ARCADIS Design & Consultancy for natural and built assets

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Subject:

2016 Third Quarter Operation Maintenance and Monitoring Report,
Operable Unit 2, Northrop Grumman Systems Corporation and Naval Weapons Industrial Reserve Plant (NWIRP) Sites, Bethpage, New York.
(NYSDEC Site #s 1-30-003A and B)

Dear Henry and Steve:

On behalf of Northrop Grumman Systems Corporation (Northrop Grumman), Arcadis is providing the NYSDEC with the 2016 Third Quarter Operation Maintenance and Monitoring Report (Report). This Report was prepared to document the operation, maintenance, and monitoring (OM&M) activities conducted for the on-site portion of the Operable Unit 2 (OU2) groundwater remedy and the results of ongoing volatile organic compound (VOC) and inorganic monitoring in groundwater to meet the remedial objectives set forth in the March 2001 OU2 Record of Decision (ROD).

Table 1 summarizes OU2 remedial system performance operational data and water balance. Tables 2 and 3 provide the analytical results for remedial system water and vapor samples for this period. Tables 4A and 4B provide the air modeling inputs and outputs and resulting analyses, based on vapor samples

collected from the Tower 96 and Tower 102 systems, respectively, for this period. Table 5 provides the validated analytical results of groundwater monitoring for this period. Figures 1 through 4 show the Locations of Wells and Onsite Groundwater Remedy, Locations of Treatment Systems and Discharges, ONCT Groundwater Extraction and Treatment System Site Plan, and the ONCT Groundwater Extraction and Treatment System Schematic, respectively.

Please contact us if you have any questions or comments.

Sincerely,

Arcadis of New York, Inc.

David E. Stern
Senior Hydrogeologist

Carlo San Giovanni
Project Manager

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**Table 1**

**Operational Summary for the On-Site Portion of the OU2 Groundwater Remedy, Third Quarter 2016 [1]**
**Operable Unit 2, Northrop Grumman Systems Corporation,**
**Bethpage, New York**

| | Quarterly Flow Rates (gpm) | | Quarterly Flow Volumes (MG) | | | Quarterly VOC Concentrations (µg/L) | | VOC Mass Removed (lbs) [7] | |
|---|---|---|---|---|---|---|---|---|---|
| | Design [2] | Average [3,4] | Design [2] | Actual [3,4] | % of Design | TCE [5] | TVOC [5,6] | Quarterly | Cumulative |
| **Influent Groundwater** | | | | | | | | | |
| Well 1 [11,13] | 800 | 827 | 103.7 | 104.0 | 100% | 838 | 880 | 765 | 42,920 |
| Well 3R [11,13] | 700 | 995 | 90.7 | 125.0 | 138% | 579 | 630 | 644 | 88,570 |
| Well 17 [13] | 1,000 | 1,047 | 129.6 | 129.0 | 100% | 132 | 170 | 179 | 52,275 |
| Well 18 [13] | 600 | 1,001 | 77.8 | 122.0 | 157% | 55 | 79 | 79 | 6,091 |
| Well 19 [12,13] | 700 | 771 | 90.7 | 90.0 | 99% | 150 | 180 | 133 | 7,834 |
| **Total [14]** | **3,800** | **4,641** | **493** | **570** | **116%** | **--** | **--** | **1,800** | **197,690** |
| **Effluent Groundwater [8]** | | | | | | | | | |
| Calpine | 100 - 400 | 589 | -- | 78.0 | -- | -- | -- | -- | -- |
| OXY Biosparge [10] | 2 - 42 | 0 | -- | 0 | -- | -- | -- | -- | -- |
| West Recharge Basins | 1,112 - 1,455 | 1,574 | -- | 204.0 | -- | -- | 3.0 | -- | -- |
| South Recharge Basins | 2,231 | 2,222 | 289.1 | 288.0 | 100% | -- | 2.1 | -- | -- |
| **Total [14]** | **--** | **4,385** | **--** | **570** | **--** | | | | |
| **Additional Flow to South Recharge Basins** | | | | | | | | | |
| Storm Water Runoff Contributing to South Recharge Basins Flow Volume [15] | -- | -- | -- | 12.9 | -- | -- | -- | -- | -- |
| **Total Flow Volume to South Recharge Basins [15,16]** | | | **289** | **301** | **104%** | | | | |

| **Treatment Efficiencies [9]** | |
|---|---|
| Tower 96 System: | 99.5% |
| Tower 102 System: | >99.9% |

Notes and abbreviations on last page.

