
Semivolatile Organic Compounds (SVOCs)[(6)]															
1,4-Dioxane	µg/L	NA / Monitor		**5.1**	**4.3 J**	**4.3**	**4.0**	**4.0**	**4.0**	**5.9**	**5.2**	**4.6**	**5.3**	**6.2**	**4.6**
Anions[(5)]															
Iron	µg/L	600		< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	< 100	**117**
Manganese	µg/L	600		< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15	< 15
Nitrogen, (Nitrate+Nitrite)	mg/L	NA		**3.9**	**4.5**	**4.2**	**4.6**	**4.6**	**4.3**	**4.4**	**3.5**	**4.5**	**4.5**	**4.5**	**5.2**
Nitrogen, Total Kjeldahl	mg/L	NA		< 0.20	< 0.20	< 0.20	< 0.20	**0.21**	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20
Total Nitrogen	mg/L	10		**3.9**	**4.5**	**4.2**	**4.6**	**4.8**	**4.3**	**4.4**	**3.5**	**4.5**	**4.5**	**4.5**	**5.2**
pH - Intake (Tower 102)	S.U.	NA		5.1	5.5	5.1	5.4	5.0	5.1	5.3	5.7	6.7	6.0	5.9	4.7
pH - Effluent	S.U.	5.0 - 8.5		6.9	6.3	5.9	6.1	7.0	6.2	6.8	6.7	7.1	6.9	6.1	6.5

Notes and Abbreviations on last page

Table 7
Summary of SPDES Equivalency Effluent Water[(1)] Sample Analytical Results 2022
ONCT Treatment System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) SPDES effluent water samples are collected at a point closest to the respective Outfalls to each of the recharge basins, not directly from the treatment system tower effluent ports unless otherwise noted.

(2) Discharge limits are per the SPDES permit equivalency, dated October 12, 2017, amended on September 15, 2022 and transmitted by the NYSDEC to Northrop Grumman on September 19, 2022.

(3) Samples were analyzed for permit specified VOCs using USEPA Method 624.

(4) TVOC represents the sum of individual concentrations of VOCs detected. Results rounded to two significant figures.

(5) Samples were analyzed for Nitrogen, (Nitrate+Nitrite) and Total Kjeldahl Nitrogen (TKN) by USEPA Methods 353.2 and 351.2, respectively. Total Nitrogen is calculated as the sum of Nitrogen, (Nitrate+Nitrite) and TKN concentrations and is rounded to two significant figures.

(6) A SPDES equivalency letter was issued October 2017, at that time 1,4-Dioxane was added to the analyte list. Basin discharges are being reported under the current SPDES Permit Equivalency; however, discussion regarding pH and other analytes are ongoing with NYSDEC.

(7) pH not recorded due to a field recording error.

--	Not Analyzed
1.2	Bolded value indicates a detection
< 0.50	Compound not detected above its laboratory quantification limit
µg/L	micrograms per liter
mg/L	milligrams per liter
J	Constituent value is estimated
DUP	Field Duplicate Sample
NA	Not Applicable
ND	Not Detected
ONCT	On-Site Containment System
SPDES	State Pollution Discharge Elimination System
S.U.	Standard Units
SVOCs	Semivolatile Organic Compounds
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

Table 8
Water-Level Measurement Results, Second Quarter 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water [7] (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 1 Wells				
FW-03	49-64	124.30	53.90	70.40
MW-3R [2]	45-55	101.45	NM	NM
N-9921 [1]	58-62	94.23	NM	NM
N-10597	63-67	109.85	40.54	69.31
N-10600	57-61	102.41	36.81	65.60
N-10631	63-67	103.47	36.85	66.62
N-10633	63-67	103.80	37.27	66.53
N-10634	63-67	101.20	38.22	62.98
N-10821 [1]	63-67	91.58	NM	NM
GM-15SR	70-80	109.35	42.80	66.55
GM-15I	95-105	109.29	42.50	66.79
GM-16SR	60-70	115.86	45.50	70.36
GM-16I	135-145	115.81	45.80	70.01
GM-17I	100-120	115.83	42.80	73.03
GM-17SR	60-70	115.79	42.30	73.49
GM-18S	63-67	107.60	39.14	68.46
GM-18I	95-105	109.03	40.45	68.58
GM-19S	48-53	109.86	39.47	70.39
GM-19I	130-140	109.86	41.45	68.41
GM-20I	95-105	103.88	35.75	68.13
GM-21S	63-67	105.81	36.65	69.16
GM-21I	130-140	105.72	36.70	69.02
GM-74I	94-114	107.42	37.84	69.58
GM-78S	60-70	104.94	39.24	65.70
GM-78I	90-110	105.06	39.49	65.57
GM-79S (N-10628)	63-67	100.88	43.82	57.06
HN-24S	49-59	122.73	49.95	72.78
HN-29I	120-130	116.42	44.70	71.72
HN-40S	49-59	116.35	47.15	69.20
HN-40I	108-118	115.91	46.95	68.96
HN-42S	50-60	120.32	49.45	70.87
HN-42I	100-110	119.61	48.80	70.81
PZ-ONCT-1	48-58	103.97	31.81	72.16
PZ-ONCT-2	48-58	105.42	34.41	71.01
PZ-ONCT-4	48-58	105.90	37.04	68.86
PZ-ONCT-5	53-63	106.71	37.9	68.81
PZ-ONCT-6	48-58	106.43	35.37	71.06
PZ-ONCT-7	48-58	105.67	34.14	71.53
PZ-ONCT-8	48-58	106.76	40.01	66.75
PZ-ONCT-9	48-58	104.63	37.9	66.73
PZ-PLT5-1	57-67	118.29	48	70.29
PZ-PLT5-2	52-62	117.29	46.6	70.69
PZ-PLT5-3	50-60	115.96	42.9	73.06
PZ-PLT5-4	50-60	115.11	43.65	71.46
PZ-PLT5-5	53-63	113.22	43.15	70.07
PZ-PLT5-6	51-61	114.81	44.1	70.71

Notes and Abbreviations on Last Page

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 1 Wells Continued				
N-10624	190-194	93.61	29.51	64.10
GM-13D	200-210	113.97	43.87	70.10
HN-24I	148-158	125.80	50.32	75.48
HN-29D	210-220	115.11	45.03	70.08
GM-79I	170-180	101.09	37.95	63.14
N-10627	290-295	93.70	30.58	63.12
GM-17D	278-298	115.68	47.31	68.37
GM-18D	290-300	108.88	43.45	65.43
GM-20D	216-226	103.92	37.27	66.65
GM-21D	278-288	105.66	42.44	63.22
GM-36D	204-214	91.63	32.47	59.16
GM-37D	242-262	97.26	36.67	60.59
GM-39D_A[2]	262-282	102.23	37.15	65.08
GM-74D	295-305	107.43	43.25	64.18
BPOW 1-1	196-241	73.65	27.30	46.35
GM-79D	280-290	101.25	39.41	61.84
MW203D[6]	275-290	127.15	54.49	72.66
MW178S[6]	190-210	114.48	45.01	69.47
MW179D[6]	212-232	118.48	47.27	71.21
MW178I[6]	290-310	114.75	45.61	69.14
Zone 2 Wells				
GM-15D	332-342	109.84	45.00	64.84
GM-34D	309-319	71.19	12.45	58.74
GM-37D2	370-390	97.17	37.36	59.81
GM-38D	320-340	91.75	36.95	54.80
GM-39D_B[2]	410-420	102.08	39.8	62.28
GM-70D2	310-330	99.58	39.05	60.53
GM-73D	401-411	104.87	44.03	60.84
GM-78D	354-364	103.81	41.78	62.03
BPOW 1-2	310-335	73.54	28.62	44.92
BPOW 1-3	374-419	71.92	28.92	43.00
BPOW 1-4	340-400	56.68	11.10	45.58
BPOW 2-1	360-400	58.64	19.50	39.14
GM-38D2	475-495	91.56	38.14	53.42
GM-71D2	444-464	98.45	39.15	59.30
GM-78D2	459-479	103.82	43.72	60.10
BPOW 2-2	455-495	58.50	22.04	36.46
BPOW 3-1	446-516	61.43	24.58	36.85
RE106D1	440-460	101.19	39.36	61.83
RE106D2	480-490	101.37	40.02	61.35
MW201D[6]	335-350	120.92	51.30	69.62
MW201D1[6]	480-500	120.80	50.90	69.90
MW202D[6]	335-350	125.95	53.70	72.25
MW202D1[6]	425-440	125.98	53.80	72.18
MW203D1[6]	335-350	127.07	54.62	72.45
MW203D2[1][6]	435-450	127.02	NM	NM
MW178I1[6]	420-440	113.88	46.31	67.57

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Table 8
Water-Level Measurement Results, Second Quarter 2022
Operable Unit 2
Northrop Grumman
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Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 2 Wells Continued				
MW179D1(6)	305-325	119.31	48.35	70.96
MW179D2(6)	400-420	119.00	48.91	70.09
RE123D1(6)	480-500	105.49	45.23	60.26
Zone 3 Wells				
Well 3R(5)	421-531	119.80	79.90	39.90
GM-15D2	536-556	109.78	47.50	62.28
GM-21D2	516-526	104.62	46.70	57.92
GM-33D2	500-520	106.85	47.04	59.81
GM-34D2	510-520	71.19	14.44	56.75
GM-35D2	510-530	96.28	37.8	58.48
GM-36D2	520-540	91.60	35.07	56.53
GM-73D2	532-552	104.62	43.89	60.73
GM-73D3(1)	635-650	103.88	NM	NM
GM-74D2	542-562	107.36	50.45	56.91
GM-74D3	625-645	106.56	47.35	59.21
GM-75D2	505-525	93.63	33.49	60.14
MW 3-1	556-566	115.28	57.09	58.19
Well 1(3)(4)	519-570	116.78	85.10	31.68
Well 17(3)(4)	480-563	104.10	65.30	38.80
Well 18(3)(4)	466-570	110.00	73.90	36.10
Well 19(3)(4)	465-617	108.70	59.80	48.90
BPOW 1-5	600-650	56.75	12.52	44.23
BPOW 2-3	564-594	57.98	21.76	36.22
BPOW 3-2	612-647	61.82	26.10	35.72
BPOW 3-3	580-620	60.64	23.01	37.63
BPOW 3-4	640-690	62.44	24.71	37.73
BPOW 4-1R(5)	652-692	67.34	22.23	45.11
RE106D3	510-530	101.34	39.74	61.60
RE107D1	505-525	98.92	39.48	59.44
RE107D2	560-580	98.99	39.00	59.99
RE107D3	645-665	99.96	41.03	58.93
RE109D1(6)	515-535	100.03	41.89	58.14
RE109D2(6)	550-570	100.15	42.31	57.84
RE109D3(6)	580-600	100.40	42.20	58.20
RE123D2(6)	635-655	106.11	46.51	59.60
RE126D1(6)	500-520	101.03	43.05	57.98
RE126D2(6)	555-575	101.39	43.52	57.87
RE126D3(6)	640-660	101.10	43.20	57.90

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Table 8
Water-Level Measurement Results, Second Quarter 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 4 Wells				
BPOW 1-6	700-750	57.06	13.00	44.06
BPOW 4-2R(5)	725-765	67.18	24.00	43.18
RE123D3(6)	815-835	105.92	45.97	59.95

Notes and Abbreviations:

(1) Well N-9921 was not accessible due to past soil re-grading activities on the road median that covered the well.
Well GM-73D3 was not accessible due to construction activities near recharge basin.
Well N-10821 no longer exists. New well located in same place (well construction details unknown).
Well MW203D2 could not be opened due to bent bolts in cover plate.
Well MW-3R could not be located.
(2) Monitoring wells were voluntarily monitored to enhance coverage in Zone 2.
(3) Surveyed elevation not available, elevation is estimated from topographic map of the area.
(4) Pumping rates for the wells during water level measurement round are as follows: Well 1 is 813 gpm,
Well 3R is 804 gpm, Well 17 is 1,003 gpm, Well 18 is 1,007 gpm and Well 19 is 511 gpm as recorded on May 17, 2022.
(5) The NAVY abandoned original Wells BPOW4-1R and BPOW4-2R between August, 2014 and October, 2014 and installed replacements.
(6) Water level data for this well was collected by Navy and was provided to Arcadis.
(7) Water-level monitoring was performed from May 17 to May 18, 2022.

ft bmp	feet below measuring point
ft (NAVD 88)	Feet relative to North American Vertical Datum 1988.
gpm	gallons per minute
NM	not measured

Table 9
Water-Level Measurement Results, Fourth Quarter 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water [7] (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 1 Wells				
FW-03	49-64	124.30	56.41	67.89
MW-3R	45-55	101.45	NM	NM
N-9921 [1]	58-62	94.23	NM	NM
N-10597	63-67	109.85	42.33	67.52
N-10600	57-61	102.41	39.62	62.79
N-10631 [1]	63-67	103.47	NM	NM
N-10633	63-67	103.80	39.02	64.78
N-10634	63-67	101.20	40.47	60.73
N-10821 [1]	NM	NM	NM	NM
GM-15SR	70-80	109.35	45.20	64.15
GM-15I	95-105	109.29	44.63	64.66
GM-16SR	60-70	115.86	46.54	69.32
GM-16I	135-145	115.81	47.62	68.19
GM-17I	100-120	115.83	44.95	70.88
GM-17SR	60-70	115.79	44.33	71.46
GM-18S	63-67	107.60	41.92	65.68
GM-18I	95-105	109.03	43.07	65.96
GM-19S	48-53	109.86	40.89	68.97
GM-19I	130-140	109.86	43.50	66.36
GM-20I	95-105	103.88	38.83	65.05
GM-21S	63-67	105.81	36.80	69.01
GM-21I	130-140	105.72	39.03	66.69
GM-74I	94-114	107.42	38.61	68.81
GM-78S	60-70	104.94	42.04	62.90
GM-78I	90-110	105.06	42.31	62.75
GM-79S (N-10628)	63-67	100.88	45.50	55.38
HN-24S	49-59	122.73	52.37	70.36
HN-29I	120-130	116.42	47.34	69.08
HN-40S	49-59	116.35	49.85	66.50
HN-40I	108-118	115.91	49.65	66.26
HN-42S	50-60	120.32	52.29	68.03
HN-42I	100-110	119.61	51.71	67.90
PZ-ONCT-1	48-58	103.97	38.32	65.65
PZ-ONCT-2	48-58	105.42	40.21	65.21
PZ-ONCT-4	48-58	105.9	39.61	66.29
PZ-ONCT-5	53-63	106.71	37.73	68.98
PZ-ONCT-6	48-58	106.43	35.35	71.08
PZ-ONCT-7	48-58	105.67	33.69	71.98
PZ-ONCT-8	48-58	106.76	41.2	65.56
PZ-ONCT-9	48-58	104.63	39.42	65.21
PZ-PLT5-1	57-67	118.29	49.98	68.31
PZ-PLT5-2	52-62	117.29	48.61	68.68
PZ-PLT5-3	50-60	115.96	45.22	70.74
PZ-PLT5-4	50-60	115.11	45.67	69.44
PZ-PLT5-5	53-63	113.22	45.35	67.87
PZ-PLT5-6	51-61	114.81	46.84	67.97

Notes and Abbreviations on last page

Table 9
Water-Level Measurement Results, Fourth Quarter 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 1 Wells Continued				
N-10624	190-194	93.61	32.72	60.89
GM-13D	200-210	113.97	46.42	67.55
HN-24I	148-158	125.80	52.82	72.98
HN-29D	210-220	115.11	47.55	67.56
GM-79I	170-180	101.09	42.26	58.83
N-10627	290-295	93.70	33.43	60.27
GM-17D	278-298	115.68	49.95	65.73
GM-18D	290-300	108.88	45.82	63.06
GM-20D	216-226	103.92	40.02	63.90
GM-21D	278-288	105.66	44.85	60.81
GM-36D	204-214	91.63	34.20	57.43
GM-37D	242-262	97.26	38.32	58.94
GM-39D$_A$(2)	262-282	102.23	40.13	62.10
GM-74D	295-305	107.43	45.75	61.68
BPOW 1-1	196-241	73.65	29.28	44.37
GM-79D	280-290	101.25	41.99	59.26
MW203D(6)	275-290	127.15	57.26	69.89
MW178S(6)	190-210	114.48	47.53	66.95
MW179D(6)	212-232	118.48	50.62	67.86
MW178I(6)	290-310	114.75	48.10	66.65
Zone 2 Wells				
GM-15D	332-342	109.84	47.60	62.24
GM-34D	309-319	71.19	15.45	55.74
GM-37D2	370-390	97.17	38.91	58.26
GM-38D	320-340	91.75	39.02	52.73
GM-39D$_B$(2)	410-420	102.08	42.21	59.87
GM-70D2	310-330	99.58	41.59	57.99
GM-73D	401-411	104.87	44.89	59.98
GM-78D	354-364	103.81	44.5	59.31
BPOW 1-2	310-335	73.54	30.88	42.66
BPOW 1-3	374-419	71.92	31.61	40.31
BPOW 1-4	340-400	56.68	13.83	42.85
BPOW 2-1	360-400	58.64	20.16	38.48
GM-38D2	475-495	91.56	39.67	51.89
GM-71D2(1)	444-464	98.45	NM	NM
GM-78D2	459-479	103.82	46.47	57.35
BPOW 2-2	455-495	58.50	21.47	37.03
BPOW 3-1	446-516	61.43	25.09	36.34
RE106D1	440-460	101.19	42.34	58.85
RE106D2	480-490	101.37	42.86	58.51
MW201D(6)	335-350	120.92	52.80	68.12
MW201D1(6)	480-500	120.80	53.23	67.57
MW202D(6)	335-350	125.95	56.43	69.52
MW202D1(6)	425-440	125.98	56.46	69.52
MW203D1(6)	335-350	127.07	57.29	69.78
MW203D2(6)	435-450	127.02	57.44	69.58
MW178I1(6)	420-440	113.88	48.86	65.02

Notes and Abbreviations on last page

Table 9
Water-Level Measurement Results, Fourth Quarter 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 2 Wells Continued				
MW179D1[(6)]	305-325	119.31	50.82	68.49
MW179D2[(6)]	400-420	119.00	51.42	67.58
RE123D1[(6)]	480-500	105.49	48.34	57.15
Zone 3 Wells				
Well 3R[(4)]	421-531	119.80	81.1	37.70
GM-15D2	536-556	109.78	49.81	59.97
GM-21D2	516-526	104.62	49.75	54.87
GM-33D2	500-520	106.85	49.79	57.06
GM-34D2	510-520	71.19	18.18	53.01
GM-35D2	510-530	96.28	41.23	55.05
GM-36D2	520-540	91.60	37.18	54.42
GM-73D2	532-552	104.62	46.76	57.86
GM-73D3	635-650	103.88	46.93	56.95
GM-74D2	542-562	107.36	53.31	54.05
GM-74D3	625-645	106.56	50.32	56.24
GM-75D2	505-525	93.63	36.55	57.08
MW 3-1	556-566	115.28	61.25	54.03
Well 1[(3)(4)]	519-570	116.78	85.60	31.18
Well 17 [(3)(4)]	480-563	104.10	66.20	37.90
Well 18 [(3)(4)]	466-570	110.00	74.40	35.60
Well 19[(3)(4)]	465-617	108.70	62.3	46.40
BPOW 1-5	600-650	56.75	15.14	41.61
BPOW 2-3	564-594	57.98	20.59	37.39
BPOW 3-2	612-647	61.82	26.73	35.09
BPOW 3-3	580-620	60.64	21.93	38.71
BPOW 3-4	640-690	62.44	24.04	38.40
BPOW 4-1R[(5)]	652-692	67.34	23.92	43.42
RE106D3	510-530	101.34	42.90	58.44
RE107D1	505-525	98.92	42.39	56.53
RE107D2	560-580	98.99	42.76	56.23
RE107D3	645-665	99.96	43.96	56.00
RE109D1[(6)]	515-535	100.03	45.34	54.69
RE109D2[(6)]	550-570	100.15	45.64	54.51
RE109D3[(6)]	580-600	100.40	45.58	54.82
RE123D2[(6)]	635-655	106.11	49.60	56.51
RE126D1[(6)]	500-520	101.03	46.42	54.61
RE126D2[(6)]	555-575	101.39	47.04	54.35
RE126D3[(6)]	640-660	101.10	46.79	54.31

Notes and Abbreviations on last page

Table 9
Water-Level Measurement Results, Fourth Quarter 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Identification	Screen Interval (ft bls)	Measuring Point Elevation (ft msl)	Depth to Water (ft bmp)	Water-Level Elevation (ft NAVD 88)
Zone 4 Wells				
BPOW 1-6	700-750	57.06	15.59	41.47
BPOW 4-2R(5)	725-765	67.18	25.18	42.00
RE123D3(6)	815-835	105.92	49.75	56.17

Notes and Abbreviations:

(1) Well N-9921 was not accessible due to past soil re-grading activities on the road median that covered the well.
Well N-10821 no longer exists. New well located in same place (well construction details unknown).
Well GM-71D2 was not measured inadvertently.
Well N-10631 was not measured.
(2) Monitoring wells were voluntarily monitored to enhance coverage in Zone 2.
(3) Surveyed elevation not available, elevation is estimated from topographic map of the area.
(4) Pumping rates for the wells during water level measurement are as follows: Well 1 is 810 gpm,
Well 3R is 808 gpm, Well 17 is 1,002 gpm, Well 18 is 1,009 gpm and Well 19 is 511 gpm as recorded on October 25, 2022.
(5) The NAVY abandoned original Wells BPOW4-1R and BPOW4-2R between August, 2014 and October, 2014 and installed replacements.
(6) Water level data for this well was collected by Navy and was provided to Arcadis
(7) Water-level monitoring was performed from October 24 to October 25, 2022.

ft bmp	feet below measuring point
ft (NAVD 88)	Feet relative to North American Vertical Datum 1988.
gpm	gallons per minute
NM	not measured
OU2	Operable Unit 2

Table 10
Comparison of Second Quarter 2022
Field Measured Vertical Hydraulic Gradients to
Model-Predicted Gradients
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Pair ID	Measuring Point Elevation (ft NAVD 88)	Well Screen Midpoint Elevation (ft NAVD 88)	Water-Level Elevation (ft NAVD 88)	Field-Measured Vertical Gradient (1) (ft/ft) x 10-3	Model-Predicted, Steady-State Vertical Gradient (2) (ft/ft) x 10-3	Difference Between Field Measured and Model Predicted Gradients (3)
In Zone 1						
GM-17SR	115.79	50.79	73.49	10.23	2.67	7.56
GM-17I	115.83	5.83	73.03			
GM-78S	104.94	39.94	65.70	3.78	1.75	2.03
GM-78I	105.06	5.56	65.57			
GM-19S	109.86	59.36	70.39	23.43	0.47	22.96
GM-19I	109.86	-25.14	68.41			
GM-21S	105.81	40.81	69.16	2.00	5.99	-3.99
GM-21I	105.72	-29.28	69.02			
GM-17I	115.83	5.83	73.03	26.16	20.43	5.73
GM-17D	115.68	-172.32	68.37			
GM-18I	109.03	9.03	68.58	16.14	19.16	-3.02
GM-18D	108.88	-186.12	65.43			
GM-20I	103.88	3.88	68.13	12.24	26.70	-14.46
GM-20D	103.92	-117.08	66.65			
GM-21I	105.72	-29.28	69.02	39.17	42.55	-3.38
GM-21D	105.66	-177.34	63.22			
Between Zones 1 & 2						
GM-74I	107.42	8.42	69.58	26.87	35.13	-8.26
GM-74D	107.43	-192.57	64.18			
GM-39D$_A$	102.23	-169.77	65.08	19.56	25.92	-6.36
GM-39D$_B$	102.08	-312.92	62.28			
Between Zones 2 & 3						
GM-15D	109.66	-227.34	64.84	12.26	-16.32	28.58
GM-15D2	109.59	-436.20	62.28			
GM-73D	104.87	-301.13	60.84	0.81	23.85	-23.04
GM-73D2	104.62	-437.38	60.73			
RE123D1	105.49	-384.51	45.23	-8.29	5.94	-14.23
RE123D2	106.11	-538.89	46.51			
Between Zones 1 & 3						
GM-18D	108.88	-186.12	65.43	25.90	49.49	-23.59
GM-33D2	106.85	-403.15	59.81			
GM-21D	105.66	-177.34	63.22	22.15	21.27	0.88
GM-21D2	104.62	-416.60	57.92			

Notes and Abbreviations on last page

Table 10
Comparison of Second Quarter 2022
Field Measured Vertical Hydraulic Gradients to
Model-Predicted Gradients
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well Pair ID	Measuring Point Elevation (ft NAVD 88)	Well Screen Midpoint Elevation (ft NAVD 88)	Water-Level Elevation (ft NAVD 88)	Field-Measured Vertical Gradient (1) (ft/ft) x 10-3	Model-Predicted, Steady-State Vertical Gradient (2) (ft/ft) x 10-3	Difference Between Field Measured and Model Predicted Gradients (3)
In Zone 3						
GM-74D2	107.63	-444.64	56.91	-27.78	-37.49	-9.71
GM-74D3	107.58	-527.42	59.21			
GM-73D	104.87	-301.13	60.84	NM	10.12	NM
GM-73D3(4)	104.64	-537.86	NM			
RE109D1	100.03	-424.97	41.89	-12.04	-1.79	10.25
RE109D2	100.15	-459.85	42.31			
RE126D1	101.03	-408.97	43.05	-8.60	-0.64	7.96
RE126D2	101.39	-463.61	43.52			

Notes and Abbreviations:

(1) Vertical hydraulic gradients are calculated as follows:

$$\frac{(\text{Water-Level Elevation}_1 - \text{Water-Level Elevation}_2)}{(\text{Screen Midpoint Elevation}_1 - \text{Screen Midpoint Elevation}_2)}$$

$_1$ - Shallower well of pairing
$_2$ - Deeper well of pairing
Positive gradient value indicates a downward hydraulic gradient.
Negative gradient value indicates an upward hydraulic gradient.