**Table 1**
**Operational Summary for the On-Site Portion of the OU2 Groundwater Remedy, Third Quarter 2016 (1)**
**Operable Unit 2, Northrop Grumman Systems Corporation,**
**Bethpage, New York**

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**Notes and Abbreviations:**

(1) Quarterly reporting period: July 06, 2016 through October 04, 2016.

(2) "Design" flow rates were determined for the five remedial wells and for the South Recharge Basins based on computer modeling (ARCADIS G&M, Inc. 2003c, modified in April 2005). Flow rates for Calpine, OXY Biosparge and West Recharge Basins are typical flow rates and are provided for reader information. "Design" flow volumes represent the volume of water that should be pumped/discharged during the reporting period and is calculated by multiplying the design rate by the reporting period duration.

(3) "Average" 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. During this quarterly reporting period, the remedial wells operated for the following percentage of the time: Well 1 (97%), Well 3R (97%), Well 17 (95%), Well 18 (94%), and Well 19 (90%). "Actual" volumes are determined via totalizing flow meters. Well 1 and 3R totalizing flow meters were replaced during 3Q 2016. Totalizers for those wells were estimated based on influent totalizing flow meter to Tower 96 air stripper.

(4) "Average" flow rates for the system discharges represent the average flow rate during the entire reporting period and are determined by dividing the total flow during the reporting period by the reporting period duration. The Calpine and South Recharge Basins flow volumes are determined via totalizing flow meters. The West Recharge Basin flow is calculated by subtracting the cumulative flow to the other discharges from the total influent flow. Actual flow to the recharge basins is greater, as shown, because storm water combines with the plant effluent prior to discharge to the recharge basins.

(5) The TCE and TVOC concentrations for the remedial wells are from the quarterly sampling event performed during this reporting period on August 17, 2016 (Table 2).

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

(7) TVOC mass removed for the reporting period is calculated by multiplying the TVOC concentration from the quarterly sampling event and the quantity of water pumped during the reporting period.

(8) There are four discharges for the effluent groundwater: South Recharge Basins, West Recharge Basins, Calpine and OXY Biosparge system. Treated water is continuously discharged to the south and west recharge basins, and is available "on-demand" to both the Calpine Power Plant (Calpine) for use as make-up water, and the biosparge remediation system operated by Occidental Chemical (OXY Biosparge).

(9) 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.

(10) Occidental Chemical reported in May 2016 that the OXY Biosparge system required no water usage in the 1st Quarter of 2016, and no planned usage for the remainder of 2016.

(11) Wells 1 and 3R were shut down on July 12 and 13, 2016 for Occidental blower repair, VPGAC inspection, and Occidental carbon changeout at Tower 96.

(12) Well 19 was shut down between July 12 and July 19 due to overheating of the VFD. The issue was remedied by replacing the VFD fan.

(13) The majority of downtime during Third Quarter 2016 was due to communication failures at both systems, repair of a treated water distribution pipeline that briefly affected both systems, and low compressed air at Tower 102. The low compressed air condition was remedied and a radiofrequency survey was completed for ONCT to investigate the cause of communication failures.

(14) Total pumpage/recharge rates are accurate to ±15% due to limitations in metering. Flow meter calibration was completed on September 29, 2016.

(15) Storm Water Runoff Volume is calculated by multiplying the adjusted tributary area and NOAA precipitation data for the reporting periods. The adjusted tributary area is tributary area that is adjusted by the runoff coefficient to exclude the infiltration volume from the total rainfall volume. The tributary area, runoff coeficient, 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.

(16) Total Flow Volume to South Recharge Basins is estimated as a sum of flow volumes contributed from the Effluent Groundwater to South Recharge Basins and from Storm Water Runoff to South Recharge Basins.

| | | | |
|---|---|---|---|
| -- | not applicable | NOAA | National Oceanic and Atmospheric Administration |
| µg/L | micrograms per liter | SPDES | State Pollution Discharge Elimination System |
| gpm | gallons per minute | TCE | trichloroethene |
| lbs | pounds | TVOC | total volatile organic compounds |
| MG | million gallons | VOC | volatile organic compounds |

**Table 2**
**Concentrations of Constituents in Remedial Wells and Treatment System Effluents, Third Quarter 2016, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York**

| Constituents (units in µg/L) | Location ID: / Sample ID: / Sample Date: | WELL 1 / WELL 1 / 8/17/2016 | WELL 3R / WELL 3R / 8/17/2016 | 96 EFFLUENT / T96 EFFLUENT / 9/26/2016 |
|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)[1,2]** | | | | |
| 1,1,1-Trichloroethane | | **0.39 J** | **0.85 J** | <1.0 |
| 1,1,2,2-Tetrachloroethane | | <1.0 | <1.0 | <1.0 |
| 1,1,2-Trichloroethane | | <1.0 | <1.0 | <1.0 |
| 1,2-Dichloropropane | | **4.0** | <1.0 | <1.0 |
| 2-Butanone (MEK) | | <10 | <10 | <10 |
| 2-Hexanone (MBK) | | <5.0 | <5.0 | <5.0 |
| 4-methyl-2-pentanone (MIK) | | <5.0 | <5.0 | <5.0 |
| Acetone | | <10 | <10 | <10 |
| Benzene | | <0.50 | <0.50 | <0.50 |
| Bromodichloromethane | | <1.0 | <1.0 | <1.0 |
| Bromoform | | <1.0 | <1.0 | <1.0 |
| Bromomethane | | <2.0 | <2.0 | <2.0 |
| Carbon Disulfide | | <2.0 | <2.0 | <2.0 |
| Carbon tetrachloride | | <1.0 | <1.0 | <1.0 |
| Chlorobenzene | | <1.0 | <1.0 | <1.0 |
| Chloroethane | | <1.0 | <1.0 | <1.0 |
| Chloroform | | **0.25 J** | <1.0 | <1.0 |
| Chloromethane | | <1.0 | <1.0 | <1.0 |
| cis-1,2-dichloroethene | | **4.5** | **4.9** | <1.0 |
| cis-1,3-dichloropropene | | <1.0 | <1.0 | <1.0 |
| Dibromochloromethane | | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | | <1.0 | <1.0 | <1.0 |
| Methylene Chloride | | <2.0 | <2.0 | <2.0 |
| Styrene | | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | | **28.0** | **33.0** | <1.0 |
| Toluene | | <1.0 | <1.0 | <1.0 |
| trans-1,2-dichloroethene | | <1.0 | <1.0 | <1.0 |
| trans-1,3-dichloropropene | | <1.0 | <1.0 | <1.0 |
| Trichloroethylene | | **838 D** | **579 D** | **3.5** |
| Trichlorotrifluoroethane (Freon 113) | | **3.8 J** | **4.1 J** | <5.0 |
| Vinyl Chloride | | <1.0 | **5.0** | <1.0 |
| Xylene-o | | <1.0 | <1.0 | <1.0 |
| Xylenes - m,p | | <1.0 | <1.0 | <1.0 |
| **Total VOCs[3]** | | **880** | **630** | **3.5** |
| **1,4-Dioxane[1,2]** | | **3.99** | **5.33** | **NA** |

Notes and abbreviations on last page.

**Table 2**
**Concentrations of Constituents in Remedial Wells and Treatment System Effluents, Third Quarter 2016, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York**

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| Constituents (units in µg/L) | Location ID: / Sample ID: / Sample Date: | WELL 17 / WELL 17 / 8/17/2016 | Well 18 / Well 18 / 8/17/2016 | WELL 18 / REP-081716-KD-1 / 8/17/2016 | WELL 19 / WELL 19 / 8/17/2016 | 102 EFFLUENT / T102 EFFLUENT / 8/17/2016 |
|---|---|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)[1,2]** | | | | | | |
| 1,1,1-Trichloroethane | | **0.34 J** | **0.64 J** | **0.63 J** | **0.41 J** | <1.0 |
| 1,1,2,2-Tetrachloroethane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,1,2-Trichloroethane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 1,2-Dichloropropane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| 2-Butanone (MEK) | | <10 | <10 | <10 | <10 | <10 |
| 2-Hexanone (MBK) | | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 4-methyl-2-pentanone (MIK) | | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Acetone | | <10 | <10 | <10 | <10 | <10 |
| Benzene | | <0.50 | <0.50 | <0.50 | <0.50 | <0.50 |
| Bromodichloromethane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromoform | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Bromomethane | | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Carbon Disulfide | | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Carbon tetrachloride | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chlorobenzene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroethane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Chloroform | | **0.34 J** | **0.25 J** | **0.23 J** | **0.43 J** | <1.0 |
| Chloromethane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| cis-1,2-dichloroethene | | **3.0** | **2.4** | **2.4** | **17** | <1.0 |
| cis-1,3-dichloropropene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Dibromochloromethane | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Ethylbenzene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Methylene Chloride | | <2.0 | <2.0 | <2.0 | <2.0 | <2.0 |
| Styrene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Tetrachloroethene | | **25.4** | **14.5** | **14.4** | **6.9** | <1.0 |
| Toluene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,2-dichloroethene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| trans-1,3-dichloropropene | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Trichloroethylene | | **132** | **54.7** | **54** | **150** | <1.0 |
| Trichlorotrifluoroethane (Freon 113) | | **4.1 J** | **1.8 J** | **1.9 J** | <5.0 | <5.0 |
| Vinyl Chloride | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Xylene-o | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| Xylenes - m,p | | <1.0 | <1.0 | <1.0 | <1.0 | <1.0 |
| **Total VOCs[3]** | | **170** | **79** | **79** | **180** | 0 |
| **1,4-Dioxane[1,2]** | | **4.40** | **2.75** | **3.51** | **3.67** | **4.25** |