(2) The 2019 model was used to calculate the Steady State Vertical Gradient when OU2 ONCT remedial wells were operating at rates designed to prevent off-Site migration of VOC-impacted groundwater .

(3) Positive value indicates an increase compared to model predicted gradient.
Negative value indicates a decrease compared to model predicted gradient.

(4) Well GM-73D3 was not accessible due to construction activities near recharge basin.

ft (NAVD 88) Feet relative to North American Vertical Datum 1988.

Table 11
Summary of 2022 and Historical Uptime and Remedial Well Flow Volumes
Operable Unit 2
Northrop Grumman
Bethpage, New York

OU2 Historical System Uptime

	2022					2021					2020				
Quarter	**Q4**	**Q3**	**Q2**	**Q1**	**% Uptime**	**Q4**	**Q3**	**Q2**	**Q1**	**% Uptime**	**Q4**	**Q3**	**Q2**	**Q1**	**% Uptime**
Days Per Period	**92**	**92**	**91**	**90**	**365**	**92**	**92**	**91**	**90**	**365**	**92**	**92**	**91**	**90**	**365**
Well 1	99.4	96.9	96.8	92.6	96.0	99.5	**81.0**	**77.3**	92.3	**87.5**	95.4	99.5	**70.6**	95.9	90.4
Well 3R	99.2	95.4	97.2	92.2	96.0	99.5	**82.4**	**77.5**	90.8	**87.6**	95.5	99.5	**70.5**	**78.5**	**86.1**
Well 17	**87.0**	98.7	96.2	96.1	94.0	99.7	99.9	97.7	98.0	98.8	93.7	97.3	97.7	99.2	97.0
Well 18	**87.0**	99.2	96.4	95.1	94.0	**83.7**	98.9	96.2	**72.4**	**87.9**	93.7	97.0	97.3	99.2	96.8
Well 19	**87.0**	99.2	95.2	94.5	94.0	99.7	99.9	97.7	96.3	98.4	93.7	97.9	97.8	99.2	97.1
T96 System Uptime	99.4	97.1	97.3	92.8	97.0	99.5	**83.1**	**77.5**	92.4	93.2	95.5	99.5	**70.6**	99.2	91.2
T102 System Uptime	**87.0**	99.2	96.4	97.4	95.0	99.7	99.9	97.7	98.1	93.8	93.7	98.1	97.9	99.9	97.4

All values provided in % of uptime.

OU2 Historical System % of Model Design Flow Rate

	2022					2021					2020				
Quarter	**Q4**	**Q3**	**Q2**	**Q1**	**% Model Design Flow**	**Q4**	**Q3**	**Q2**	**Q1**	**% Model Design Flow**	**Q4**	**Q3**	**Q2**	**Q1**	**% Model Design Flow**
Well 1	100.9	101.9	102.9	93.3	99.8	104.0	**78.0**	**84.0**	102.0	92.0	97.0	102.0	**71.0**	101.0	92.8
Well 3R	114.0	106.5	104.3	105.5	107.6	112.0	**71.0**	**77.0**	91.0	**87.8**	102.0	115.0	**81.0**	**85.0**	95.8
Well 17	**87.9**	102.3	97.7	98.5	96.6	101.0	101.0	97.0	101.0	100.0	98.0	107.0	108.0	109.0	105.5
Well 18	109.4	123.6	122.9	122.1	119.5	106.0	125.0	111.0	**89.0**	107.8	103.0	123.0	123.0	124.0	118.3
Well 19	**89.4**	101.5	97.0	98.5	96.6	102.0	102.0	98.0	115.0	104.3	95.0	100.0	100.0	100.0	98.8
Total % Model Design Flow	100.3	107.2	105.0	103.6	104.0	105.0	96.0	94.0	99.0	98.5	99.0	110.0	97.0	105.0	102.8

1. For the purposes of maintaining accuracy of historical % model design flows for Wells 18 and 19, the model design flow rates were increased from 600 to 800 gpm for Well 18 and decreased from 700 to 500 gpm for Well 19 beginning in the 2018 annual period.

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Upgradient of the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents unit in (ug/L)	Zone:	Zone 1								Zone 2	
	Well ID:	FW-03	FW-03	GM-13D	HN-24I	HN-40I	HN-40S	HN-42I	HN-42S	MW-3-1	MW-3-1
	Sample ID:	FW-03	REP041422SV1	GM-13D	HN-24I	HN-40I	HN-40S	HN-42I	HN-42S	MW-3-1	MW-3-1
	Date:	4/14/2022	4/14/2022	4/18/2022	4/11/2022	4/13/2022	4/13/2022	4/12/2022	4/12/2022	4/19/2022	10/12/2022
Volatile Organic Compounds (VOCs) (2)	**NYSDEC SCGs (ug/L)**(1)										
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.64 J**	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**1.5 J**
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	**1.4**	**1.5**	< 1.0	< 1.0	< 1.0	< 1.0	**5.2**	**1.7**
1,1-Dichloroethene	5	< 1.0	< 1.0	**1.1**	**0.81 J**	< 1.0	< 1.0	< 1.0	< 1.0	**2.6**	**1.7**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10 J	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	**0.86**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0 J	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 B
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.54 J**	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	**3.7**	**0.65 J**	< 1.0	< 1.0	< 1.0	< 1.0	**3.2**	**8.6**
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**3.2**	**3.0**	**13.4**	**12.6**	**2.0**	**2.4**	**5.0**	< 1.0	**12.2**	**11.8**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**0.59 J**	**0.80 J**	**8.2**	**7.3**	**0.96 J**	< 1.0	**0.64 J**	< 1.0	**61.9**	**80.9**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.1**	**21.7**
TVOCs(3)(4)		**3.8**	**3.8**	**27.8**	**23.7**	**3.0**	**2.4**	**5.6**	ND	**87.4**	**127.9**

Notes and Abbreviations on last page

Table 12
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Upgradient of the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Standards, Criteria, and Guidance (SCG) values based on NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

(2) Samples analyzed for the TCL VOCs using USEPA Method 8260C.

(3) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least precision (decimal places), including whole numbers with no decimal place.

(4) Acetone, 2-Butanone (MEK), and Dichloromethane (Methylene Chloride), each of which are recognized lab contaminants and are not included on the list of COCs in Appendix A and therefore, are not included in the total VOC values on this table.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Bold value indicates a detection.

< 5.0	Compound not detected above its method detection limit
ND	Non-Detect
µg/L	Micrograms per Liter
J	Value is estimated concentration
NYSDEC	New York State Department of Environmental Conservation
TCL	Target Compound List
TVOCs	Total Volatile Organic Compounds (known lab contaminants acetone, 2-butanone, and methylene chloride are not included in calculation of TVOCs)
TOGs	Technical and Operational Guidance Series
VOCs	Volatile Organic Compounds
[boxed cell]	Compound detected in exceedance of NYSDEC SCG Criteria
USEPA	United States Environmental Protection Agency

Table 13
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Proximate to the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents units in ug/L	Zone: / Well ID: / Sample ID: / Date:	Zone 1											
	Well ID:	GM-15I	GM-15I	GM-15SR	GM-15SR	GM-17D	GM-17D	GM-17I	GM-17I	GM-17I	GM-18D	GM-18D	GM-18I
	Sample ID:	GM-15I	GM-15I	GM-15SR	GM-15SR	GM-17D	GM-17D	GM-17I	REP042122SV1	GM-17I	GM-18D	GM-18D	GM-18I
	Date:	4/6/2022	10/18/2022	4/6/2022	10/18/2022	4/21/2022	10/11/2022	4/21/2022	4/21/2022	10/11/2022	4/14/2022	10/12/2022	4/14/2022
Volatile Organic Compounds (VOCs) (2)	**NYSDEC SCGs (ug/L)(1)**												
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10 J	< 10	< 10 J	< 10 J	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10 J	< 10	< 10 J	< 10	< 10 J	< 10 J	< 10	< 10	< 10	< 10
Benzene	1	**0.50**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.0**	**0.96**	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**5.8**	< 1.0	< 1.0	< 1.0	**1.9**	< 1.0	**14.5**	**18.6**	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**1.5**	**0.81 J**	**0.87 J**	**0.70 J**	< 1.0	< 1.0	**2.3**	**2.4**	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl chloride	2	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs(3)(4)		**7.8**	**0.81**	**0.87**	**0.7**	**1.9**	ND	**17.8**	**22.0**	ND	ND	ND	ND

Notes and Abbreviations on last page

Table 13
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Proximate to the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents units in ug/L	Zone: / Well ID: / Sample ID: / Date:	Zone 1											
	Well ID:	GM-18I	GM-20D	GM-20I	GM-21D	GM-21I	GM-21S		GM-39DA	GM-74I	GM-74I	GM-78I	GM-79D
	Sample ID:	GM-18I	GM-20D	GM-20I	GM-21D	GM-21I	GM-21S	GM-39DA	GM-39DA	GM-74I	GM-74I	GM-78I	GM-79D
	Date:	10/12/2022	4/19/2022	4/19/2022	4/11/2022	4/11/2022	4/11/2022	4/6/2022	10/10/2022	4/5/2022	10/10/2022	4/12/2022	4/20/2022
Volatile Organic Compounds (VOCs) (2)	**NYSDEC SCGs (ug/L)(1)**												
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10	< 10 J	< 10 J	< 10	< 10	< 10	< 10 J	< 10	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.75**
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0
Bromomethane	5	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0 J
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0 J	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.8**	**8.1**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**1.9 J**	< 1.0	< 1.0	**0.64 J**	**0.55 J**	< 1.0	**1.1**	**1.1**	< 1.0	**0.59 J**	< 1.0	**16.0**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs(3)(4)		**1.9**	ND	ND	**0.64**	**0.55**	ND	**1.1**	**1.1**	ND	**0.59**	**1.8**	**24.9**

Notes and Abbreviations on last page

Table 13
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Proximate to the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Constituents units in ug/L	Zone: Well ID: Sample ID: Date:	Zone 1 GM-79D GM-79D 10/17/2022	 GM-79I GM-79I 4/20/2022	 GM-79I GM-79I 10/17/2022	Zone 2 GM-15D GM-15D 4/6/2022	 GM-15D GM-15D 10/18/2022	 GM-39DB GM-39DB 4/6/2022	 GM-39DB GM-39DB 10/10/2022	 GM-73D GM-73D 4/7/2022	 GM-73D GM-73D 10/6/2022	 GM-74D GM-74D 4/5/2022	 GM-74D GM-74D 10/10/2022	 GM-78D GM-78D 4/12/2022
Volatile Organic Compounds (VOCs) (2)	**NYSDEC SCGs (ug/L)(1)**												
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10 J	< 10 J	< 10	< 10 J	< 10	< 10 J	< 10	< 10	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.68**
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J
Bromomethane	5	< 2.0 J	< 2.0 J	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**11.4**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**11.3**	**2.0**	**2.0**	< 1.0	< 1.0	**16.5**	**25.7**	**42.9**	**24.8**	**2.7**	**2.0**	**1.8**
Vinyl chloride	2	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs(3)(4)		**11.3**	**2.0**	**2.0**	ND	ND	**16.5**	**25.7**	**42.9**	**24.8**	**2.7**	**2.0**	**13.9**

Notes and Abbreviations on last page

Table 13
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Proximate to the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents units in ug/L	Zone:	Zone 2			Zone 3								
	Well ID:	GM-78D	GM-78D2	GM-78D2	GM-15D2	GM-15D2	GM-21D2	GM-21D2	GM-21D2	GM-21D2	GM-33D2	GM-33D2	GM-73D2
	Sample ID:	GM-78D	GM-78D2	GM-78D2	GM-15D2	GM-15D2	GM-21D2	GM-21D2	GM-21D2	GM-21D2	GM-33D2	GM-33D2	GM-73D2
	Date:	10/11/2022	4/13/2022	10/11/2022	4/6/2022	10/18/2022	3/10/2022	4/11/2022	9/23/2022	10/12/2022	4/5/2022	10/5/2022	4/7/2022
Volatile Organic Compounds (VOCs) (2)	**NYSDEC SCGs (ug/L)(1)**												
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**2.3 J**	**2.1 J**	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	**0.70 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10 J
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**136 (5)**	**2.8**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0 J	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0 B	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	**3.2**	**2.3**	< 1.0	< 1.0	**0.64 J**	**0.65 J**	**1.2**	**0.98 J**	**1.3**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.8**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**0.89 J**	**0.77 J**	**0.57 J**	**7.1**	**5.6**	**4.7**	**4.7**	**3.9**	**4.7**	**7.9**	**7.9**	**80.9**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs(3)(4)		**0.89**	**0.77**	**0.57**	**10.3**	**8.6**	**145**	**7.5**	**4.5**	**5.4**	**11.4**	**11.0**	**82.2**

Notes and Abbreviations on last page

Table 13
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Proximate to the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituents units in ug/L	Zone:	Zone 3								
	Well ID:	GM-73D2	GM-73D2	GM-73D3	GM-73D3	GM-74D2	GM-74D2	GM-74D2	GM-74D3	GM-74D3
	Sample ID:	REP040722SV1	GM-73D2	GM-73D3	GM-73D3	GM-74D2	REP040522PQ1	GM-74D2	GM-74D3	GM-74D3
	Date:	4/7/2022	10/6/2022	4/7/2022	10/6/2022	4/5/2022	4/5/2022	10/10/2022	4/7/2022	10/10/2022
Volatile Organic Compounds (VOCs) (2)	**NYSDEC SCGs (ug/L)(1)**									
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0 J	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0 J	< 1.0	< 1.0 J	**0.68 J**	**0.71 J**	**0.89 J**	< 1.0	< 1.0
1,1-Dichloroethene	5	< 1.0	< 1.0 J	< 1.0	< 1.0 J	**0.72 J**	**0.68 J**	**0.87 J**	< 1.0	< 1.0
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10 J	< 10	< 10	< 10	< 10	< 10 J	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**1.9**	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0 J
Carbon Disulfide	50	< 2.0	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.91 J**	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	**0.77 J**	**0.81 J**	**0.86 J**	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0 J
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	**1.2**	**1.7**	**1.3**	**1.6**	**2.8**	**2.7**	**2.5**	**52.5**	**2.6**
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**78.9**	**94.4**	**2.3**	**2.4**	**8.2**	**8.3**	**7.9**	**7.4**	**2.5**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
TVOCs(3)(4)		**80.1**	**96.1**	**3.6**	**4.0**	**13.2**	**13.2**	**13.0**	**62.7**	**5.1**

Notes and Abbreviations on last page

Table 13
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Proximate to the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

Notes and Abbreviations:

(1) Standards, Criteria, and Guidance (SCG) values based on NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

(2) Samples analyzed for the TCL VOCs using USEPA Method 8260C.

(3) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least precision (decimal places), including whole numbers with no decimal place.

(4) Acetone, 2-Butanone (MEK), and Dichloromethane (Methylene Chloride), each of which are recognized lab contaminants and are not included on the list of COCs in Appendix A and therefore, are not included in the total VOC values on this table.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016.)

(5) The elevated concentration of Benzene was isolated to the Q1 2022 sampling event and did not persist as confirmed by the analytical data from Q2 2022, when Benzene was detected at a low concentration of 2.8 ppb. Benzene also was not detected in GM-21D2 in 2021. The primary OU2 site-related constituent, TCE, did not exhibit such short-term variability for GM-21D2.

Bold value indicates a detection.

< 5.0	Compound not detected above its method detection limit
ND	Non-Detect
µg/L	micrograms per Liter
J	Value is estimated concentration
NYSDEC	New York State Department of Environmental Conservation
TCL	Target Compound List
TOGs	Technical and Operational Guidance Series
TVOCs	Total Volatile Organic Compounds (known lab contaminants acetone, 2-butanone, and methylene chloride are not included in calculation of TVOCs).
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
[boxed cell]	Compound detected in exceedance of NYSDEC SCG Criteria
USEPA	United States Environmental Protection Agency

Table 14
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Downgradient of the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

		Near Central					Far Central									
	Zone:	Zone 1		Zone 2	Zone 3		Zone 1	Zone 2				Zone 3				
	Well ID:	GM-37D	N-10624	GM-37D2	GM-75D2	GM-75D2	GM-36D	GM-34D	GM-34D	GM-70D2	GM-71D2	GM-34D2	GM-34D2	GM-35D2	GM-35D2	GM-36D2
Constituents units	Sample ID:	GM-37D	N-10624	GM-37D2	GM-75D2	GM-75D2	GM-36D	GM-34D	GM-34D	GM-70D2	GM-71D2	GM-34D2	GM-34D2	GM-35D2	GM-35D2	GM-36D2
in ug/L	Date:	4/19/2022	4/20/2022	4/18/2022	4/5/2022	10/5/2022	4/18/2022	4/20/2022	10/17/2022	4/19/2022	4/19/2022	4/20/2022	10/17/2022	4/7/2022	10/12/2022	4/18/2022
Volatile Organic Compounds (VOCs)[2]	**NYSDEC SCGs (ug/L) [1]**															
1,1,1-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.75 J**	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	**0.63 J**	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
1,1,2-Trichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**1.1**	< 1.0	< 1.0	< 1.0	< 1.0	**0.70 J**
1,1-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.85 J**	< 1.0	< 1.0	< 1.0	< 1.0	**0.72 J**
1,2-Dichloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
2-Butanone (MEK)	50	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
4-Methyl-2-Pentanone	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Acetone	50	< 10 J	< 10	< 10	< 10	< 10	< 10	< 10	< 10 J	< 10 J	< 10 J	< 10	< 10 J	< 10 J	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**2.5**	**2.2**	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromoform	50	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	5	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0 J	< 2.0 J	< 2.0	< 2.0	< 2.0 J	< 2.0 J	< 2.0	< 2.0 J	< 2.0
Carbon Disulfide	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Carbon Tetrachloride	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chlorodibromomethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0 J	< 1.0
Chloroform	7	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0
cis-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**3.3 J**	**2.4**	< 1.0	< 1.0	**1.0**	**0.99 J**	< 1.0	< 1.0	< 1.0
cis-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dichloromethane	5	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Ethylbenzene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
m&p-Xylenes	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
o-Xylene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Styrene (Monomer)	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**4.6 J**	**5.6**	**2.1**	< 1.0	**2.4**	**0.92 J**	**4.2**	**3.8**	< 1.0
Toluene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	5	**21.8**	< 1.0	**0.74 J**	**15.4**	**13.0**	< 1.0	**85.1 J**	**77.5**	**5.5**	**9.3**	**16.7**	**13.4**	**28.9**	**30.8**	**3.0**
Vinyl chloride	2	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0	< 1.0 J	< 1.0	< 1.0	< 1.0
TVOCs[3][4]		**21.8**	ND	**0.74**	**15.4**	**13.0**	ND	**93.0**	**86.1**	**7.6**	**12.0**	**22.6**	**17.5**	**33.1**	**34.6**	**4.0**

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Table 14
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Downgradient of the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

		Former Outpost Wells													
	Zone:	Zone 1		Zone 2											
	Well ID:	BPOW 1-1	BPOW 1-1	BPOW 1-2	BPOW 1-2	BPOW 1-3	BPOW 1-3	BPOW 1-4	BPOW 1-4	BPOW 2-1	BPOW 2-1	BPOW 2-1	BPOW 2-1	BPOW 2-2	BPOW 2-2
Constituents units	Sample ID:	BPOW 1-1	BPOW 1-1	BPOW 1-2	BPOW 1-2	BPOW 1-3	BPOW 1-3	BPOW 1-4	BPOW 1-4	BPOW 2-1	BPOW 2-1	BPOW 2-1	BPOW 2-1	BPOW 2-2	BPOW 2-2
in ug/L	Date:	5/9/2022	11/7/2022	5/9/2022	11/7/2022	5/9/2022	11/7/2022	5/9/2022	10/5/2022	3/9/2022	5/10/2022	9/21/2022	11/9/2022	3/9/2022	5/10/2022
Volatile Organic Compounds (VOCs)[(2)]	**NYSDEC SCGs (ug/L) [(1)]**														
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (MEK)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Acetone	50	< 5.0	< 5.0 J	< 5.0	< 5.0 J	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromoform	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon Disulfide	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon Tetrachloride	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorodibromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dichloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
o-Xylene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene (Monomer)	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	5	**0.46 J**	**0.81**	**0.51**	**0.57**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
TVOCs[(3)(4)]		**0.46**	**0.81**	**0.51**	**0.57**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes and Abbreviations on last page

Table 14
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Downgradient of the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

		Former Outpost Wells														
	Zone:					Zone 3										
	Well ID:	BPOW 2-2	BPOW 2-2	BPOW 3-1	BPOW 3-1	BPOW 1-5	BPOW 1-5	BPOW 2-3	BPOW 2-3	BPOW 2-3	BPOW 2-3	BPOW 2-3	BPOW 3-2	BPOW 3-2	BPOW 3-3	BPOW 3-3
Constituents units	Sample ID:	BPOW 2-2	BPOW 2-2	BPOW 3-1	BPOW 3-1	BPOW 1-5	BPOW 1-5	BPOW 2-3	BPOW 2-3	BPOW 2-3	BPOW 2-3	REP092122LW1	BPOW 3-2	BPOW 3-2	BPOW 3-3	BPOW 3-3
in ug/L	Date:	9/21/2022	11/9/2022	5/10/2022	11/9/2022	5/9/2022	10/5/2022	3/9/2022	5/10/2022	9/21/2022	11/9/2022	9/21/2022	5/10/2022	11/9/2022	5/5/2022	11/14/2022
Volatile Organic Compounds (VOCs)[2]	**NYSDEC SCGs (ug/L) [1]**															
1,1,1-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J
1,1,2-trichloro-1,2,2-trifluoroethane	5	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	**0.48 J**	**0.49 J**
1,1,2-Trichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J
1,1-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,1-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
1,2-Dichloropropane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
2-Butanone (MEK)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
4-Methyl-2-Pentanone	50	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J
Acetone	50	< 5.0	< 5.0	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromoform	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon Disulfide	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Carbon Tetrachloride	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorobenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chlorodibromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloroform	7	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Chloromethane	5	< 0.50	< 0.50 J	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50 J	< 0.50	< 0.50 J
cis-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Dichloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Ethylbenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
m&p-Xylenes	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J
o-Xylene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Styrene (Monomer)	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Toluene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Trichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Vinyl chloride	2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
TVOCs[3][4]		ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**0.48**	**0.49**