Notes and abbreviations on last page.

**Table 2**
**Concentrations of Constituents in Remedial Wells and Treatment System Effluents, Second Quarter 2016, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York**

**Notes and Abbreviations:**

(1) VOC samples analyzed using USEPA Method 8260C. 1,4-Dioxane samples analyzed using USEPA Method 8270 SIM.
(2) Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016).
(3) Total VOC results rounded to two significant figures.

NA Not Analyzed
**2.4** Bold value indicates the constituent was detected at or above its reporting limit.
< 5.0 Compound is not detected above its laboratory quantification limit.
µg/L micrograms per liter
D Concentration is based on a diluted sample analysis.
J Constituent value is estimated.
NYSDEC New York State Department of Conservation
REP blind replicate sample
SIM selective ion monitoring
SPDES State Pollution Discharge Elimination System
TCE Trichloroethylene
VOC volatile organic compounds

**Table 3**
**Vapor Sample Analytical Results for Treatment Systems, Third Quarter 2016, Northrop Grumman Systems Corporation, Operable Unit 2, Bethpage, New York**

| Location ID: / Sample ID: / Constituents (Units in µg/m³) / Date: | 96 INFLUENT T96 INFLUENT (AA) 8/17/2016 | 96 MID-EFFLUENT T96 MIDTRAIN (AA) 8/17/2016 | 96 EFFLUENT T96 EFFLUENT (AA) 8/17/2016 | 102 INFLUENT T102 INFLUENT (AA) 8/17/2016 | 102 EFFLUENT T102 EFFLUENT (AA) 8/17/2016 |
|---|---|---|---|---|---|
| **Volatile Organic Compounds (VOCs)[1]** | | | | | |
| 1,1,1-Trichloroethane | **19** | **8.2** | <0.55 | **98** | **0.65** |
| 1,1,2,2-Tetrachloroethane | <14 | <5.5 | <0.69 | <8.9 | <0.69 |
| 1,1,2-Trichloroethane | <11 | <4.4 | <0.55 | <7.1 | <0.55 |
| 1,1-Dichloroethane | **38** | **39** | **2.0** | **121** | **10** |
| 1,1-Dichloroethylene | **111** | **140** | **14** | **271** | **77** |
| 1,2-Dichloroethane | <16 | <6.5 | <0.81 | **7.3 J** | <0.81 |
| 1,2-Dichloropropane | **64** | **14** | <0.92 | **6.9 J** | <0.92 |
| Benzene | <13 | <5.1 | <0.64 | <8.0 | **0.42** |
| Bromodichloromethane | <13 | <5.4 | <0.67 | <8.7 | <0.67 |
| Bromoform | <8.3 | <3.3 | <0.41 | <5.3 | <0.41 |
| Bromomethane | <16 | <6.2 | <0.78 | <9.7 | <0.78 |
| Carbon disulfide | <12 | <5.0 | <0.62 | <7.8 | <0.62 |
| Carbon tetrachloride | <5.0 | <2.0 | <0.25 | **9.4** | <0.25 |
| Chlorobenzene | <18 | <7.4 | <0.92 | <12 | <0.92 |
| Chloroethane | <11 | **5.3** | **6.3** | <6.6 | <0.53 |
| Chloroform | <20 | **6.8 J** | <0.98 | **40** | **1.5** |
| Chloromethane | <8.3 | <3.3 | **5.0** | <5.2 | **0.89** |
| cis-1,3-Dichloropropene | <18 | <7.3 | <0.91 | <11 | <0.91 |
| Dibromochloromethane | <17 | <6.8 | <0.85 | <11 | <0.85 |
| Ethylbenzene | <17 | <6.9 | <0.87 | <11 | <0.87 |
| Methylene chloride | **8.7 J** | **5.2 J** | **1.1** | <8.7 | **1.3** |
| Styrene | <17 | <6.8 | <0.85 | <11 | <0.85 |
| Tetrachloroethylene | **936** | **37** | <0.27 | **773** | **0.36** |
| Toluene | <15 | <6.0 | <0.75 | <9.4 | <0.75 |
| trans-1,3-Dichloropropene | <18 | <7.3 | <0.91 | <11 | <0.91 |
| Trichloroethylene | **23,400** | **3,770** | **1.6** | **8,550** | **13** |
| Trichlorotrifluoroethane (Freon 113) | **128** | **94** | <0.77 | **251** | **16** |
| Vinyl chloride | **83** | **113** | **3.6** | <1.3 | **0.54** |
| Xylene-o | <17 | <6.9 | <0.87 | <11 | **0.56** |
| Xylenes - m,p | <17 | <6.9 | <0.87 | <11 | **0.42** |
| **Total VOCs [2]** | **24,787** | **4,232** | **34** | **10,128** | **123** |