Notes and Abbreviations on last page

Table 14
Summary of Volatile Organic Compound Concentrations in Groundwater for 2022
Downgradient of the ONCT System
Operable Unit 2
Northrop Grumman
Bethpage, New York

		Former Outpost Wells										GM-38 Area	
	Zone:							Zone 4				Zone 2	
	Well ID:	BPOW 3-4	BPOW 3-4	BPOW 3-4	BPOW 4-1R	BPOW 4-1R	BPOW 4-1R	BPOW 1-6	BPOW 1-6	BPOW 4-2R	BPOW 4-2R	GM-38D2	GM-38D2
Constituents units	Sample ID:	BPOW 3-4	BPOW 3-4	REP111422PQ1	BPOW 4-1R	BPOW 4-1R	REP050522SV1	BPOW 1-6	BPOW 1-6	BPOW 4-2R	BPOW 4-2R	GM-38D2	GM-38D2
in ug/L	Date:	5/5/2022	11/14/2022	11/14/2022	5/5/2022	11/14/2022	5/5/2022	5/9/2022	10/5/2022	5/5/2022	11/14/2022	4/21/2022	10/11/2022
Volatile Organic Compounds (VOCs)(2)	**NYSDEC SCGs (ug/L) (1)**												
1,1,1-Trichloroethane	5	**0.34 J**	**0.39 J**	**0.45 J**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.70 J**	**0.76 J**
1,1,2,2-Tetrachloroethane	5	< 0.50	< 0.50 J	< 0.50 J	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 1.0	< 1.0
1,1,2-trichloro-1,2,2-trifluoroethane	5	**3.7**	**3.7**	**4.3**	**30.2**	**45.9**	**35.8**	< 1.0	< 1.0	**1.4**	**27.0**	< 5.0	< 5.0
1,1,2-Trichloroethane	5	**1.1**	**1.3 J**	**1.3 J**	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 1.0	< 1.0
1,1-Dichloroethane	5	**0.64**	**0.91**	**0.98**	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**3.4**	**3.7**
1,1-Dichloroethene	5	**5.2**	**5.6**	**6.3**	**0.70**	**1.2**	**0.87**	< 0.50	< 0.50	< 0.50	**0.76**	**1.5**	**1.5**
1,2-Dichloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
1,2-Dichloropropane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
2-Butanone (MEK)	50	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 10	< 10
4-Methyl-2-Pentanone	50	< 2.0	< 2.0 J	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 5.0	< 5.0
Acetone	50	< 5.0	< 5.0 J	< 5.0 J	< 5.0	< 5.0 J	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0 J	< 10	< 10
Benzene	1	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Bromodichloromethane	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Bromoform	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Bromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0
Carbon Disulfide	50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0 J
Carbon Tetrachloride	5	**1.0**	**0.89**	**1.0**	< 0.50	**0.38 J**	**0.30 J**	< 0.50	< 0.50	< 0.50	**0.25 J**	< 1.0	< 1.0
Chlorobenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chlorodibromomethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chloroethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chloroform	7	**1.2**	< 1.5 B	< 1.5 B	**0.18 J**	< 0.50 B	**0.23 J**	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Chloromethane	5	< 0.50	< 0.50 J	< 0.50 J	< 0.50	< 0.50 J	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50 J	< 1.0 J	< 1.0
cis-1,2-Dichloroethene	5	**2.0**	**2.1**	**2.2**	**0.22 J**	**0.46 J**	**0.30 J**	< 0.50	< 0.50	< 0.50	**0.27 J**	**0.71 J**	**0.66 J**
cis-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Dichloromethane	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 2.0	< 2.0
Ethylbenzene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
m&p-Xylenes	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Methyl N-Butyl Ketone (2-Hexanone)	50	< 2.0	< 2.0 J	< 2.0 J	< 2.0	< 2.0 J	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0 J	< 5.0	< 5.0
o-Xylene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Styrene (Monomer)	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Tetrachloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	**0.85**	< 1.0	< 1.0
Toluene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
trans-1,2-Dichloroethene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
trans-1,3-Dichloropropene	5	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
Trichloroethene	5	**150 D**	**181 D**	**178**	**1.2**	**2.3**	**1.7**	< 0.50	< 0.50	**0.33 J**	**3.5**	**45.1**	**53.0**
Vinyl chloride	2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 1.0	< 1.0
TVOCs(3)(4)		**165**	**196**	**195**	**32.5**	**50.2**	**39.2**	ND	ND	**1.7**	**33.0**	**51.4**	**60.0**

Notes and Abbreviations on last page

Notes and Abbreviations:

(1) Standards, Criteria, and Guidance (SCG) values based on NYSDEC TOGs (NYSDEC 1998); most stringent values are listed.

(2) Samples were analyzed using USEPA Method 8260C.

(3) TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least precision (decimal places), including whole numbers with no decimal place.

(4) Acetone, 2-Butanone (MEK), and Dichloromethane (Methylene Chloride), each of which are recognized lab contaminants and are not included on the list of COCs in Appendix A and therefore, are not included in the total VOC values on this table.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Bold value indicates a detection.

< 5.0	Compound not detected above its method detection limit
ND	Non-Detect
µg/L	micrograms per liter
D	Concentration is based on a diluted sample analysis
J	Value is estimated concentration.
NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2
REP	Blind duplicate sample
TOGs	Technical and Operational Guidance Series
TVOCs	Total Volatile Organic Compounds (known lab contaminants acetone, 2-butanone, and methylene chloride are not included in calculation of TVOCs)
VOCs	Volatile Organic Compounds
[boxed cell]	Compound detected in exceedance of NYSDEC SCG Criteria
USEPA	United States Environmental Protection Agency

Table 15
Summary of Metals Concentrations in Groundwater for 2022
Proximate to Former Northrop Grumman Plants 1 and 2
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituent (units in ug/L)	Location	Plant 1							
	Well ID:	GM-15SR	GM-15SR	PLT1 MW-04	PLT1 MW-04	PLT1 MW-05	PLT1 MW-05	PLT1 MW-06	PLT1 MW-06
	Sample ID:	GM-15SR	GM-15SR	PLT1 MW-04	PLT1 MW-04	PLT1 MW-05	PLT1 MW-05	PLT1 MW-06	PLT1 MW-06
	Sample Date:	4/6/2022	10/18/2022	4/13/2022	10/13/2022	4/13/2022	10/13/2022	4/13/2022	10/13/2022
	NYSDEC SCGs (ug/L)[(1)]								
Cadmium (Total)	5	--	--	--	--	--	--	--	--
Cadmium (Dissolved)	5	--	--	--	--	--	--	--	--
Chromium (Total)	50	**128**	**439**	< 10	< 10	**258**	**302**	**157**	**172**
Chromium (Dissolved)	50	**126**	**437**	< 10	< 10	**258**	**309**	**156**	**170**

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Table 15
Summary of Metals Concentrations in Groundwater for 2022
Proximate to Former Northrop Grumman Plants 1 and 2
Operable Unit 2
Northrop Grumman
Bethpage, New York

Constituent (units in ug/L)	Location	Plant 2							
	Well ID:	GM-78I	GM-78S	GM-78S	MW-01GF	MW-01GF	MW-02GF	MW-02GF	MW-02GF
	Sample ID:	GM-78I	GM-78S	REP041222PQ1	MW-01GF	MW-01GF	MW-02GF	MW-02GF	REP101322ARH
	Sample Date:	4/12/2022	4/12/2022	4/12/2022	4/13/2022	10/13/2022	4/13/2022	10/13/2022	10/13/2022
	NYSDEC SCGs (ug/L)[1]								
Cadmium (Total)	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Cadmium (Dissolved)	5	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0	< 3.0
Chromium (Total)	50	< 10	< 10	< 10	< 10	< 10	**293**	**269**	**268**
Chromium (Dissolved)	50	< 10	< 10	< 10	< 10	< 10	**290**	**272**	**268**

Notes and Abbreviations on last page

Notes and Abbreviations:

(1) Standards, Criteria, and Guidance (SCG) values based on documents referenced in the Groundwater Feasibility Study Report (ARCADIS Geraghty & Miller, Inc. 2000) that are based on the NYSDEC TOGs (NYSDEC 1998); most stringent values listed.

(2) Well N-10631 was observed to be filled with approximately 22 feet of sediment in July 2021 and therefore was not sampled in 2022.

Samples analyzed for total unfiltered and filtered Cadium and Chromium using USEPA Method 6010C; Total indicates unfiltered sample and Dissolved indicates filtered sample.

Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Bold value indicates a detection

--	Not analyzed
< 3.0	Compound not detected above its laboratory quantification limit
µg/L	Micrograms per liter
NYSDEC	New York State Department of Environmental Conservation
OU2	Operable Unit 2
REP	Blind Duplicate Sample
TOGs	Technical Operational and Guidance Series
USEPA	United States Environmental Protection Agency
[boxed cell]	Compound detected in exceedance of NYSDEC SCG Criteria

Table 16
Summary of 1,4-Dioxane Concentrations in Groundwater for 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well ID	Sample ID	Sample Date	1,4-Dioxane (µg/L)
Zone 1			
BPOW 1-1	BPOW 1-1	5/9/2022	< 0.200
BPOW 1-1	BPOW 1-1	11/7/2022	< 0.200
FW-03	FW-03	4/14/2022	< 0.24
FW-03	REP041422SV1	4/14/2022	< 0.25
GM-13D	GM-13D	4/18/2022	**4.6**
GM-15I	GM-15I	4/6/2022	**0.54**
GM-15I	GM-15I	10/18/2022	**0.26**
GM-15SR	GM-15SR	4/6/2022	**0.42**
GM-15SR	GM-15SR	10/18/2022	**0.41**
GM-17D	GM-17D	4/21/2022	**6.7**
GM-17D	GM-17D	10/11/2022	**6.0**
GM-17I	GM-17I	4/21/2022	**6.1 J**
GM-17I	REP042122SV1	4/21/2022	**3.9 J**
GM-17I	GM-17I	10/11/2022	**5.5**
GM-18D	GM-18D	4/14/2022	**7.3**
GM-18D	GM-18D	10/12/2022	**8.5**
GM-18I	GM-18I	4/14/2022	**7.0**
GM-18I	GM-18I	10/12/2022	**7.1**
GM-20D	GM-20D	4/19/2022	**6.0 J**
GM-20I	GM-20I	4/19/2022	**7.0 J**
GM-21D	GM-21D	4/11/2022	**3.9**
GM-21I	GM-21I	4/11/2022	**3.3**
GM-21S	GM-21S	4/11/2022	**4.4**
GM-36D	GM-36D	4/18/2022	**1.6**
GM-37D	GM-37D	4/19/2022	**0.61 J**
GM-39DA	GM-39DA	4/6/2022	**4.3 J**
GM-39DA	GM-39DA	10/10/2022	**3.7**
GM-74I	GM-74I	4/5/2022	**5.8**
GM-74I	GM-74I	10/10/2022	**5.3**
GM-78I	GM-78I	4/12/2022	**0.66 J**
GM-78S	GM-78S	4/12/2022	**1.7**
GM-78S	REP041222PQ1	4/12/2022	**1.3**
GM-79D	GM-79D	4/20/2022	**6.1 J**
GM-79D	GM-79D	10/17/2022	**3.9**
GM-79I	GM-79I	5/4/2022	**3.6**
GM-79I	GM-79I	10/17/2022	**3.6**
HN-24I	HN-24I	4/11/2022	**0.81**
HN-40I	HN-40I	4/13/2022	**0.33**
HN-40S	HN-40S	4/13/2022	< 0.24
HN-42I	HN-42I	4/12/2022	**0.28**

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Table 16
Summary of 1,4-Dioxane Concentrations in Groundwater for 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well ID	Sample ID	Sample Date	1,4-Dioxane (µg/L)
Zone 1 (cont'd)			
HN-42S	HN-42S	4/12/2022	< 0.23
MW-01GF	MW-01GF	4/13/2022	**4.7**
MW-01GF	MW-01GF	10/13/2022	**6.4**
MW-02GF	MW-02GF	4/13/2022	**6.4**
MW-02GF	MW-02GF	10/13/2022	**5.3**
MW-02GF	REP101322ARH	10/13/2022	**4.9**
N-10624	N-10624	4/20/2022	**2.0 J**
N-10627	N-10627	4/20/2022	**4.6 J**
PLT1 MW-04	PLT1 MW-04	4/13/2022	**1.6**
PLT1 MW-04	PLT1 MW-04	10/13/2022	**1.8**
PLT1 MW-05	PLT1 MW-05	4/13/2022	**0.62**
PLT1 MW-05	PLT1 MW-05	10/13/2022	**0.66**
PLT1 MW-06	PLT1 MW-06	4/13/2022	**0.15 J**
PLT1 MW-06	PLT1 MW-06	10/13/2022	**0.99**
Zone 2			
BPOW 1-2	BPOW 1-2	5/9/2022	< 0.200
BPOW 1-2	BPOW 1-2	11/7/2022	< 0.200
BPOW 1-3	BPOW 1-3	5/9/2022	**0.111 J**
BPOW 1-3	BPOW 1-3	11/7/2022	< 0.200
BPOW 1-4	BPOW 1-4	5/9/2022	**0.236**
BPOW 2-1	BPOW 2-1	3/9/2022	**0.864**
BPOW 2-1	BPOW 2-1	5/10/2022	**0.966**
BPOW 2-1	BPOW 2-1	9/21/2022	**1.85 J**
BPOW 2-1	BPOW 2-1	11/9/2022	**0.586**
BPOW 2-2	BPOW 2-2	3/9/2022	**0.741**
BPOW 2-2	BPOW 2-2	5/10/2022	**0.679**
BPOW 2-2	BPOW 2-2	9/21/2022	**0.545 J**
BPOW 2-2	BPOW 2-2	11/9/2022	**0.595**
BPOW 3-1	BPOW 3-1	5/10/2022	**0.713**
BPOW 3-1	BPOW 3-1	11/9/2022	**0.634**
GM-15D	GM-15D	4/6/2022	< 0.24
GM-15D	GM-15D	10/18/2022	< 0.24
GM-34D	GM-34D	4/20/2022	**9.4 J**
GM-34D	GM-34D	10/17/2022	**6.6 J**
GM-37D2	GM-37D2	4/18/2022	**0.40**
GM-38D	GM-38D	4/21/2022	**4.6 J**
GM-38D	GM-38D	10/11/2022	**3.4**
GM-38D	REP101122ARH1	10/11/2022	**4.0**
GM-38D2	GM-38D2	4/21/2022	**1.8**
GM-38D2	GM-38D2	10/11/2022	**2.6**
GM-39DB	GM-39DB	4/6/2022	**2.2**

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Table 16
Summary of 1,4-Dioxane Concentrations in Groundwater for 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well ID	Sample ID	Sample Date	1,4-Dioxane (µg/L)
Zone 2 (cont'd)			
GM-39DB	GM-39DB	10/10/2022	**2.0**
GM-70D2	GM-70D2	4/19/2022	**4.8 J**
GM-71D2	GM-71D2	4/19/2022	**5.2 J**
GM-73D	GM-73D	4/7/2022	**0.46 J**
GM-73D	GM-73D	10/6/2022	**1.1 J**
GM-74D	GM-74D	4/5/2022	**5.3**
GM-74D	GM-74D	10/10/2022	**4.3**
GM-78D	GM-78D	4/12/2022	**8.7**
GM-78D	GM-78D	10/11/2022	**9.2**
GM-78D2	GM-78D2	4/13/2022	**10**
GM-78D2	GM-78D2	10/11/2022	**13**
MW-3-1	MW-3-1	4/19/2022	**4.3 J**
MW-3-1	MW-3-1	10/12/2022	**16 J**
Zone 3			
BPOW 1-5	BPOW 1-5	5/9/2022	< 0.200
BPOW 2-3	BPOW 2-3	3/9/2022	**3.29**
BPOW 2-3	BPOW 2-3	5/10/2022	**4.40**
BPOW 2-3	BPOW 2-3	9/21/2022	**4.50 J**
BPOW 2-3	REP092122LW1	9/21/2022	**4.52 J**
BPOW 2-3	BPOW 2-3	11/9/2022	**3.39**
BPOW 3-2	BPOW 3-2	5/10/2022	**1.46**
BPOW 3-2	BPOW 3-2	11/9/2022	**2.41**
BPOW 3-3	BPOW 3-3	5/5/2022	**9.09**
BPOW 3-3	BPOW 3-3	11/14/2022	**8.47**
BPOW 3-4	BPOW 3-4	5/5/2022	**7.91**
BPOW 3-4	BPOW 3-4	11/14/2022	**9.66**
BPOW 3-4	REP111422PQ1	11/14/2022	**9.83**
BPOW 4-1R	BPOW 4-1R	5/5/2022	**4.08**
BPOW 4-1R	REP050522SV1	5/5/2022	**3.65**
BPOW 4-1R	BPOW 4-1R	11/14/2022	**3.83 J**
GM-15D2	GM-15D2	4/6/2022	**3.3**
GM-15D2	GM-15D2	10/18/2022	**2.3**
GM-21D2	GM-21D2	3/10/2022	**4.4**
GM-21D2	GM-21D2	4/11/2022	**4.9**
GM-21D2	GM-21D2	9/23/2022	**5.7**
GM-21D2	GM-21D2	10/12/2022	**4.4**
GM-33D2	GM-33D2	4/5/2022	**9.0**
GM-33D2	GM-33D2	10/5/2022	**9.6**
GM-34D2	GM-34D2	4/20/2022	**5.2 J**
GM-34D2	GM-34D2	10/17/2022	**6.1**
GM-35D2	GM-35D2	4/7/2022	**4.7**

Notes and Abbreviations on last page

Table 16
Summary of 1,4-Dioxane Concentrations in Groundwater for 2022
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Well ID	Sample ID	Sample Date	1,4-Dioxane (µg/L)
Zone 3 (cont'd)			
GM-35D2	GM-35D2	10/12/2022	**7.9**
GM-73D2	GM-73D2	4/7/2022	**1.1**
GM-73D2	REP040722SV1	4/7/2022	**0.94**
GM-73D2	GM-73D2	10/6/2022	**1.4 J**
GM-73D3	GM-73D3	4/7/2022	**0.59**
GM-73D3	GM-73D3	10/6/2022	**0.99 J**
GM-74D2	GM-74D2	4/5/2022	**2.3**
GM-74D2	REP040522PQ1	4/5/2022	**2.1**
GM-74D2	GM-74D2	10/10/2022	**2.5**
GM-74D3	GM-74D3	4/7/2022	**0.92**
GM-74D3	GM-74D3	10/10/2022	**0.74**
GM-75D2	GM-75D2	4/5/2022	**5.6**
GM-75D2	GM-75D2	10/5/2022	**5.7**
WELL 1	WELL 1	2/16/2022	**6.8**
WELL 1	WELL 1	5/17/2022	**6.6**
WELL 1	WELL 1	8/18/2022	**6**
WELL 1	WELL 1	11/22/2022	**6.2**
Well 3R	Well 3R	2/16/2022	**6.6**
Well 3R	REP-021622-KC-1	2/16/2022	**6.9**
WELL 3R	WELL 3R	5/17/2022	**8.7**
WELL 3R	RE-051722-KC-1	5/17/2022	**9.2**
Well 3R	REP-051722-KC-1	5/17/2022	**9.2**
WELL 3R	WELL 3R	8/18/2022	**7.2**
WELL 3R	WELL 3R	11/22/2022	**9.5**
WELL 17	WELL 17	2/16/2022	**3.6**
WELL 17	WELL 17	5/17/2022	**5.5**
WELL 17	WELL 17	8/18/2022	**6.5**
WELL 17	WELL 17	11/22/2022	**7.1**
WELL 18	WELL 18	2/16/2022	**2.4**
WELL 18	WELL 18	5/17/2022	**4.2**
WELL 18	WELL 18	8/18/2022	**3.8**
Well 18	REP-081822-KC-1	8/18/2022	**4.4**
WELL 18	WELL 18	11/22/2022	**3.8**
WELL 19	WELL 19	2/16/2022	**2.4**
WELL 19	WELL 19	5/17/2022	**3.5**
WELL 19	WELL 19	8/18/2022	**3.6**
WELL 19	WELL 19	11/22/2022	**2.9**
Zone 4			
BPOW 1-6	BPOW 1-6	5/9/2022	< 0.200
BPOW 4-2R	BPOW 4-2R	5/5/2022	**2.43**
BPOW 4-2R	BPOW 4-2R	11/14/2022	**2.21**

Notes and Abbreviations on last page

Notes and Abbreviations:

Results are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).

Samples were analyzed for 1,4-Dioxane using USEPA Method 8270D SIM, except for outpost wells (BPOW designation in Well ID) which were analyzed using USEPA Method 522.

Bold value indicates constituent detected.