Notes and abbreviations on last page.

**Table 3**
**Vapor Sample Analytical Results for Treatment Systems,**
**Third Quarter 2016, Northrop Grumman Systems Corporation,**
**Operable Unit 2, Bethpage, New York**

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**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) "Total VOCs" represents the sum of individual concentrations of compounds detected rounded to the nearest whole number.

**19** Bold data indicates that the analyte was detected at or above its reporting limit.
ELAP Environmental Laboratory Approval Program
J Compound detected below its reporting limit; value is estimated.
NYSDOH New York State Department of Health
USEPA United States Environmental Protection Agency
VOC volatile organic compound
$\mu g/m^3$ micrograms per cubic meter

**Table 4A**
**Summary of AERMOD Air Quality Impact Analysis**
**Tower 96 Treatment System, Operable Unit 2,**
**Northrop Grumman Systems Corporation,**
**Bethpage, New York**

| Constituent | CAS# | T96 Effluent (ug/m3) | Emission Rate[1] | | | Scaled Impact - Hourly [2] ($ug/m^3$) | Scaled Impact - Annual [2] ($ug/m^3$) | SGC [3] ($ug/m^3$) | AGC[3] ($ug/m^3$) | Modeled Impacts < SGC and AGC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 8/17/2016 | lb/yr | lb/hr | g/s | | | | | |
| 1,1 - Dichloroethane | 00075-34-3 | 2.0 | 0.31 | 3.56E-05 | 4.49E-06 | 8.48E-04 | 2.71E-05 | -- | 6.30E-01 | Yes |
| 1,1 - Dichloroethene | 00075-35-4 | 14 | 2.18 | 2.49E-04 | 3.14E-05 | 5.94E-03 | 1.90E-04 | -- | 200 | Yes |
| Trichloroethene | 00079-01-6 | 1.6 | 0.25 | 2.85E-05 | 3.59E-06 | 6.79E-04 | 2.17E-05 | 20 | 2.00E-01 | Yes |
| Vinyl Chloride | 00075-01-4 | 3.6 | 0.56 | 6.41E-05 | 8.07E-06 | 1.53E-03 | 4.87E-05 | 180000 | 1.1E-01 | Yes |
| Chloroethane | 00075-00-3 | 6.3 | 0.98 | 1.12E-04 | 1.41E-05 | 2.67E-03 | 8.53E-05 | -- | 10000 | Yes |
| Chloromethane | 00074-87-3 | 5.0 | 0.78 | 8.90E-05 | 1.12E-05 | 2.12E-03 | 6.77E-05 | 22000 | 90 | Yes |
| Dichloromethane | 00075-09-2 | 1.1 | 0.17 | 1.96E-05 | 2.47E-06 | 4.67E-04 | 1.49E-05 | 14000 | 60 | Yes |
| | | | | | | | | | | |

Notes and abbreviations on last page.

**Table 4A**
**Summary of AERMOD Air Quality Impact Analysis**
**Tower 96 Treatment System, Operable Unit 2,**
**Northrop Grumman Systems Corporation,**
**Bethpage, New York**

**Notes and Abbreviations:**

(1) Emission rate calculated based on effluent concentration and a stack air flow rate of 4,720 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on the day of sampling.
Trichloroethene (lb/hr) = (1.6 ug/$m^3$) x (4,720 $ft^3$/min) x (1 $m^3$/35 $ft^3$) x (60 min/hr) x (0.000001 g/1 ug) x (0.0022 lb/g)
lb/yr = lb/hr x 8,760 hrs/yr
g/s = lb/hr x 1 hr/3,600 sec x 453.59 g/1 lb

(2) Ambient impact based on AERMOD modeling using noramalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Farmingdale, NY) for the years 2011 through 2015, and a stack which is 55 feet high and 20 inches in diameter. The maximum impact from all the years was used for the calculations.
Scaled hourly impact (ug/$m^3$) = AERMOD predicted hourly ambient impact at 1 g/s ([ug/$m^3$]/[g/s]) x Actual emission rate (g/s)
Scaled annual impact (ug/$m^3$) = AERMOD predicted annual ambient impact at 1 g/s ([ug/$m^3$]/[g/s]) x Actual emission rate (g/s)

| AERMOD Normalized Ambient Impact at 1 g/s | |
|---|---|
| Hourly ([ug/$m^3$]/[g/s]) | Annual ([ug/$m^3$]/[g/s]) |
| 189.14 | 6.04 |

(3) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
(4) The receptor height corresponds to the average inhalation level.

| | |
|---|---|
| µg/$m^3$ | micrograms per cubic meter |
| lb/yr | pounds per year |
| lb/hr | pounds per hour |
| g/s | grams per second |
| 0.57 | bold value indicates a detection |
| AGC | annual guideline concentration |
| SGC | short-term guideline concentration |
| acfm | actual cubic feet per minute |
| DAR-1 | Division of Air Resources-1 |
| NYSDEC | New York State Department of Environmental Conservation |

**Table 4B**
**Summary of AERMOD Air Quality Impact Analysis**
**Tower 102 Treatment System, Operable Unit 2,**
**Northrop Grumman Systems Corporation,**
**Bethpage, New York**

| Constituent | CAS# | T102 Effluent ($ug/m^3$) | Emission Rate[1] | | | Scaled Impact -Hourly [2] ($ug/m^3$) | Scaled Impact -Annual [2] ($ug/m^3$) | SGC [3] ($ug/m^3$) | AGC[3] ($ug/m^3$) | Modeled Impacts < SGC and AGC (Yes/No) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 8/17/2016 | lb/yr | lb/hr | g/s | | | | | |
| 1,1,1 - Trichloroethane | 00071-55-6 | 0.65 | 0.17 | 1.91E-05 | 2.41E-06 | 2.71E-04 | 5.97E-06 | 9000 | 5000 | Yes |
| 1,1 - Dichloroethane | 00075-34-3 | 10 | 2.57 | 2.94E-04 | 3.70E-05 | 4.17E-03 | 9.18E-05 | -- | 6.30E-01 | Yes |
| 1,1 - Dichloroethene | 00075-35-4 | 76.9 | 19.79 | 2.26E-03 | 2.85E-04 | 3.21E-02 | 7.06E-04 | -- | 200 | Yes |
| Tetrachloroethene | 00127-18-4 | 0.36 | 0.09 | 1.06E-05 | 1.33E-06 | 1.50E-04 | 3.30E-06 | 300 | 4 | Yes |
| Trichloroethene | 00079-01-6 | 13 | 3.35 | 3.82E-04 | 4.81E-05 | 5.42E-03 | 1.19E-04 | 20 | 2.00E-01 | Yes |
| Vinyl Chloride | 00075-01-4 | 0.54 | 0.14 | 1.59E-05 | 2.00E-06 | 2.25E-04 | 4.96E-06 | 180000 | 1.1E-01 | Yes |
| Benzene | 00071-43-2 | 0.42 | 0.11 | 1.23E-05 | 1.55E-06 | 1.75E-04 | 3.86E-06 | 1300 | 1.30E-01 | Yes |
| Total Xylene | 01330-20-7 | 0.98 | 0.25 | 2.88E-05 | 3.63E-06 | 4.09E-04 | 9.00E-06 | 37000 | 5000 | Yes |
| Chloroform | 00067-66-3 | 1.5 | 0.39 | 4.41E-05 | 5.55E-06 | 6.25E-04 | 1.38E-05 | 150 | 14.7 | Yes |
| Chloromethane | 00074-87-3 | 0.89 | 0.23 | 2.61E-05 | 3.29E-06 | 3.71E-04 | 8.17E-06 | 22000 | 90 | Yes |
| Dichloromethane | 00075-09-2 | 1.3 | 0.33 | 3.82E-05 | 4.81E-06 | 5.42E-04 | 1.19E-05 | 14000 | 60 | Yes |
| Trichlorotrifluoroethane (Freon 113) | 00076-13-1 | 16 | 4.12 | 4.70E-04 | 5.92E-05 | 6.67E-03 | 1.47E-04 | 960000 | 180000 | Yes |
| | | | | | | | | | | |

Notes and abbreviations on last page.