< 0.20	Compound not detected above its laboratory quantification limit
µg/L	micrograms per liter
J	Value is estimated concentration
OU2	Operable Unit 2
SIM	Selective Ion Monitoring
USEPA	United States Environmental Protection Agency

Table 17
Percent Change in Total Volatile Organic Compounds Over Time
in Monitoring and Remedial Wells
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Well ID	Highest Historical TVOC Concentration		Current TVOC Concentration		Percent Change From Highest Historical or Initial TVOC Concentration
	Date	µg/L	Date	µg/L	
Upgradient From OU2 ONCT System (Zone 1)					
FW-03	1/3/2002	64.9	4/14/2022	3.79	**-94.2%**
GM-13D	**3/23/2000**	**2,401**	4/18/2022	**27.8**	**-98.8%**
HN-24I	**12/1/1991**	**58,034**	4/11/2022	**23.7**	**-100.0%**
HN-40I	12/22/2003	53.3	4/13/2022	3.0	-94.4%
HN-40S	3/17/2006	8.0	4/13/2022	2.40	-70.0%
HN-42I	7/8/2009	27.4	4/12/2022	5.64	-79.4%
HN-42S	3/18/2003	5.0	4/12/2022	ND	-100.0%
Zone 2					
MW-3-1	3/28/2012	1,620	10/29/2021	122	-92.5%
Average Upgradient:	--	7,777	--	26.8	-99.7%
Proximate to OU2 ONCT System (Zone 1)					
GM-15SR	6/28/2017	11.1	10/18/2022	0.7	-93.7%
GM-15I	2/24/2010	38.2	10/18/2022	0.8	-97.9%
GM-17D	12/27/2001	3.0	10/11/2022	ND	-100.0%
GM-17I	3/28/2003	2.5	10/11/2022	ND	-100.0%
GM-18D	4/11/2006	12.9	10/12/2022	ND	-100.0%
GM-18I	10/29/1991	14.0	10/12/2022	1.90	-86.4%
GM-20D	6/28/2018	50.2	4/19/2022	ND	-100.0%
GM-20I	6/5/2001	899	4/19/2022	ND	-100.0%
GM-21D	9/10/2019	8.0	4/11/2022	0.64	-92.0%
GM-21I	10/23/1991	17.0	4/11/2022	0.55	-96.8%
GM-21S	10/22/1991	7.0	4/11/2022	ND	-100.0%
GM-39DA	3/23/2004	42.0	10/10/2022	1.1	-97.4%
GM-74I	**12/9/2013**	**1.4**	10/10/2022	**0.59**	**-56.9%**
GM-78I	1/9/2002	7.0	4/12/2022	1.8	-74.3%
GM-78S	**6/18/2002**	**8.8**	**4/12/2022**	**0.7**	**-92.6%**
GM-79D	**4/7/2003**	**116**	**10/17/2022**	**11.3**	**-90.2%**
GM-79I	2/14/2012	31.4	10/17/2022	2.0	-93.6%
Zone 2					
RE123D1	**9/29/2015**	**22.1**	**8/19/2022**	**ND**	**-100.0%**
GM-15D	10/8/2001	39.9	10/18/2022	ND	-100.0%
GM-39DB	1/7/2003	111	10/10/2022	25.7	-76.8%
GM-73D	10/18/2002	780	10/6/2022	24.8	-96.8%
GM-74D	**2/5/2001**	**87.0**	**10/10/2022**	**2.0**	**-97.7%**
GM-78D	4/26/2013	4.8	11/17/2021	0.54	-88.7%
GM-78D2	5/4/2017	1.6	11/2/2021	0.88	-45.0%
Zone 3					
RE123D2	**3/9/2017**	**9.7**	**8/19/2022**	**4.95**	**-49.0%**
GM-15D2	3/21/2003	36.5	10/18/2022	8.6	-76.4%
GM-21D2	**2/11/2016**	**278**	**10/12/2022**	**5.4**	**-98.1%**
GM-33D2	**11/2/1994**	**16,000**	**10/5/2022**	**11.0**	**-99.9%**
GM-73D2	**11/22/2002**	**1,204**	**10/6/2022**	**96.1**	**-92.0%**
GM-73D3	10/8/2019	3.3	10/6/2022	4.0	21.2%
GM-74D2	**3/20/2006**	**25.4**	**10/10/2022**	**13.0**	**-48.7%**
GM-74D3	**6/13/2015**	**11.5**	**10/10/2022**	**5.1**	**-55.6%**
Zone 4					
RE123D3	**3/9/2017**	**0.95**	**8/19/2022**	**15.2**	**1500.0%**
Average Proximate:	**--**	603	**--**	9.6	-98.4%

Notes and Abbreviations on last page

Table 17
Percent Change in Total Volatile Organic Compounds Over Time
in Monitoring and Remedial Wells
Operable Unit 2
Northrop Grumman
Bethpage, New York

ARCADIS

Well ID	Highest Historical TVOC Concentration		Current TVOC Concentration		Percent Change From Highest Historical or Initial
	Date	µg/L	Date	µg/L	
Near Central Downgradient of OU2 ONCT System (Zone 1)					
GM-37D	**9/7/1999**	**41.0**	**4/19/2022**	**21.8**	**-46.8%**
N-10624	3/31/2004	3.0	4/20/2022	ND	-100.0%
Zone 2					
GM-37D2	7/13/2000	29.0	4/18/2022	0.74	-97.4%
Zone 3					
GM-75D2	**10/3/2002**	**1,566**	**10/5/2022**	**13**	**-99.2%**
RE109D1	**12/19/2018**	**31.2**	**11/1/2022**	**11.5**	**-63.2%**
RE109D2	**9/17/2019**	**53.8**	**11/1/2022**	**26.91**	**-50.0%**
RE109D3	**9/17/2019**	**91.0**	**11/1/2022**	**31.59**	**-65.3%**
RE126D1	**12/7/2017**	**87.5**	**8/17/2022**	**24.81**	**-71.6%**
RE126D2	**6/22/2021**	**575.0**	**8/17/2022**	**312.94**	**-45.6%**
RE126D3	**3/10/2017**	**19.8**	**8/17/2022**	**2.7**	**-86.4%**
Average Near:	--	227	--	46.1	-79.7%
Far Central Downgradient of OU2 ONCT System (Zone 1)					
GM-36D	8/23/1993	255	4/18/2022	ND	-100.0%
Zone 2					
GM-34D	11/30/2006	1,172	10/17/2022	86.13	-92.7%
GM-36D2	**6/26/2018**	**5.3**	**4/18/2022**	**4.4**	**-16.4%**
GM-70D2	**12/16/1996**	**314**	**4/19/2022**	**7.6**	**-97.6%**
GM-71D2	**4/12/2016**	**26.5**	**4/19/2022**	**12.0**	**-54.7%**
Zone 3					
GM-34D2	**6/9/2005**	**415**	**10/17/2022**	**17.51**	**-95.8%**
GM-35D2	**10/3/2002**	**455**	**10/12/2022**	**34.6**	**-92.4%**
RE108D1	**9/24/2014**	**143.87**	**8/18/2022**	**34.55**	**-76.0%**
RE108D2	**3/12/2014**	**4,653**	**8/18/2022**	**2300**	**-50.6%**
RE122D1	**9/9/2019**	**765**	**8/18/2022**	**234.4**	**-69.3%**
RE122D2	**9/9/2019**	**6,343**	**8/18/2022**	**4128.2**	**-34.9%**
Zone 4					
RE122D3	**3/13/2017**	**15.50**	**8/18/2022**	**1.50**	**-90.3%**
Average Far:	--	1,214	--	623.7	-48.6%
GM-38 Area Downgradient of OU2 ONCT System (Zone 2)					
GM-38D	**12/11/1996**	**1,622**	**10/11/2022**	**116**	**-92.8%**
GM-38D2	**7/1/2002**	**2,012**	**10/11/2022**	**32.6**	**-98.4%**
Average GM-38 Area:	--	1,817	--	74.4	-95.9%
Plume Monitoring (Former Outpost) Wells Downgradient of OU2 ONCT System (Zone 1)					
BPOW 1-1	**4/30/2004**	**30.2**	**11/7/2022**	**0.81**	**-97.3%**
Zone 2					
BPOW 1-2	**6/7/2016**	**1.6**	**11/7/2022**	**0.57**	**-65.4%**
BPOW 1-3	6/18/2007	16.0	11/7/2022	ND	-100.0%
BPOW 1-4	11/8/2017	0.2	10/5/2022	ND	-100.0%
BPOW 2-1	6/19/2007	230	11/9/2022	ND	-100.0%
BPOW 2-2	1/17/2006	2.6	11/9/2022	ND	-100.0%
BPOW 3-1	6/4/2019	0.2	11/9/2022	ND	-100.0%
Zone 3					
BPOW 1-5	8/10/2011	0.00	44872	0.00	NA
BPOW 2-3	12/22/2011	0.6	11/9/2022	ND	-100.0%
BPOW 3-2	10/21/2003	0.3	11/9/2022	ND	-100.0%
BPOW 3-3	**8/11/2011**	**0.0**	**11/14/2022**	**0.5**	**NA**
BPOW 3-4	**8/11/2011**	**43.5**	**11/14/2022**	**196**	**350.1%**
BPOW 4-1R	**12/30/2014**	**8.8**	**11/14/2022**	**50.2**	**468.3%**

Notes and Abbreviations on last page

Table 17
Percent Change in Total Volatile Organic Compounds Over Time
in Monitoring and Remedial Wells
Operable Unit 2
Northrop Grumman
Bethpage, New York

Well ID	Highest Historical TVOC Concentration		Current TVOC Concentration		Percent Change From Highest Historical or Initial
	Date	µg/L	Date	µg/L	
Zone 4					
BPOW 1-6	11/29/2016	0.1	10/5/2022	ND	-100.0%
BPOW 4-2R	**12/30/2014**	**11.7**	**11/14/2022**	**32.6**	**178.2%**
Average Plume Monitoring Wells:	--	23.0	--	40.1	74.0%
ONCT Remedial Wells (Zone 2)					
Well 3R	**12/13/2017**	**647**	**11/22/2022**	**211**	**-67.4%**
Zone 3					
Well 1	**3/17/1989**	**14,362**	**11/22/2022**	**566**	**-96.1%**
Well 17	**3/5/1998**	**7,200**	**11/22/2022**	**141**	**-98.0%**
Well 18	**10/16/2000**	**221**	**11/22/2022**	**46.0**	**-79.2%**
Well 19	**2/27/2012**	**237**	**11/22/2022**	**81**	**-65.9%**
Average ONCT Wells:	--	4,533	--	209	-95.4%

Notes and Abbreviations:

Yellow color indicates % increase from initial concentration.
Green color indicates % decrease from historical high concentration.

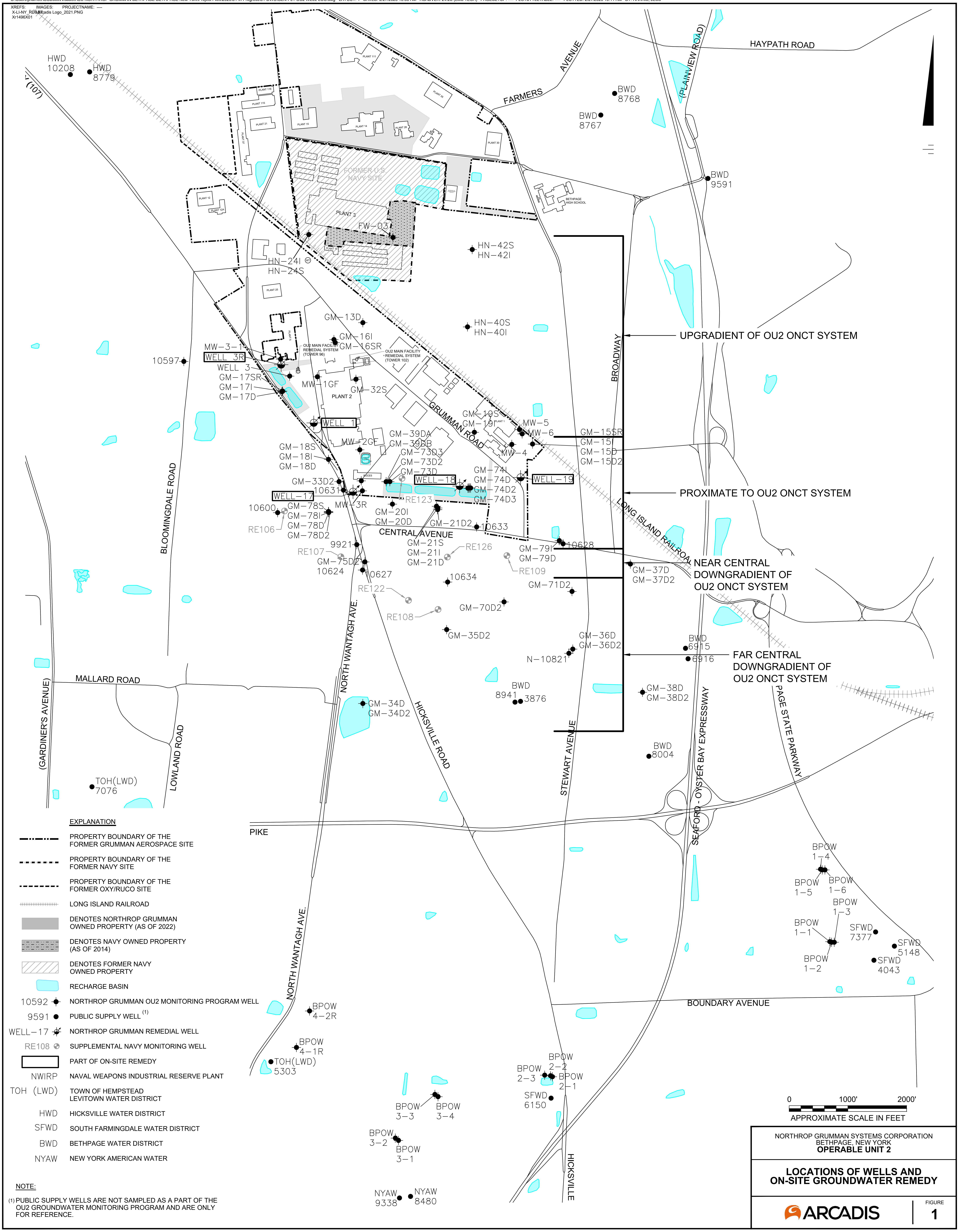
ND Non-Detect
NA Not Applicable

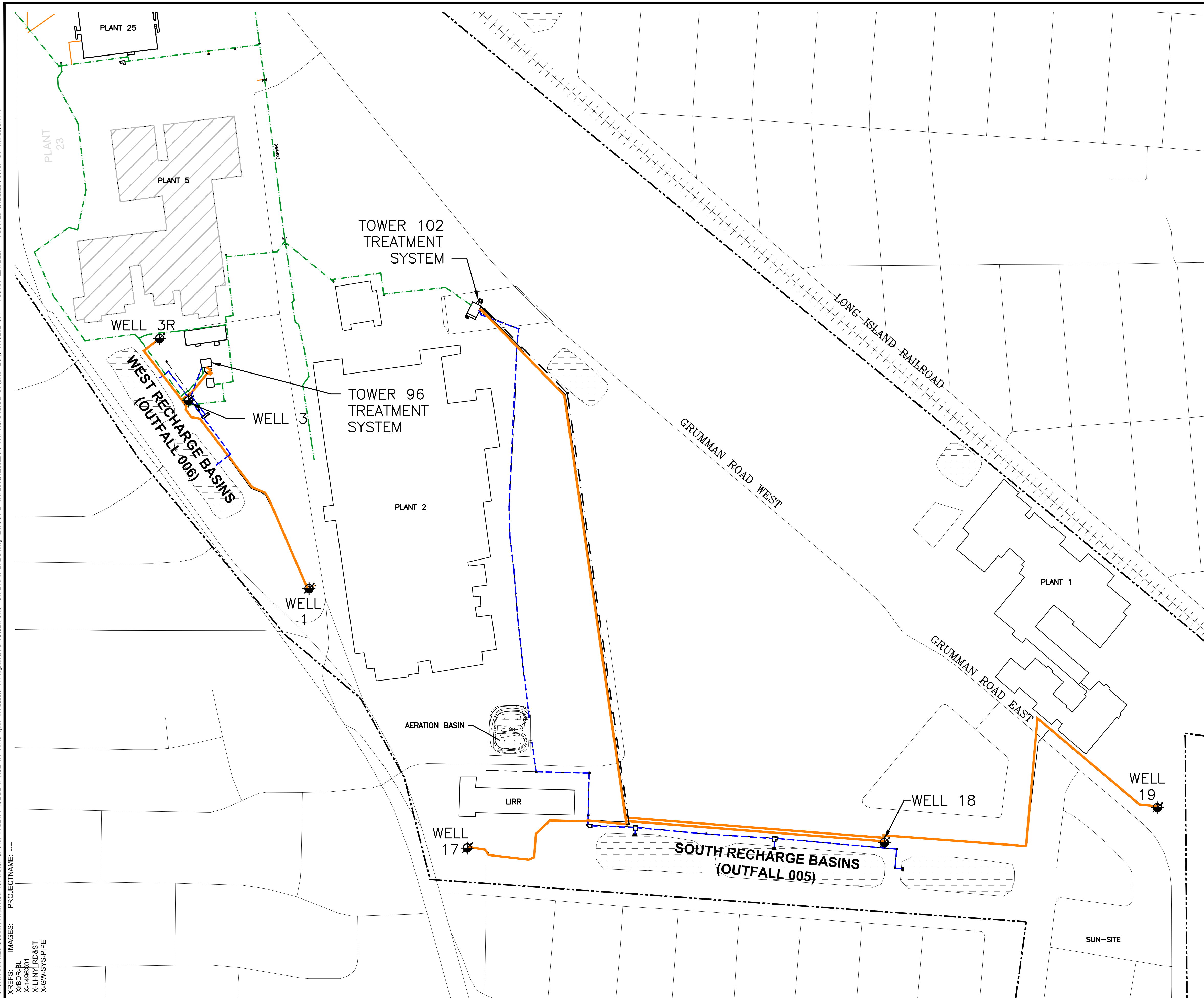
Bold wells are shown in trend graph figures.

TVOC concentrations are rounded to the number of decimal places of the individual VOC with the least precision (decimal places), including whole numbers with no decimal place.

Figures

C:\Users\jlharris\ACCDocs\Arcadis\AUS-NORTHROP GRUMMAN-BETHPAGE-BETHPAGE New York\Project Files\2023\01-In Progress\01-DWG\GEN-F01-OU2 WELL LOC.dwg LAYOUT: 1 SAVED: 2/27/2023 10:08 AM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 2/27/2023 10:11 AM BY: HARRIS, JESS





LEGEND:

- FORMER NORTHROP GRUMMAN PROPERTY LINE
- INFLUENT LINE
- BYPASS
- STORM DRAIN (EFFLUENT)
- NON POTABLE WATER DISTRIBUTION LINE (EFFLUENT)
- RAILROAD TRACKS
- FENCE
- WELL 18 REMEDIAL WELL
- BASIN
- ONCT ON-SITE CONTAMINANT

NOTES:

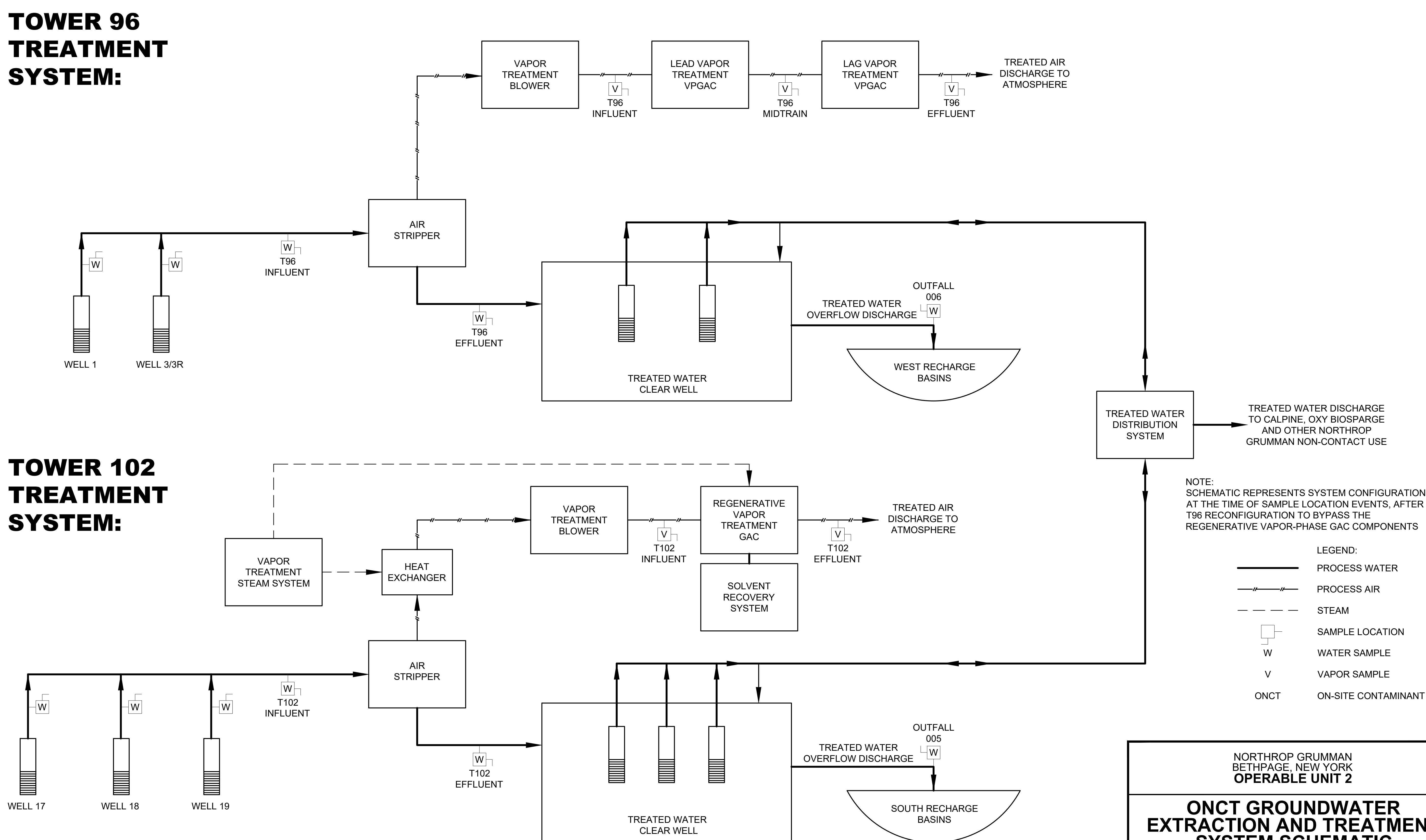
1. DRAWING IS NOT TO BE USED FOR DESIGN PURPOSES. LAYOUT OF PIPING IS FOR REPRESENTATION ONLY (LOCATIONS ARE APPROXIMATE).
2. THE PIPING REPRESENTED IN THIS DRAWING MAY BE CONSTRUCTED OF CAST IRON PIPE (CIP), DUCTILE IRON PIPE (DIP), ASBESTOS CEMENT PIPE (ACP) OR TRANSITE, OR A COMBINATION OF THESE PIPE TYPES.

NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN

ARCADIS

FIGURE
2



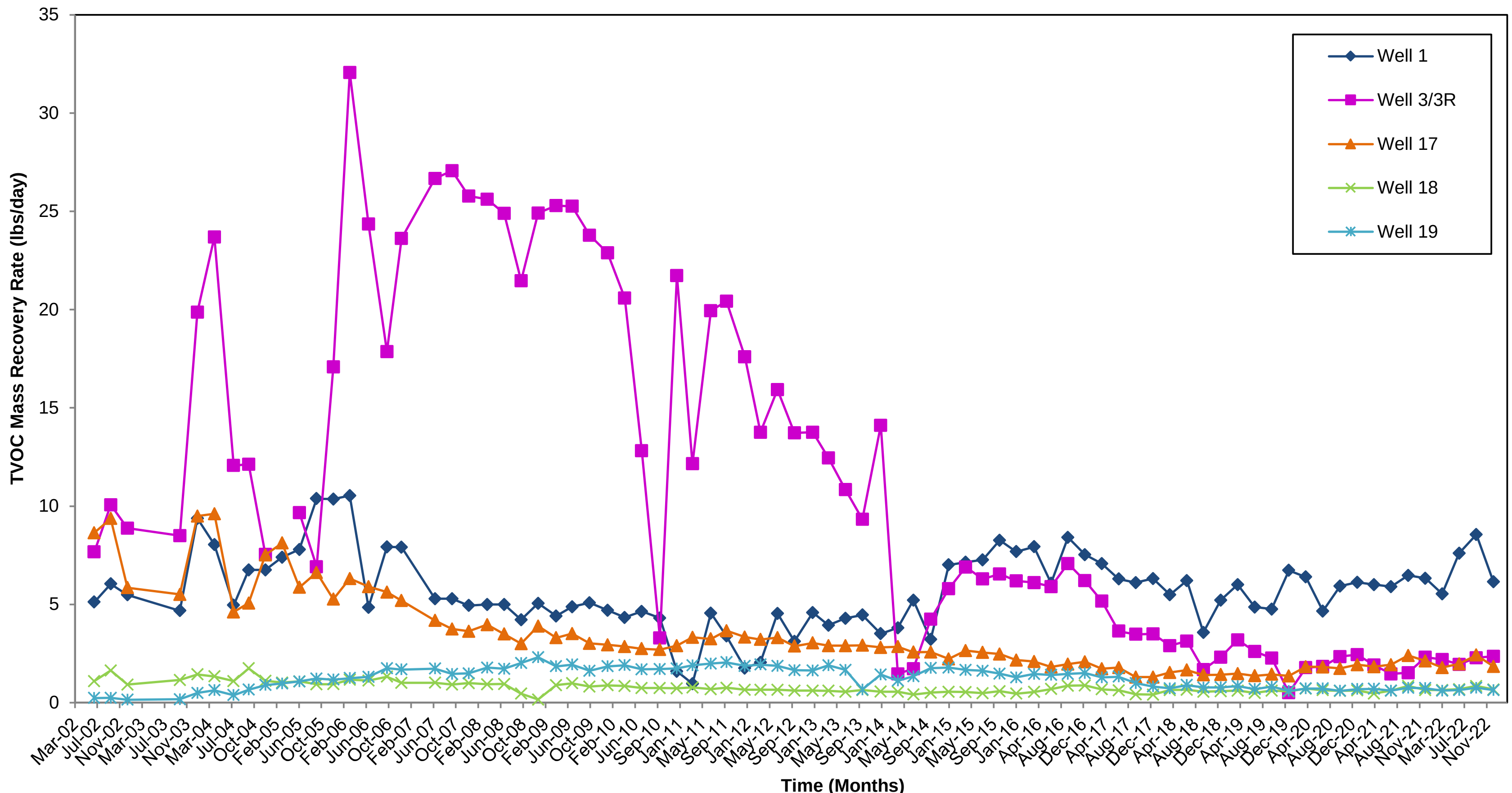
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SCHEMATIC

ARCADIS

FIGURE
3

CITY: MANCHESTER DIV/GROUP: ENVCAD DB: B.SMALL PM: TM:
C:\Users\BSmall\ACCDocs\Arcadis\AUS-NORTHROP GRUMMAN-BETHPAGE-BETHPAGE New York\Project Files\2022\01-In Progress\01-DWG\OU2-F03-GWE SYSTEM.dwg LAYOUT: 3 SAVED: 8/8/2022 5:00 PM ACADVER: 24.2S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB
PLOTTED: 8/8/2022 5:01 PM BY: SMALL, BRIAN
XREFS: IMAGES: PROJECTNAME: ----



Abbreviations:

VOC = Volatile Organic Compound.

lbs/day = Pounds per day.

TVOCs = Sum of VOCs detected

NORTHROP GRUMMAN

BETHPAGE, NEW YORK

OU2 ON-SITE GROUNDWATER REMEDY

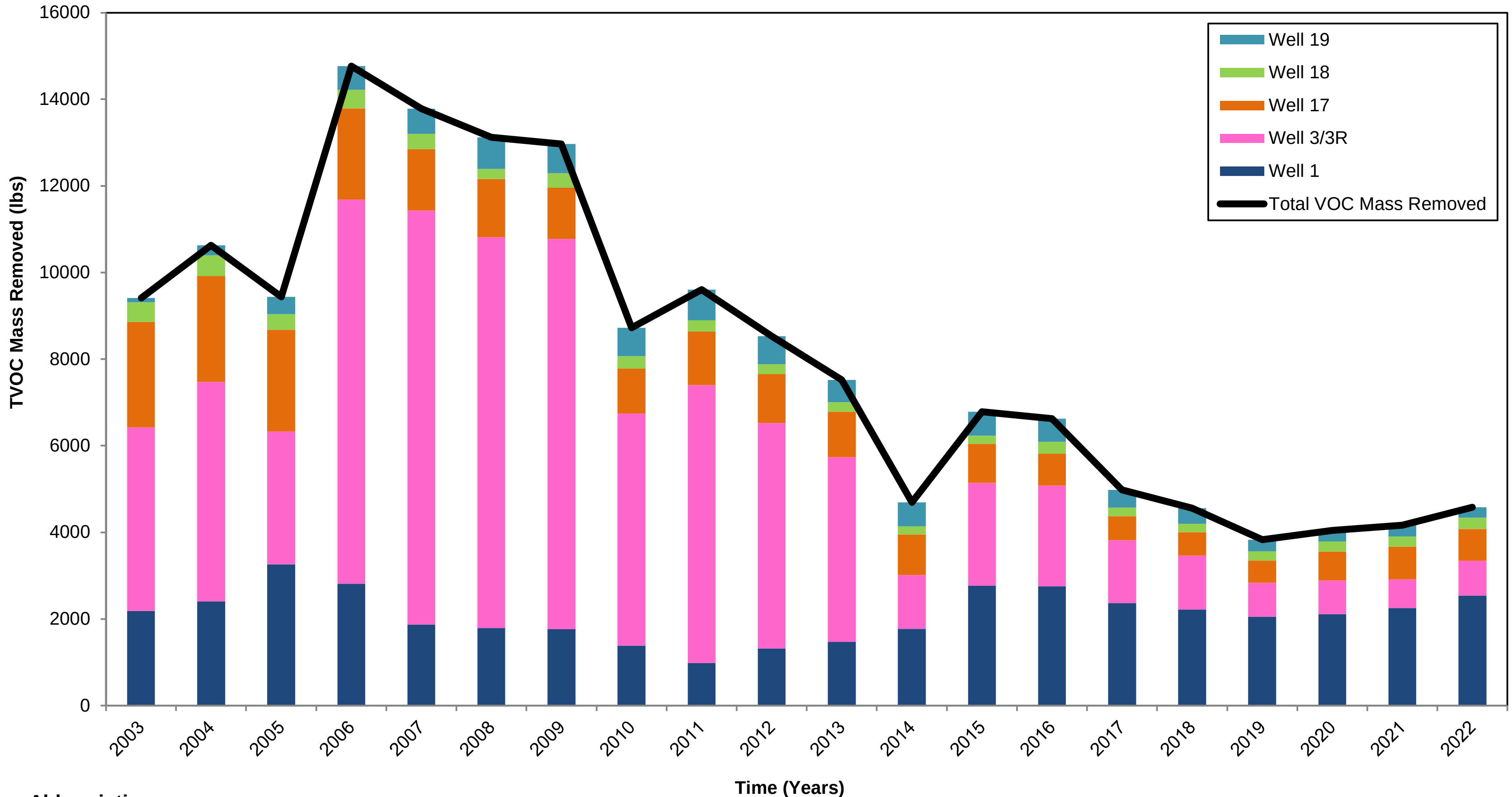
REMEDIAL WELLS TOTAL VOC MASS RECOVERY RATES THROUGH DECEMBER 2022

ARCADIS

FIGURE

4

3/6/2023



Abbreviations:

VOC = Volatile Organic Compound

lbs = Pounds

TVOCs = Sum of VOCs detected

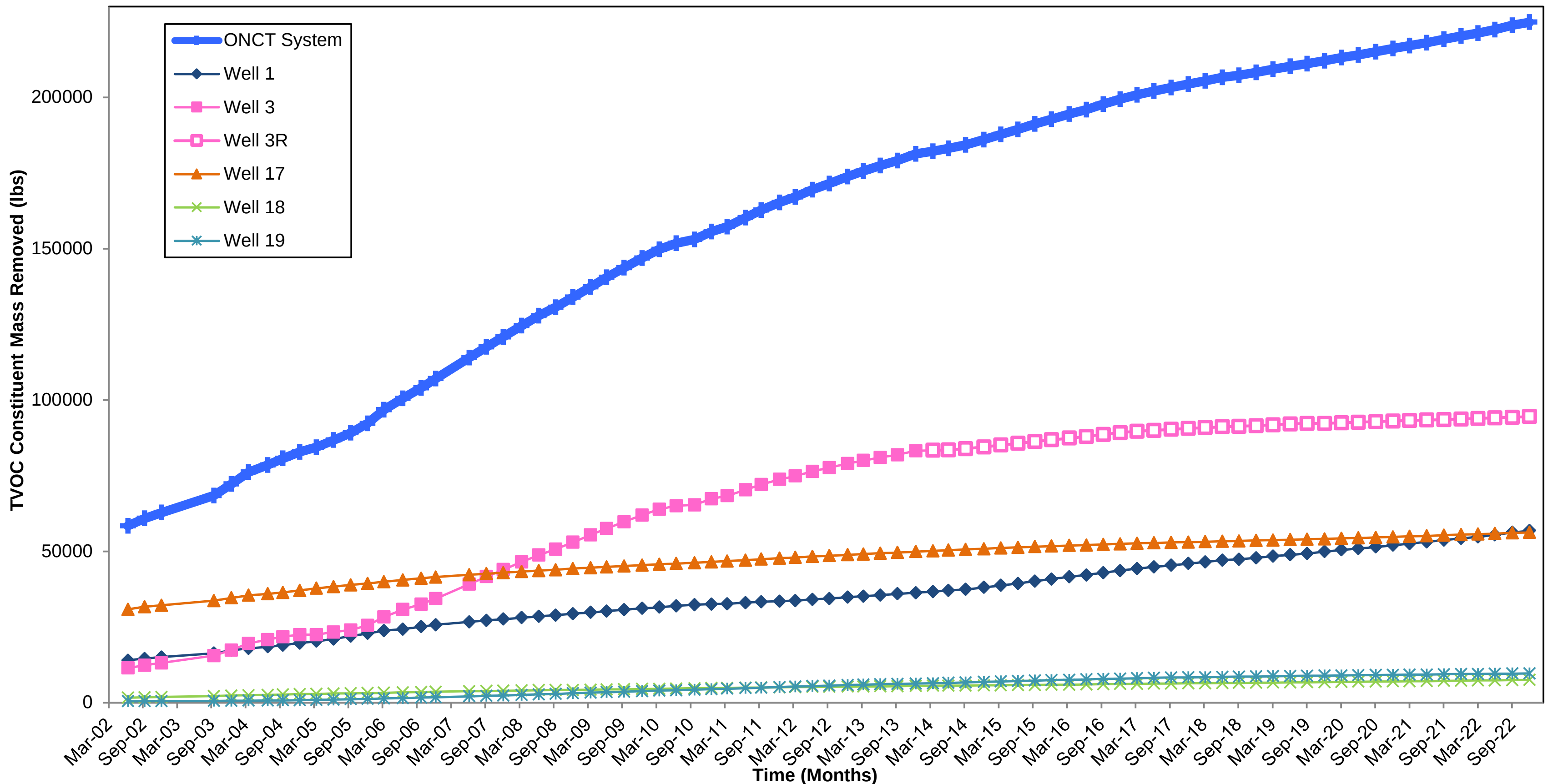
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OU2 ON-SITE GROUNDWATER REMEDY

REMEDIAL WELLS YEARLY TOTAL VOC MASS REMOVED THROUGH DECEMBER 2022

ARCADIS

FIGURE **5**

3/6/2023



Abbreviations:

VOC = Volatile Organic Compound

lbs = Pounds

TVOCs = Sum of VOCs detected

ONCT = On-Site Containment

Notes:

1. Cumulative Total VOC Mass Removed includes mass removed since startup of the ONCT system in September 1998.

NORTHROP GRUMMAN

BETHPAGE, NEW YORK

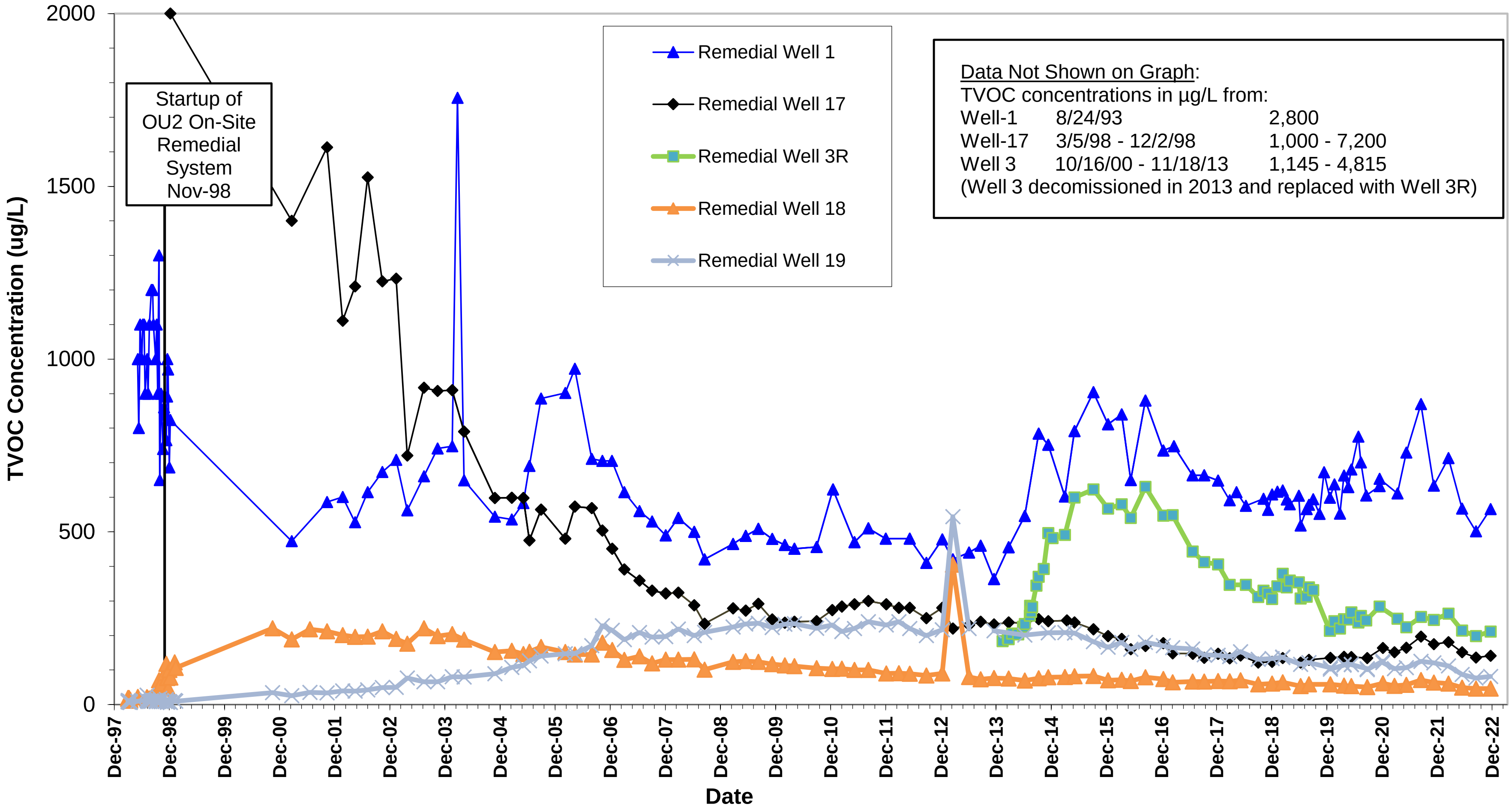
OU2 ON-SITE GROUNDWATER REMEDY

REMEDIAL WELLS CUMULATIVE TOTAL VOC MASS REMOVED THROUGH DECEMBER 2022

ARCADIS

FIGURE 6

3/6/2023



Notes and Abbreviations:

TVOC: Total volatile organic compound

Total VOCs: Sum of VOCs detected

µg/L: micrograms per liter

NORTHROP GRUMMAN

BETHPAGE, NEW YORK

OPERABLE UNIT 2

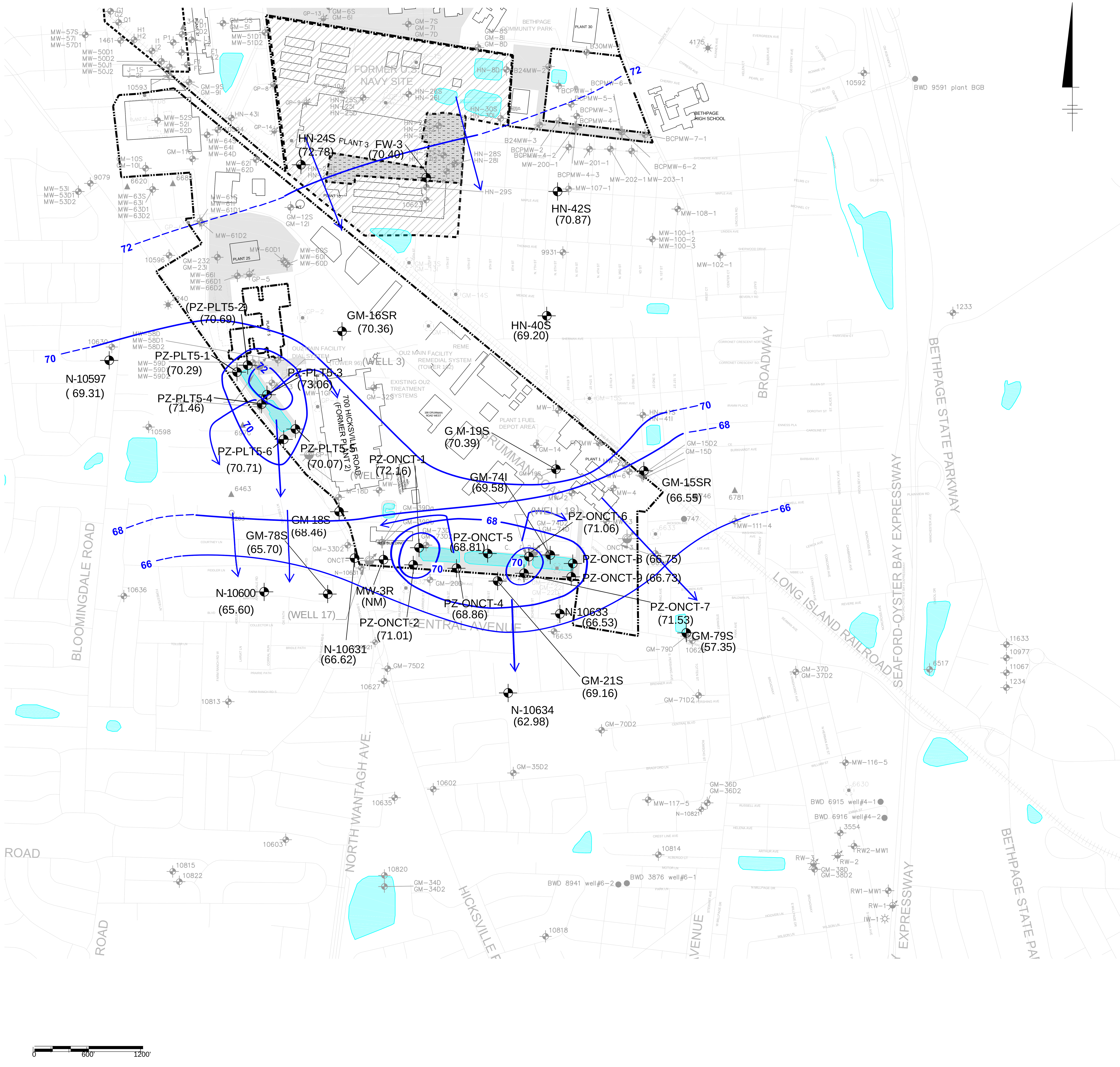
Total Volatile Organic Compound Concentrations in On-Site Zone 3 OU2 Remedial Wells

ARCADIS

FIGURE

7

3/6/2023



EXPLANATION:

PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE

PROPERTY BOUNDARY OF THE FORMER U.S. NAVY SITE

LONG ISLAND RAILROAD

NORTHROP GRUMMAN PROPERTY AS OF 2009

NAVY PROPERTY AS OF 2014

RECHARGE BASIN

OBSERVATION/MONITORING WELL

INDUSTRIAL WELL

PUBLIC SUPPLY WELL

IRRIGATION WELL

NORTHROP GRUMMAN ONCT WELL

ABANDONED WELL

68 — LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL (DASHED WHERE LESS CONTROL)

(57.35) WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL

DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW

NM NOT ACCESSIBLE

NOTES:

1. NORTHROP GRUMMAN ONCT WELLS 1, 3R, 17, 18 AND 19 SCREENED IN ZONE 3.
2. BETHPAGE WATER DISTRICT WELL 3876 SCREENED IN ZONE 2.
3. BETHPAGE WATER DISTRICT WELLS 6915 AND 6916 SCREENED IN ZONE 3.
4. BETHPAGE WATER DISTRICT WELL 8941 SCREENED IN ZONE 4.

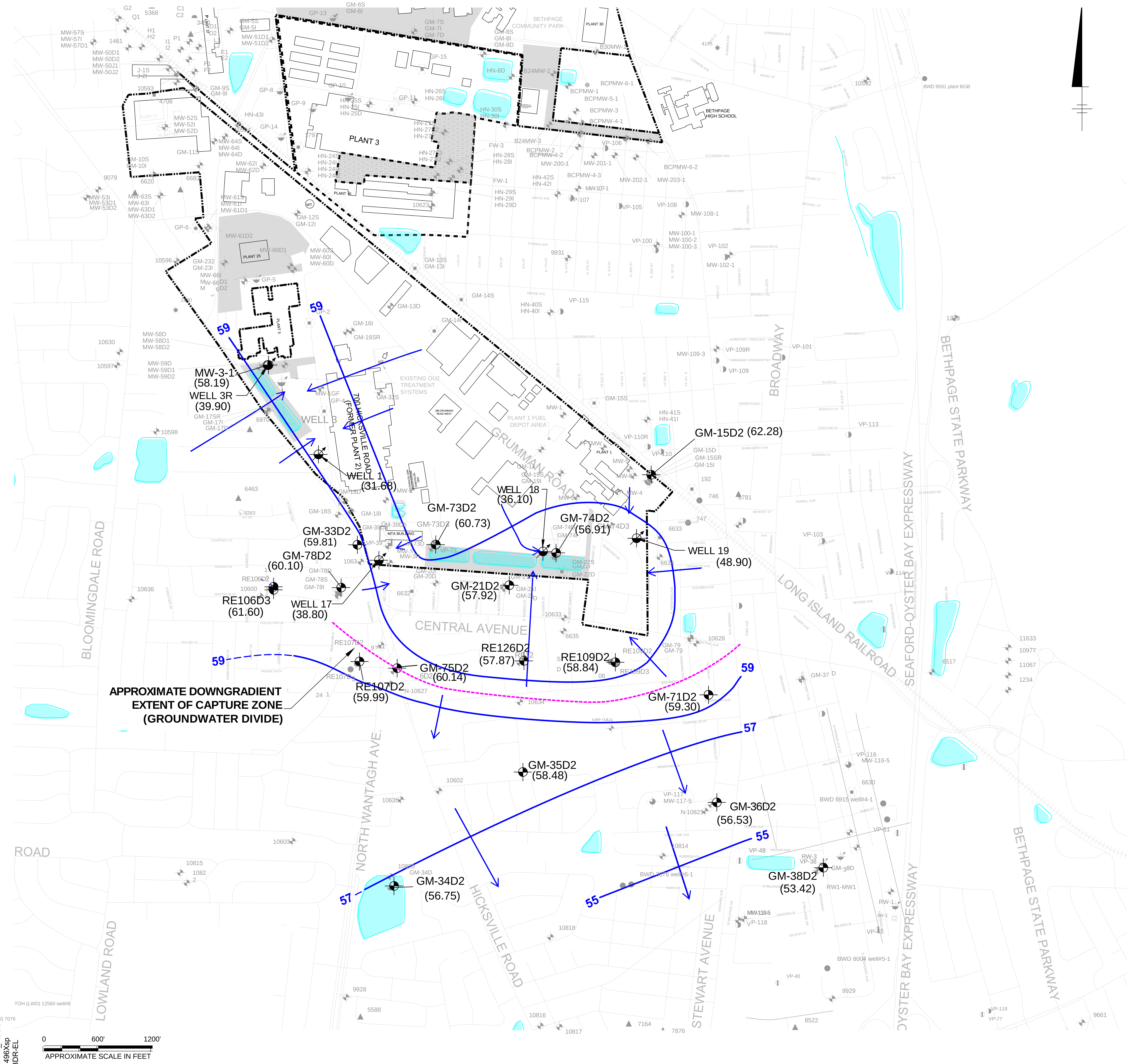
ALL COORDINATES REFERENCED TO NORTH AMERICAN DATUM 1983

NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

WATER-TABLE ELEVATION AND GENERALIZED HORIZONTAL GROUNDWATER FLOW DIRECTION IN ZONE 1 (0-300 FEET BELOW LAND SURFACE), MAY 2022

ARCADIS

FIGURE
8



EXPLANATION:

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- LONG ISLAND RAILROAD
- NORTHROP GRUMMAN PROPERTY AS OF 2009
- NAVY PROPERTY AS OF 2014
- RECHARGE BASIN
- OBSERVATION/MONITORING WELL
- INDUSTRIAL WELL
- PUBLIC SUPPLY WELL
- IRRIGATION WELL
- NORTHROP GRUMMAN ONCT WELL
- ABANDONED WELL
- 58 — LINE OF EQUAL WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL (DASHED WHERE LESS CONTROL)
- (62.63) WATER-LEVEL ELEVATION IN FEET RELATIVE TO MEAN SEA LEVEL
- DIRECTION OF HORIZONTAL COMPONENT OF GROUNDWATER FLOW
- GROUNDWATER DIVIDE
- NM NOT MEASURED
- NU NOT USED

NOTES:

1. NORTHROP GRUMMAN ONCT WELLS 1, 3R, 17, 18 AND 19 SCREENED IN ZONE 3.
2. BETHPAGE WATER DISTRICT WELL 3876 SCREENED IN ZONE 2.
3. BETHPAGE WATER DISTRICT WELLS 6915 AND 6916 SCREENED IN ZONE 3.
4. BETHPAGE WATER DISTRICT WELL 8941 SCREENED IN ZONE 4.