**Table 4B**
**Summary of AERMOD Air Quality Impact Analysis**
**Tower 102 Treatment System, Operable Unit 2,**
**Northrop Grumman Systems Corporation,**
**Bethpage, New York**

**Notes and Abbreviations:**

(1) Emission rate calculated based on effluent concentration and a stack air flow rate of 7,790 cfm. The stack air flow rate (in acfm) is taken from the actual stack air flow rate on the day of sampling.
Trichloroethene (lb/hr) = (13 ug/$m^3$) x (4,720 $ft^3$/min) x (1 $m^3$/35 $ft^3$) x (60 min/hr) x (0.000001 g/1 ug) x (0.0022 lb/g)
lb/yr = lb/hr x 8,760 hrs/yr
g/s = lb/hr x 1 hr/3,600 sec x 453.59 g/1 lb

(2) Ambient impact based on AERMOD modeling using noramalized rate of 1 g/s is scaled to the actual emission rate of the pollutant. Modeling was performed using the representative meteorological data from the nearest station (Farmingdale, NY) for the years 2011 through 2015, and a stack which is 69.52 feet high and 24 inches in diameter. The maximum impact from all the years was used for the calculations.
Scaled hourly impact (ug/$m^3$) = AERMOD predicted hourly ambient impact at 1 g/s ([ug/$m^3$]/[g/s]) x Actual emission rate (g/s)
Scaled annual impact (ug/$m^3$) = AERMOD predicted annual ambient impact at 1 g/s ([ug/$m^3$]/[g/s]) x Actual emission rate (g/s)

| AERMOD Normalized Ambient Impact at 1 g/s | |
|---|---|
| Hourly ([ug/$m^3$]/[g/s]) | Annual ([ug/$m^3$]/[g/s]) |
| 112.65 | 2.48 |

(3) Short-term and annual guideline concentrations for air toxic pollutants specified in the NYSDEC DAR-1 AGC/SGC tables revised August 10, 2016.
(4) The receptor height corresponds to the average inhalation level.

| | |
|---|---|
| µg/$m^3$ | micrograms per cubic meter |
| lb/yr | pounds per year |
| lb/hr | pounds per hour |
| g/s | grams per second |
| 0.57 | bold value indicates a detection |
| AGC | annual guideline concentration |
| SGC | short-term guideline concentration |
| acfm | actual cubic feet per minute |
| DAR-1 | Division of Air Resources-1 |
| NYSDEC | New York State Department of Environmental Conservation |

**Table 5.**
**Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Monitoring Wells [1]**
**BPOW 2-1, BPOW 2-2 and BPOW 2-3, Third Quarter 2016**
**Operable Unit 2 (Groundwater),**
**Bethpage, New York**

| Well: / Sample ID: / CONSTITUENT / Date: / Units (ug/L) | BPOW 2-1<br>BPOW 2-1<br>8/12/2016 | BPOW 2-2<br>BPOW 2-2<br>8/10/2016 | BPOW 2-3<br>BPOW 2-3<br>8/30/2016 |
|---|---|---|---|
| **Volatile Organic Compounds (VOCs) [2][3]** | | | |
| 1,1,1-Trichloroethane | <0.50 | <0.50 | <0.50 |
| 1,1,2,2-Tetrachloroethane | <0.50 | <0.50 | <0.50 |
| 1,1,2-trichloro-1,2,2-trifluroethane | <1.0 | <1.0 | <1.0 |
| 1,1,2-Trichloroethane | <0.50 | <0.50 | <0.50 |
| 1,1-Dichloroethane | <0.50 | <0.50 | <0.50 |
| 1,1-Dichloroethene | <0.50 | <0.50 | <0.50 |
| 1,2-Dichloroethane | <0.50 | <0.50 | <0.50 |
| 1,2-Dichloropropane | <0.50 | <0.50 | <0.50 |
| 2-Butanone (MEK) | <5.0 | <5.0 | <5.0 |
| 2-Hexanone | <2.0 | <2.0 | <2.0 |
| 4-methyl-2-pentanone (MIK) | <2.0 | <2.0 | <2.0 |
| Acetone | <5.0 | <5.0 | <5.0 |
| Benzene | **0.067 J** | <0.50 | <0.50 |
| Bromodichloromethane | <0.50 | <0.50 | <0.50 |
| Bromoform | <0.50 | <0.50 | <0.50 |
| Bromomethane | <0.50 | <0.50 | <0.50 |
| Carbon Disulfide | <0.50 | <0.50 | <0.50 |
| Carbon tetrachloride | <0.50 | <0.50 | <0.50 |
| Chlorobenzene | <0.50 | <0.50 | <0.50 |
| Chloroethane | <0.50 | <0.50 | <0.50 |
| Chloroform | <0.50 | <0.50 | <0.50 |
| Chloromethane | <0.50 | <0.50 | <0.50 |
| cis-1,2-dichloroethene | <0.50 | <0.50 | <0.50 |
| cis-1,3-dichloropropene | <0.50 | <0.50 | <0.50 |
| Dibromochloromethane | <0.50 | <0.50 | <0.50 |
| Ethylbenzene | <0.50 | <0.50 | <0.50 |
| Methylene Chloride | <0.50 | <0.50 | <0.50 |
| Styrene | <0.50 | <0.50 | <0.50 |
| Tetrachloroethene | <0.50 | <0.50 | <0.50 |
| Toluene | <0.50 | <0.50 | <0.50 |
| trans-1,2-dichloroethene | <0.50 | <0.50 | <0.50 |
| trans-1,3-dichloropropene | <0.50 | <0.50 | <0.50 |
| Trichloroethylene | <0.50 | <0.50 | <0.50 |
| Vinyl Chloride | <0.50 | <0.50 | <0.50 |
| Xylene-o | <0.50 | <0.50 | <0.50 |
| Xylenes - m,p | <0.50 | <0.50 | <0.50 |
| **Total VOCs [4]** | **0.07** | 0 | 0 |
| **1,4-Dioxane [2] [3]** | **0.547** | **0.346** | **3.21** |