ALL COORDINATES REFERENCED TO NORTH AMERICAN DATUM 1983

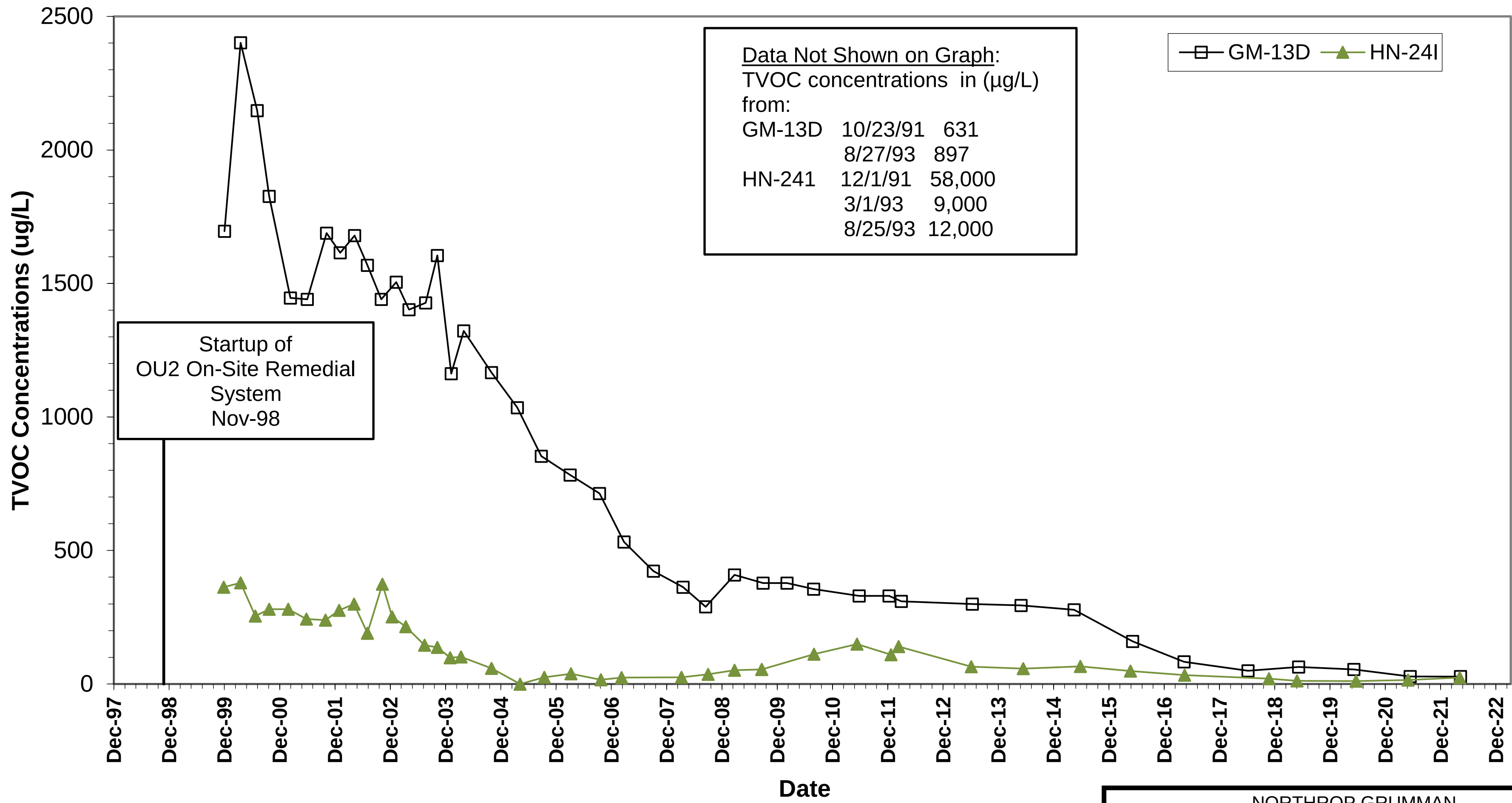
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

POTENTIOMETRIC SURFACE ELEVATION AND GENERALIZED HORIZONTAL GROUNDWATER FLOW DIRECTIONS IN ZONE 3 (500-700 FEET BELOW LAND SURFACE), MAY 2022

ARCADIS

FIGURE 9

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
C:\Users\roberlander\BIM 360\Arcadis\ANA - Northrop Grumman\Project Files\OU2 ONCT OM&M Program\2021\01-DWG\NGC-BP-ONCT-GW-D2-ZONE.dwg LAYOUT: 18 SAVED: 3/29/2021 9:19 AM ACADVER: 23.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 3/29/2021 9:19 AM BY: OBERLANDER, ROSEANNE
XREFS: X-1496X01 X-OU2-BDR-DL X-LI-NY_RD&ST X-1496Xsp X-BDR-EL IMAGES: PROJECTNAME: ----



Notes and Abbreviations:

TVOC: Total volatile organic compound

Total VOCs: Sum of VOCs detected

µg/L: micrograms per liter

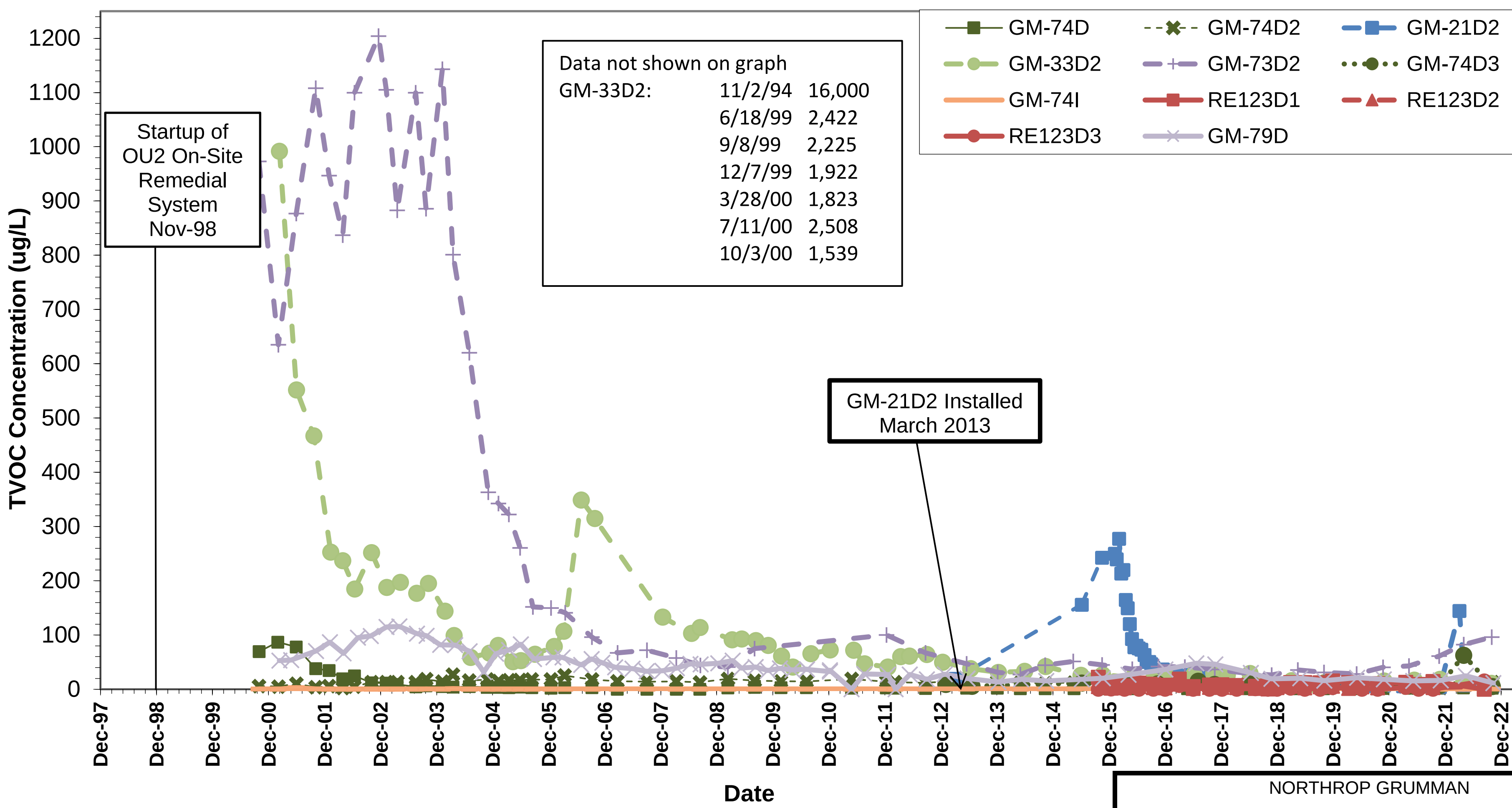
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in Zone 1 Monitoring Wells Upgradient of OU2 ONCT System

ARCADIS

FIGURE **10**

3/6/2023



Notes and Abbreviations:

TVOC: Total volatile organic compound

Total VOCs: Sum of VOCs detected

µg/L: micrograms per liter

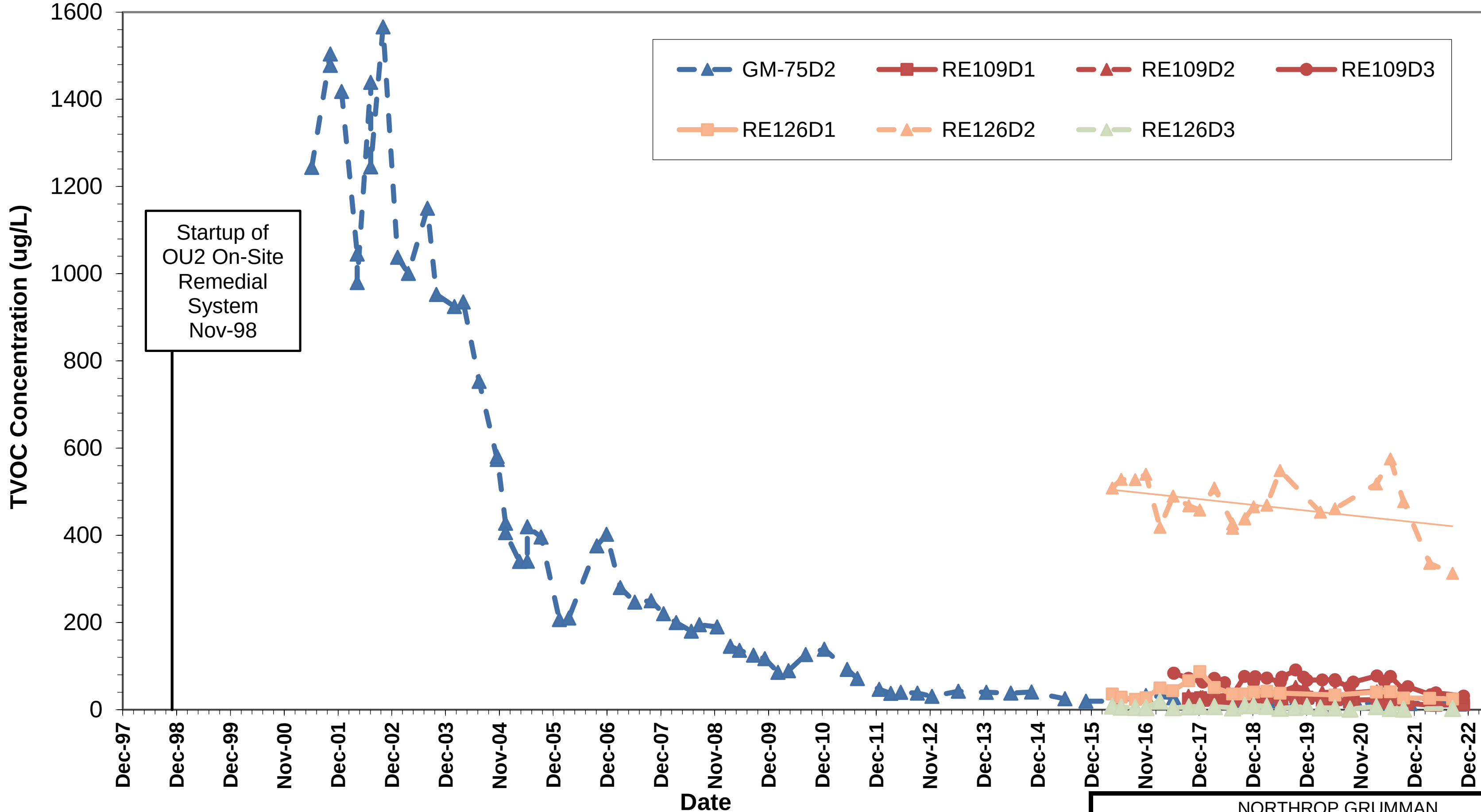
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in Zones 1 - 4 Monitoring Wells Proximate to OU2 ONCT System

ARCADIS

FIGURE **11**

3/6/2023



Notes and Abbreviations:

TVOC: Total volatile organic compound

Total VOCs: Sum of VOCs detected

µg/L: micrograms per liter

Trend line shown for RE-126D2

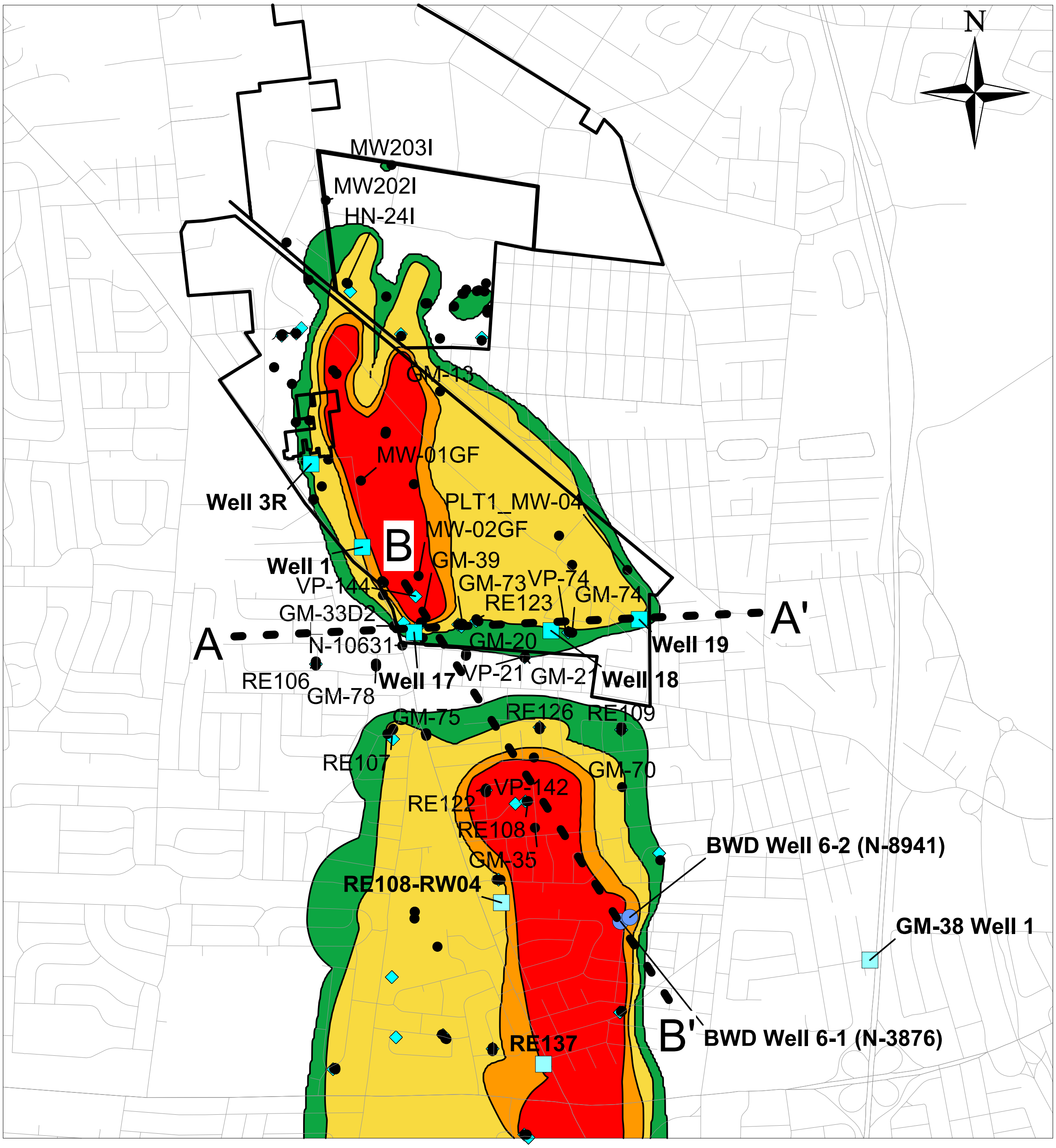
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in Zones 2 and 3 Monitoring Wells Downgradient of OU2 ONCT System (Near Central)

ARCADIS

FIGURE **12**

3/6/2023



Total Volatile Organic Compound (TVOC)
Concentrations (µg/L)

1,000
500
50
5
Non-detect

Boundary of the Former Northrop Grumman / NWIRP Site

A-A' Cross-Section Line

Monitoring Wells

Vertical Profile Borings

Remediation Well

Public Supply Well

Plume is based on the most recently available data from each sampling location collected between 2016 and 2022. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Horizontal Scale (Feet)

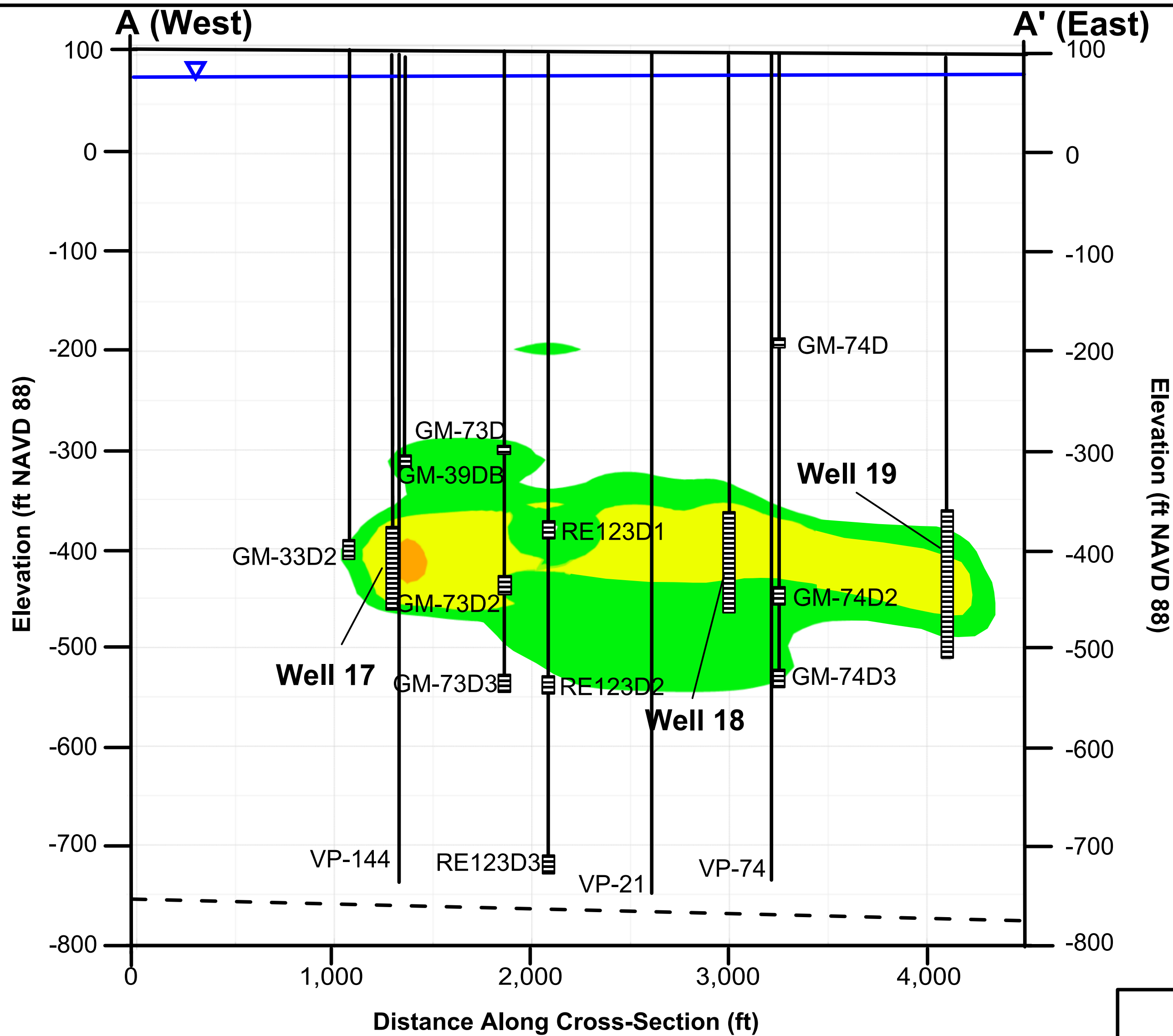
0 2,000 4,000

Northrop Grumman
Bethpage, New York

CROSS-SECTION LINES AND MAXIMUM TVOC CONCENTRATIONS 2022

ARCADIS

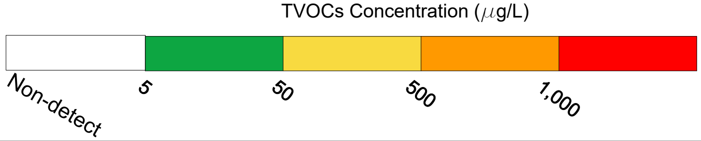
FIGURE 13



NAVD 88 = North American Vertical Datum of 1988

TVOC = Total Volatile Organic Compound

Vertical Exaggeration is 5:1.



LEGEND

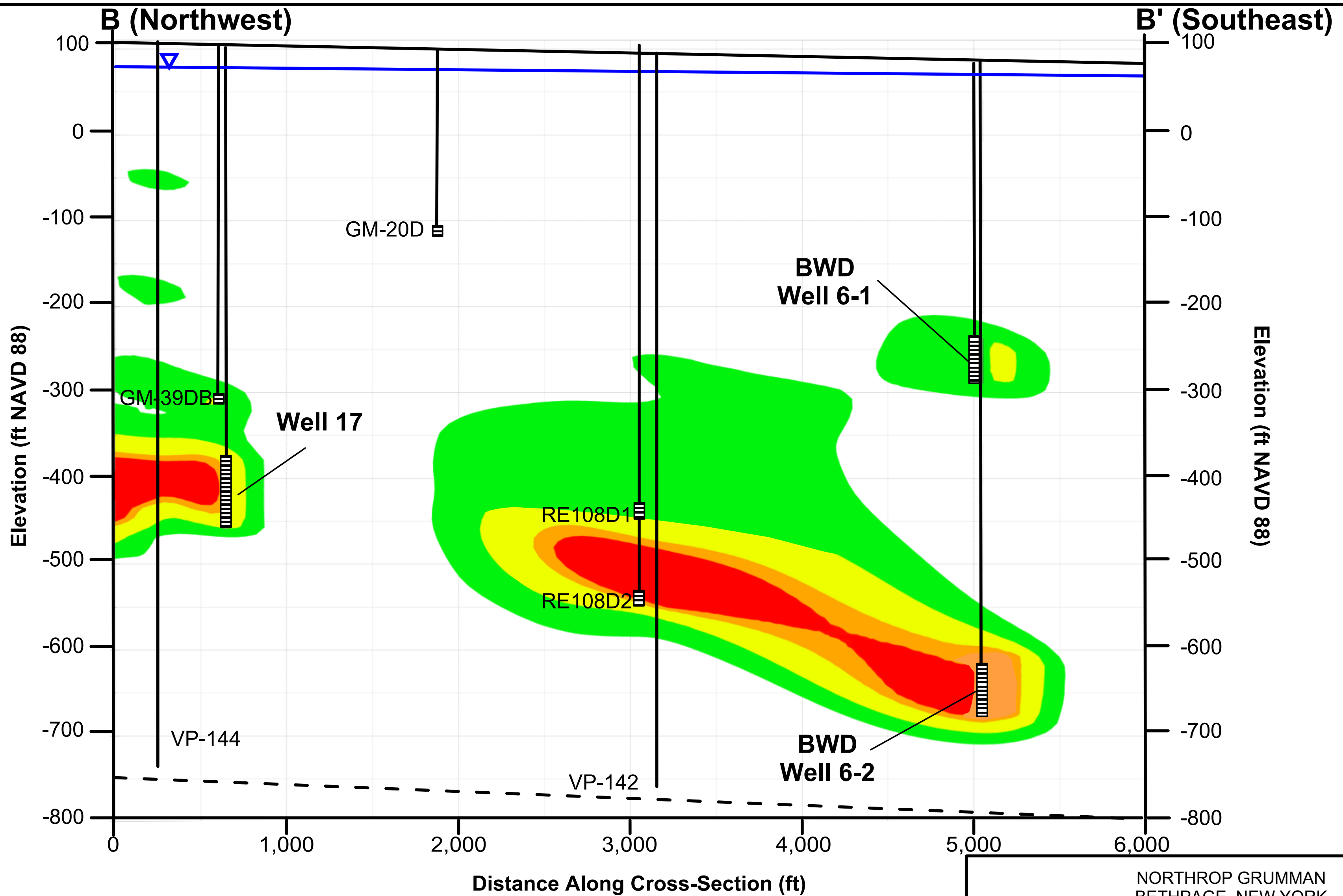
- Approximate Land Surface
- Approximate Water Table
- Approximate Top of Raritan Confining Unit
- Well Screen Interval

NORTHROP GRUMMAN
BETHPAGE, NEW YORK

TVOCS IN GROUNDWATER 2022
CROSS-SECTION A-A'

ARCADIS

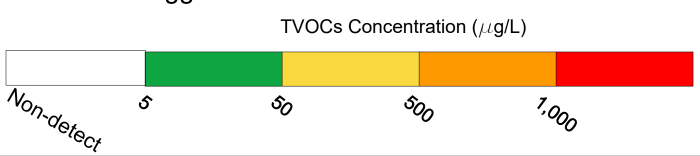
FIGURE
14



NAVD 88 = North American Vertical Datum of 1988

TVOC = Total Volatile Organic Compound

Vertical Exaggeration is 5:1.



LEGEND

Approximate Land Surface

Approximate Water Table

Approximate Top of Raritan Confining Unit

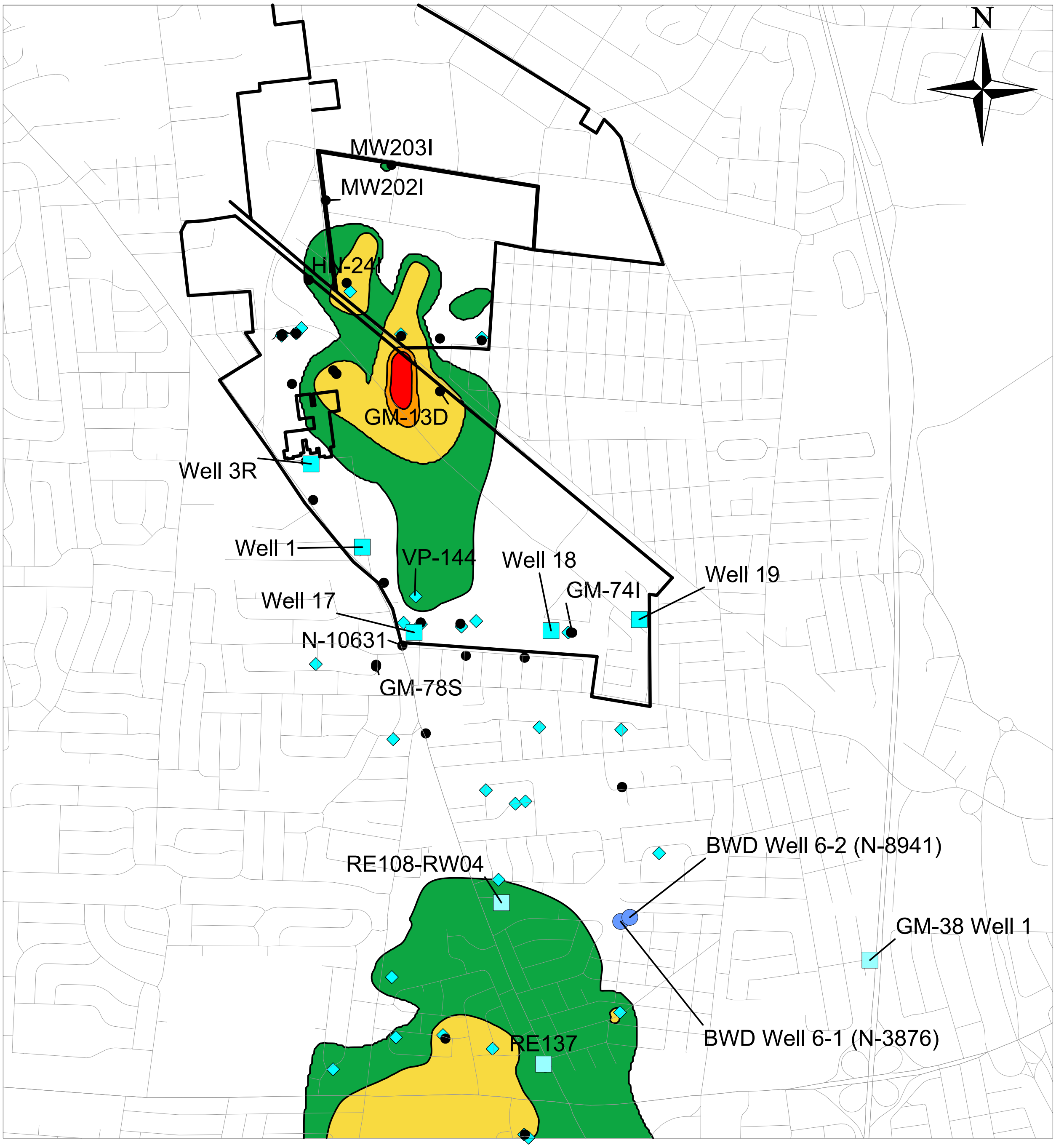
Well Screen Interval

NORTHROP GRUMMAN
BETHPAGE, NEW YORK

TVOCS IN GROUNDWATER 2022
CROSS-SECTION B-B'

ARCADIS

FIGURE
15



Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

1,000
500
50
5
Non-detect

Boundary of the Former Northrop Grumman / NWIRP Site

Monitoring Wells

Vertical Profile Borings

Remediation Well

Public Supply Well

Remediation and public supply wells are shown for reference and are not necessarily screened in this zone.

Plume is based on the most recently available data from each sampling location collected between 2016 and 2021. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Horizontal Scale (Feet)

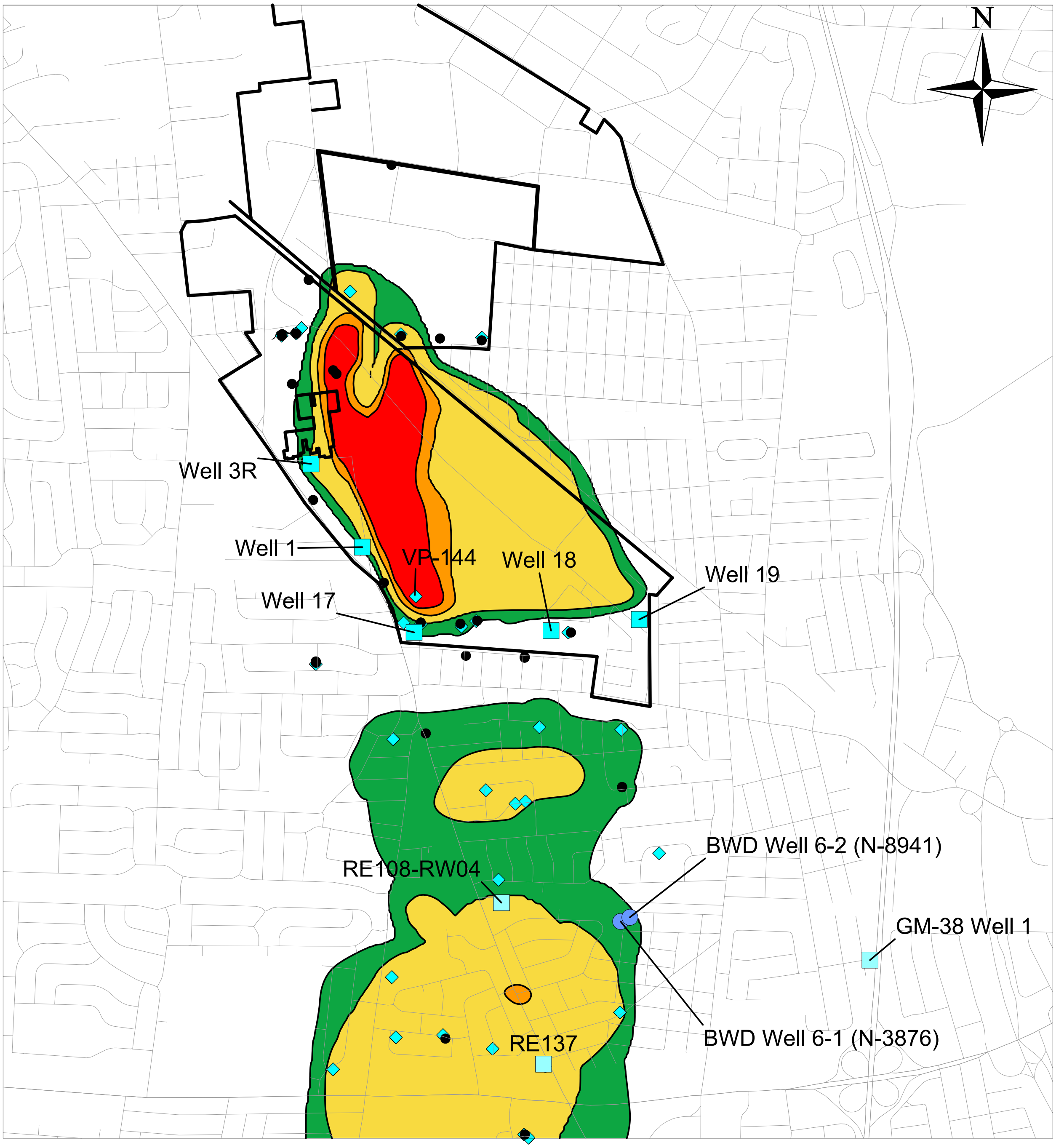
0 2,000 4,000

Northrop Grumman
Bethpage, New York

ZONE 1 (0 TO 300 FEET BELOW LAND SURFACE) MAXIMUM TVOC CONCENTRATIONS 2022

ARCADIS

FIGURE 16



Total Volatile Organic Compound (TVOC) Concentrations (μg/L)

1,000
500
50
5
Non-detect

Boundary of the Former Northrop Grumman / NWIRP Site

Monitoring Wells

Vertical Profile Borings

Remediation Well

Public Supply Well

Horizontal Scale (Feet)

0 2,000 4,000

Remediation and public supply wells are shown for reference and are not necessarily screened in this zone.

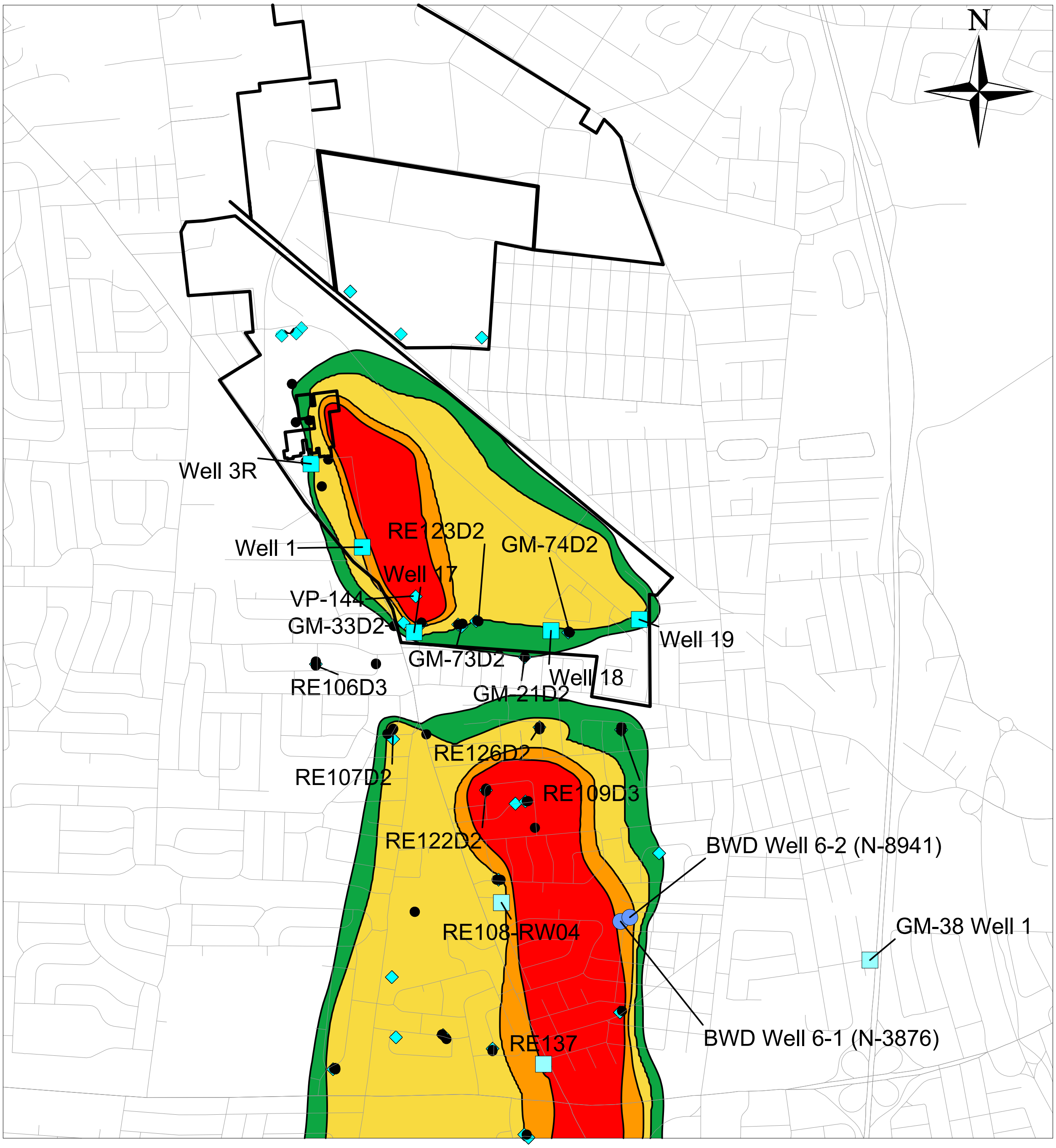
Plume is based on the most recently available data from each sampling location collected between 2016 and 2022. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Northrop Grumman
Bethpage, New York

ZONE 2 (300 TO 500 FEET BELOW LAND SURFACE) MAXIMUM TVOC CONCENTRATIONS 2022

ARCADIS

FIGURE 17



Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

1,000
500
50
5
Non-detect

Boundary of the Former Northrop Grumman / NWIRP Site

Monitoring Wells

Vertical Profile Borings

Remediation Well

Public Supply Well

Remediation and public supply wells are shown for reference and are not necessarily screened in this zone.

Plume is based on the most recently available data from each sampling location collected between 2016 and 2022. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Horizontal Scale (Feet)

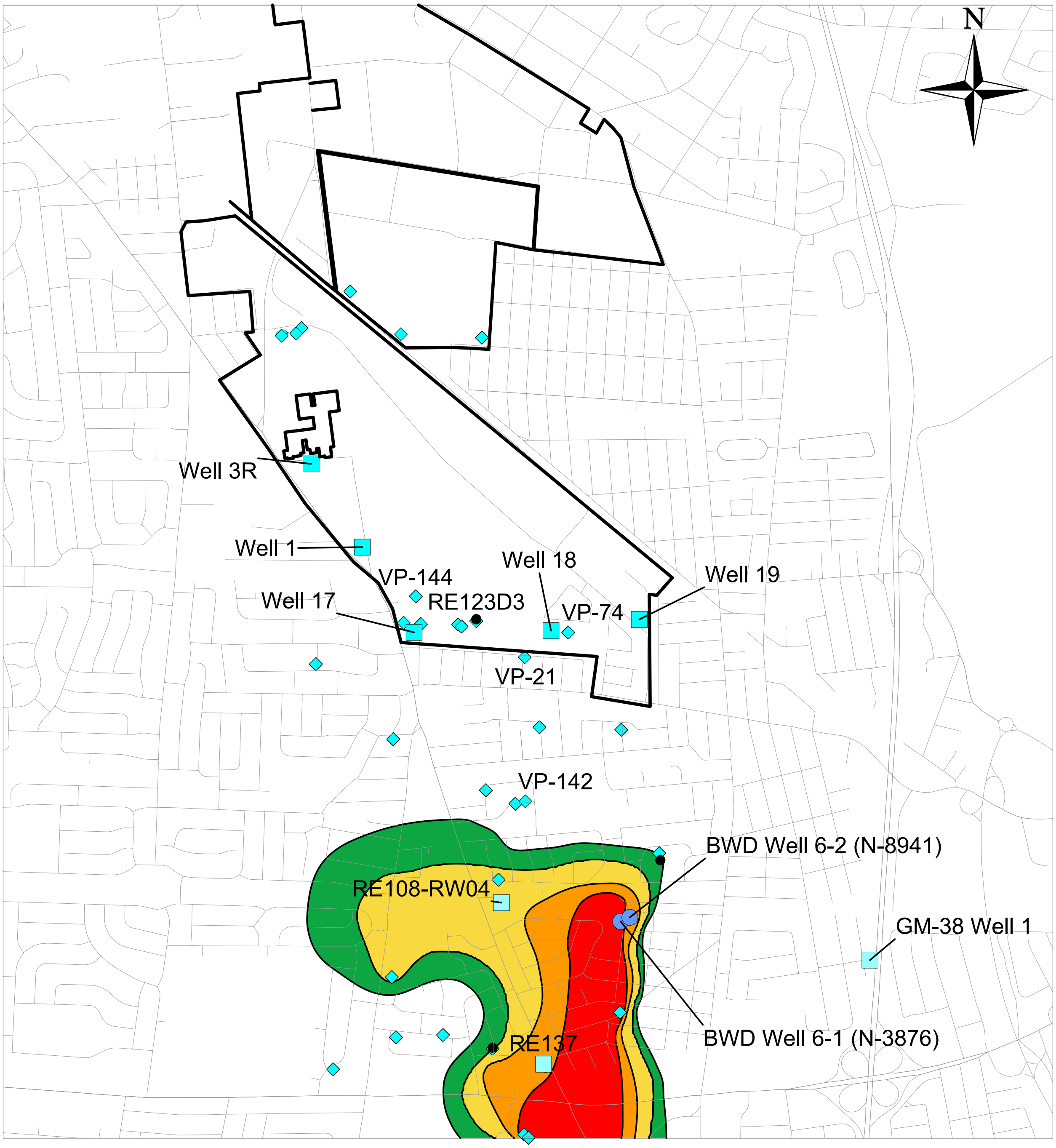
0 2,000 4,000

Northrop Grumman
Bethpage, New York

ZONE 3 (500 TO 700 FEET BELOW LAND SURFACE) MAXIMUM TVOC CONCENTRATIONS 2022

ARCADIS

FIGURE
18



Total Volatile Organic Compound (TVOC) Concentrations (µg/L)

1,000
500
50
5
Non-detect

Boundary of the Former Northrop Grumman / NWIRP Site

Monitoring Wells

Vertical Profile Borings

Remediation Well

Public Supply Well

Remediation and public supply wells are shown for reference and are not necessarily screened in this zone.

Plume is based on the most recently available data from each sampling location collected between 2016 and 2022. Data were collected from monitoring wells, vertical profile borings, remedial wells, and public supply wells.

Horizontal Scale (Feet)

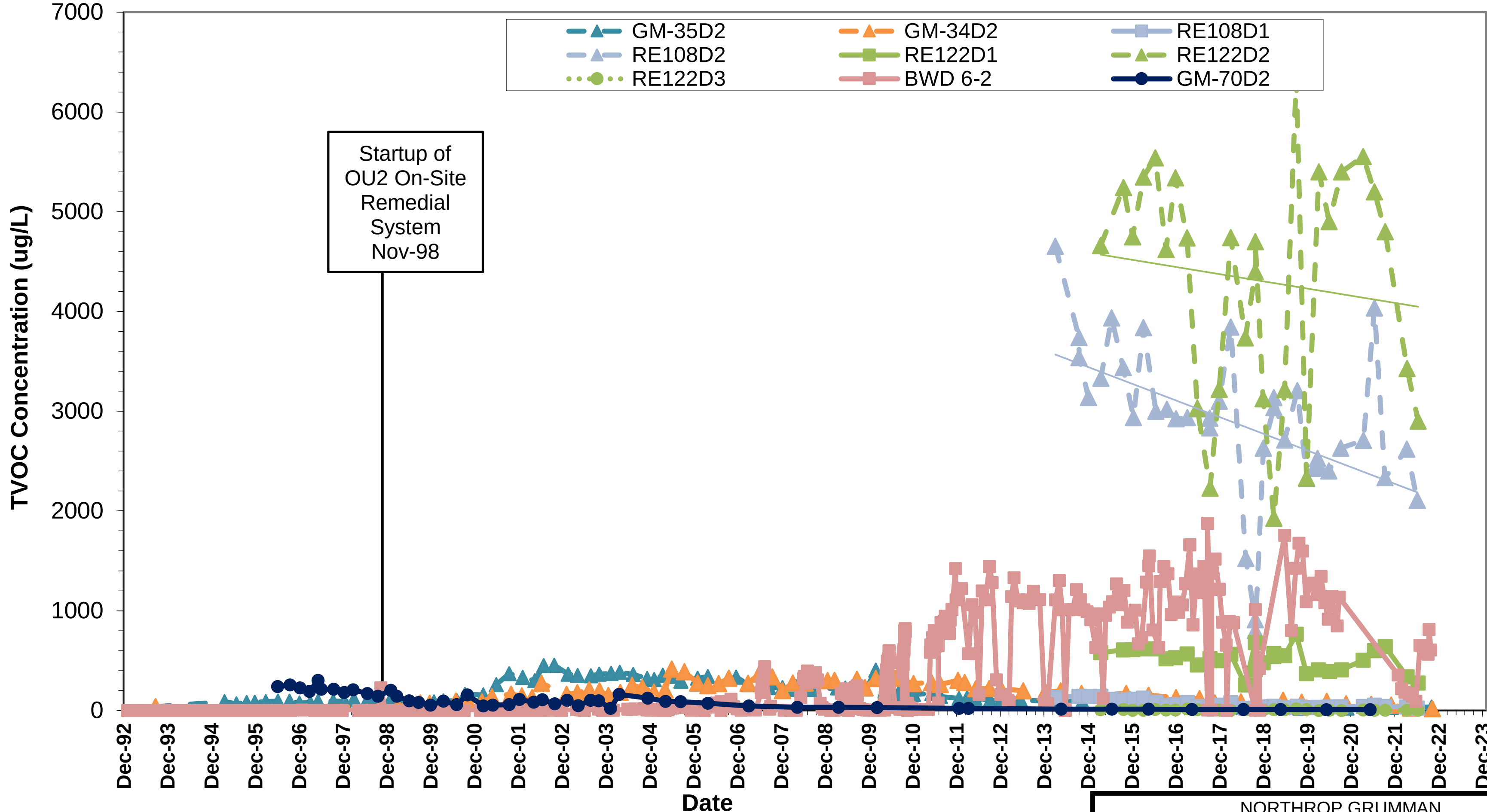
0 2,000 4,000

Northrop Grumman
Bethpage, New York

ZONE 4 (GREATER THAN 700 FEET BELOW LAND SURFACE) MAXIMUM TVOC CONCENTRATIONS 2022

ARCADIS

FIGURE
19



Notes and Abbreviations:

TVOC: Total volatile organic compound

Total VOCs: Sum of VOCs detected

µg/L: micrograms per liter

Trend lines shown for RE-108D2 and RE-122D2

NORTHROP GRUMMAN

BETHPAGE, NEW YORK

OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in

Zones 3 and 4 Monitoring Wells Far Central Downgradient of OU2 ONCT System

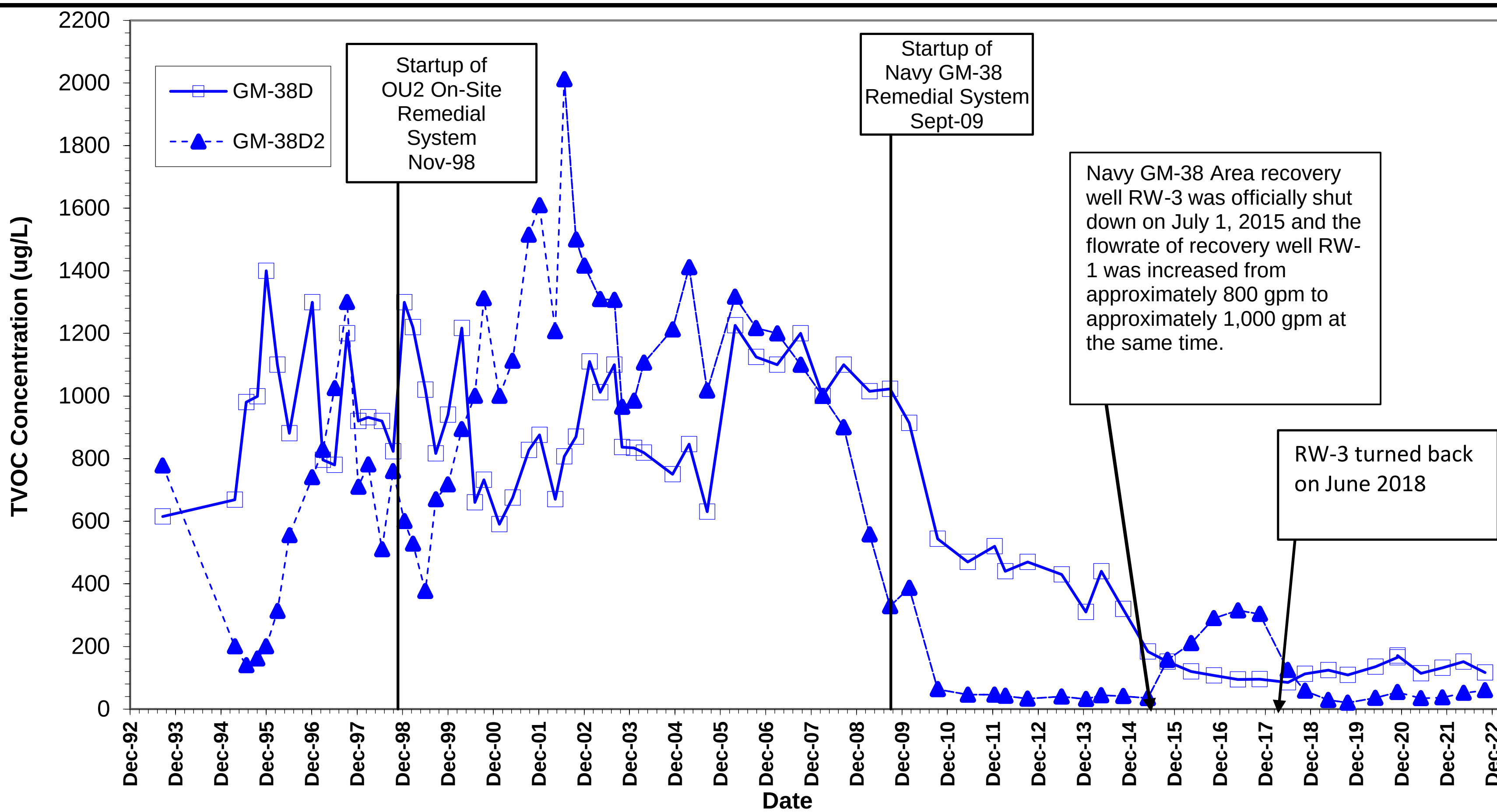
(Far Central)

ARCADIS

FIGURE

20

3/6/2023



Notes and Abbreviations:

TVOC: Total volatile organic compound

Total VOCs: Sum of VOCs detected

µg/L: micrograms per liter

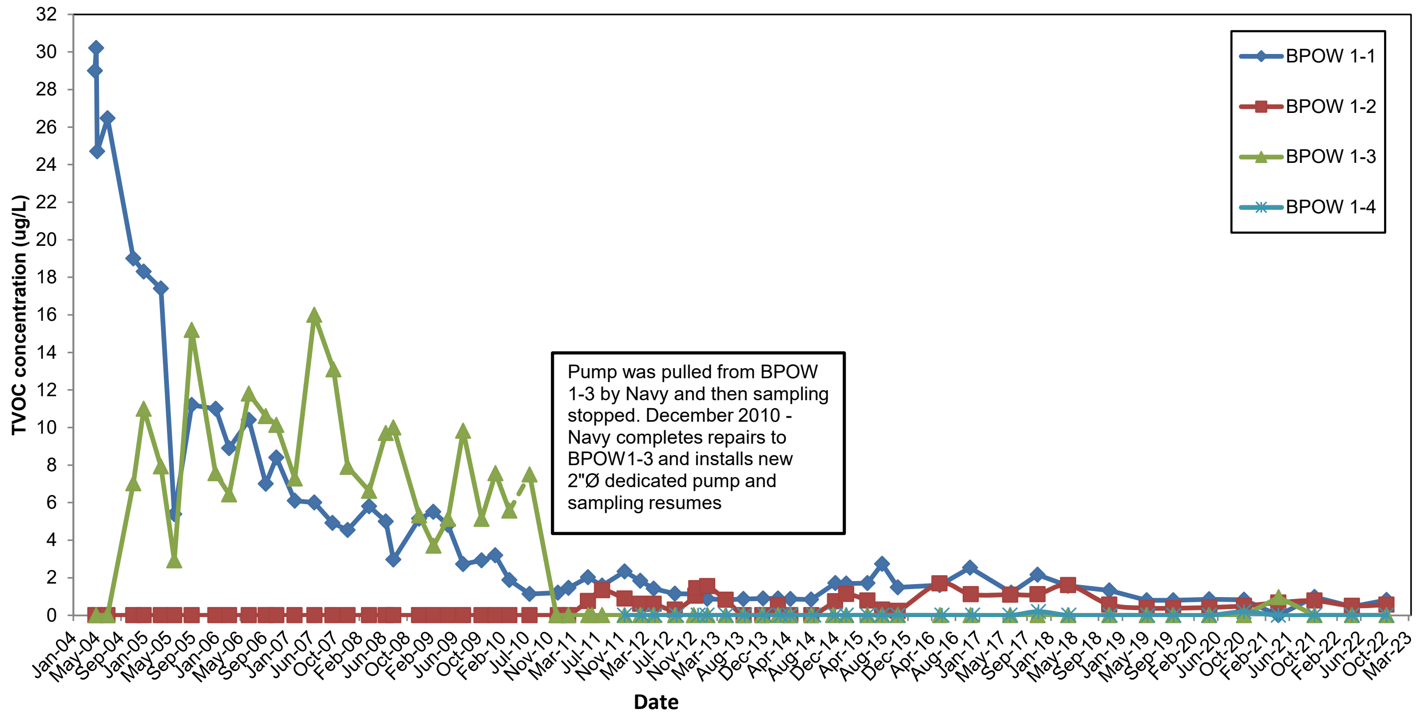
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in GM-38 Area Zones 1 and 2 Monitoring Wells

ARCADIS

FIGURE 21

3/6/2023



Notes and Abbreviations:

TVOCs for BPOW 1-5 and 1-6 are non detect for the period of record.
TVOC: Total volatile organic compound
SFWD: South Farmingdale Water District
ug/L: micrograms per Liter
Total VOCs: Sum of VOCs detected

NORTHROP GRUMMAN

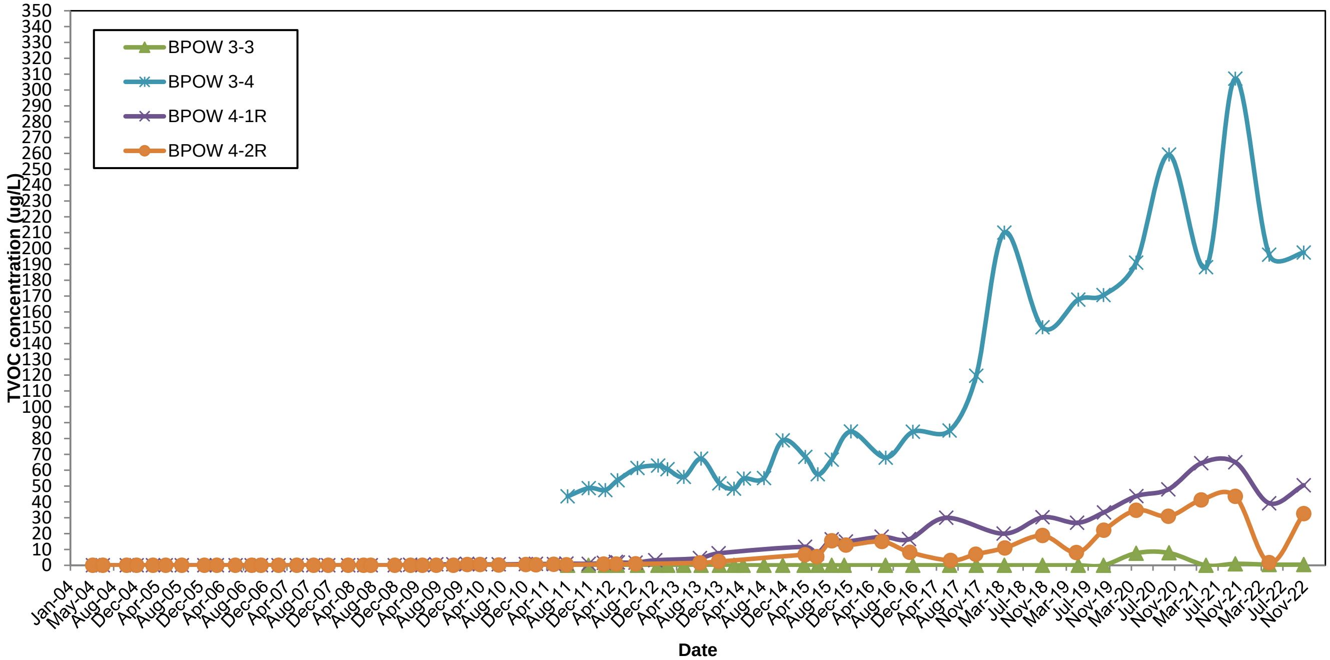
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in Off-site Former Outpost Wells BPOW1-1, BPOW1-2, (Wells Monitor SFWD Well Field 1)

ARCADIS

22

3/17/2023



Notes and Abbreviations:

BPOW 3-3/3-4 Wells Monitor NYAW Seaman's Neck Well Field and 4-1R/4-2R Monitor Town of Hempstead Levittown Water District Well N-5303.

TVOCs for both BPOW 3-1 and BPOW 3-2 are non-detect for the period of record except for a detection of 0.2 ug/L in well BPOW 3-1 in June 2019.

TVOC: Total volatile organic compound
NYAW: New York American Water
ug/L: micrograms per Liter
Total VOCs: Sum of VOCs detected

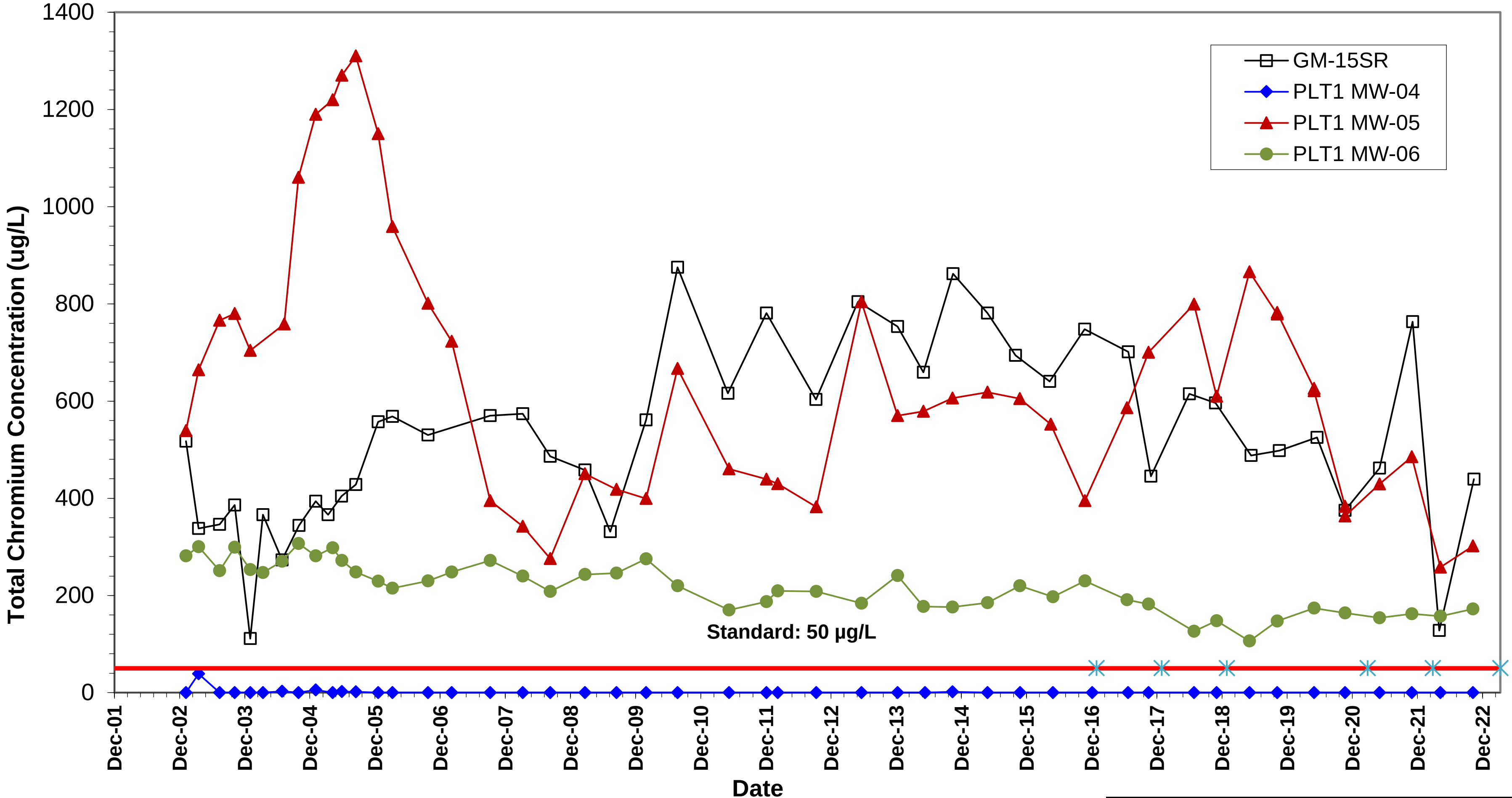
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Volatile Organic Compound Concentrations in Former Outpost Wells BPOW 3-3, BPOW 3-4, BPOW 4-1R, and BPOW 4-2R (Wells Monitor NYAW Seaman's Neck Well Field and Town of Hempstead Levittown Water District Well N-5303)

ARCADIS

23

3/6/2023



Notes and Abbreviations:

µg/L: micrograms per liter

NORTHROP GRUMMAN

BETHPAGE, NEW YORK

OPERABLE UNIT 2

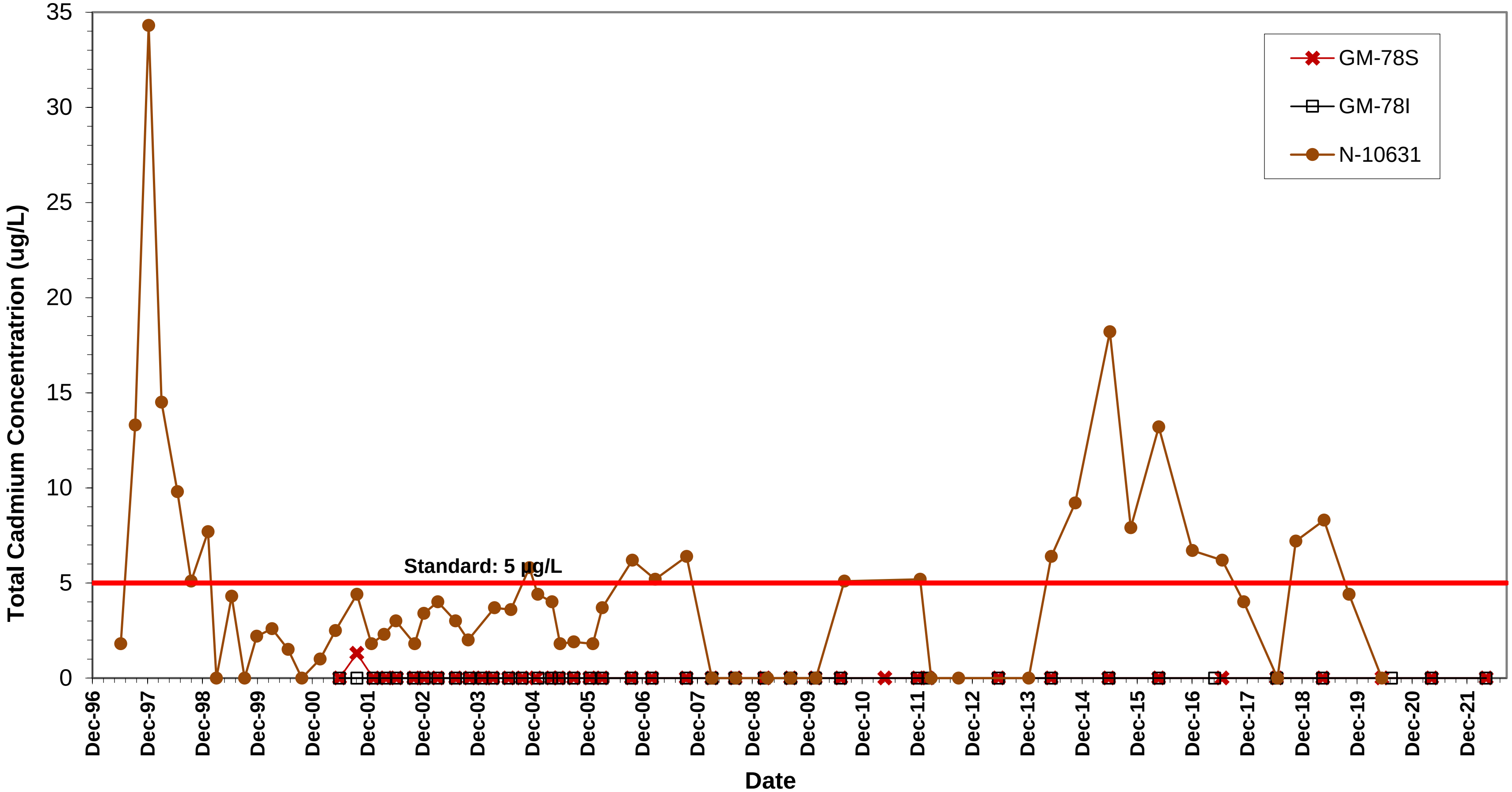
Total Chromium (unfiltered) Concentrations in Zone 1 Monitoring Wells Near Former Plant 1

ARCADIS

FIGURE

24

3/6/2023



Notes and Abbreviations:

µg/L: micrograms per liter

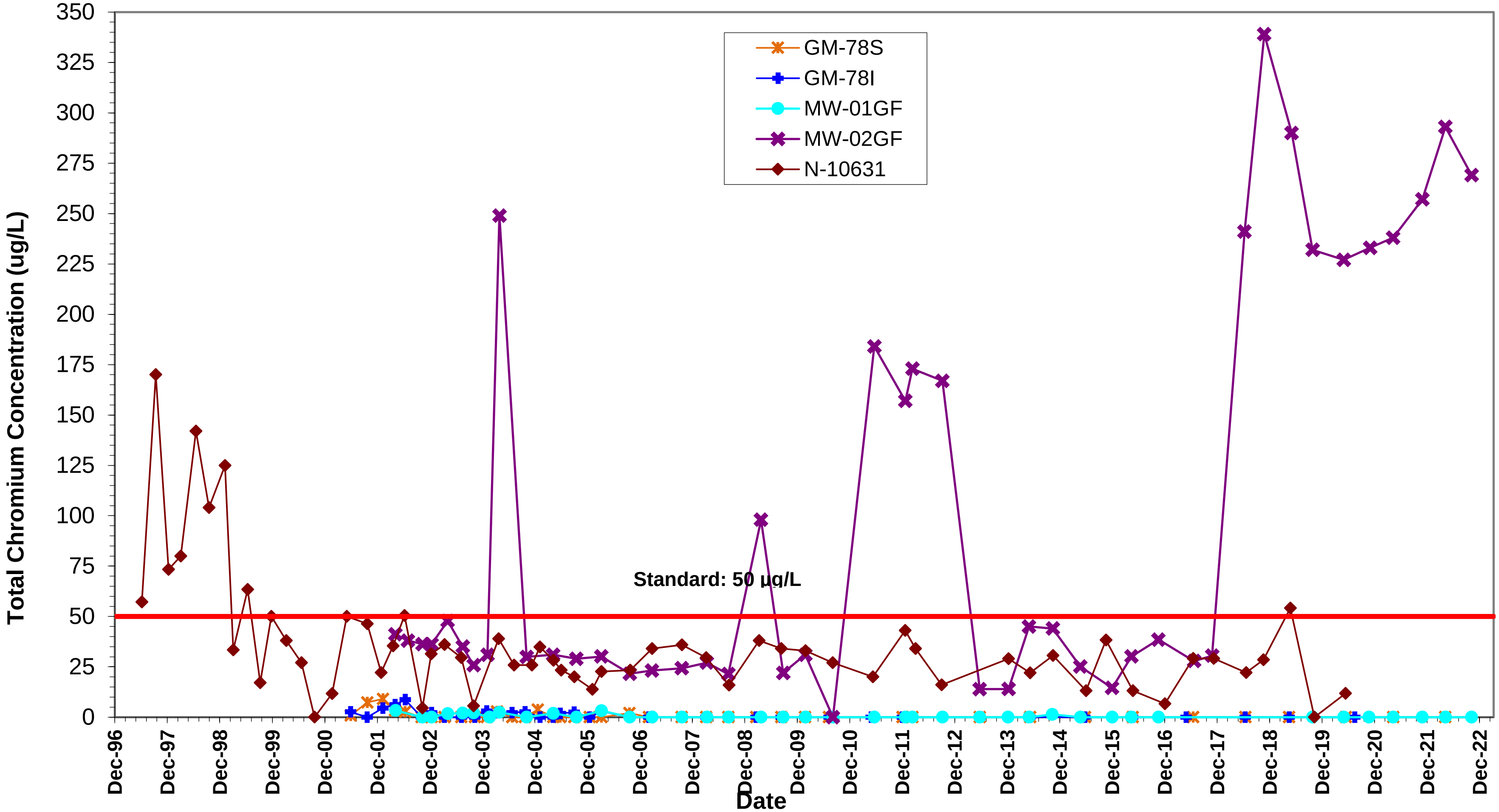
NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Cadmium (unfiltered) Concentrations in Zone 1 Monitoring Wells Near Former Plant 2

ARCADIS

FIGURE **25**

3/6/2023



NORTHROP GRUMMAN
BETHPAGE, NEW YORK
OPERABLE UNIT 2

Total Chromium (unfiltered) Concentrations in Zone 1 Monitoring Wells Near Former Plant 2

ARCADIS

FIGURE 26

Notes and Abbreviations:

µg/L: micrograms per liter

3/6/2023

Appendix A

AROD Table 1 OU2 Plume Constituents

Appendix B

Daily and Monthly Logs

Appendix C

Hazardous Waste Manifests

Appendix D

SPDES Discharge Monitoring Reports

Appendix E

Groundwater Sampling Logs and Chain of Custody Records

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