See last page for Notes and Abbreviations.

**Table 5.**
**Concentrations of Volatile Organic Compounds and 1,4-Dioxane in Monitoring Wells [1]**
**BPOW 2-1, BPOW 2-2 and BPOW 2-3, Third Quarter 2016**
**Operable Unit 2 (Groundwater),**
**Bethpage, New York**

**Notes and Abbreviations:**

| | |
|---|---|
| (1) | These outpost wells have been recently repurposed for use as plume monitoring wells per the June 2015 Groundwater Monitoring Plan Addendum (ARCADIS of New York, Inc., 2015) as conditionally approved by the NYSDEC (August 25, 2015). Therefore, TVOC trigger levels that may have been previously established are no longer shown |
| (2) | Samples were analyzed for VOCs using USEPA Method 524.2; samples were analyzed for 1,4-Dioxane using USEPA Method 522 |
| (3) | Results for the program are validated at 20% frequency, per protocols specified in OU2 Groundwater Monitoring Plan (Arcadis 2016) |
| (4) | Total VOCs are rounded to two significant figures |
| **0.547** | Bold value indicates constituent detected at or above its reporting limit. |
| J | Constituent value is estimated |
| TVOCs | Total Volatile Organic Compounds |
| VOC | Volatile Organic Compounds |
| µg/L | micrograms per liter |
| <0.5 | Compound not detected above its laboratory quantification limit. |

HWD 10208
HWD 8779
FORMER OXY/RUCO POLYMER SITE
(107)
PLANT 111
PLANT 110
PLANT 115
PLANT 21
PLANT 37
PLANT 35
PLANT 15
PLANT 14
PLANT 26
PLANT 30
BETHPAGE COMMUNITY PARK
NWIRP SITE (FORMER NAVY SITE)
PLANT 12
PLANT 12A
PLANT 3
HN-24I
HN-24S
FW-03
PLANT 10
WT
HN-42S
HN-42I
FARMERS AVENUE
BWD 8768
BWD 8767
HAYPATH ROAD
(PLAINVIEW ROAD)
BETHPAGE COMMUNITY PARK
BETHPAGE HIGH SCHOOL
BWD 9591
GM-13D
GM-16I
GM-16SR
HN-40S
HN-40I
BROADWAY
MW-3-1
WELL 3R
WELL 3
10597
GM-17SR
GM-17I
GM-17D
PLANT 5 BASINS
PLANT 5
OU2 MAIN FACILITY REMEDIAL SYSTEM (TOWER 96)
OU2 MAIN FACILITY REMEDIAL SYSTEM (TOWER 102)
EXISTING OU2 TREATMENT SYSTEMS
MW-1GF
GM-32S
PLANT 2
PLANT 1 FUEL DEPOT AREA
GRUMMAN ROAD
PLANT 1
OU-2 ON-SITE GROUNDWATER REMEDY TREATMENT SYSTEMS
WELL 1
GM-18S
GM-18I
GM-18D
MW-2GF
GM-39DA
GM-39DB
GM-19S
GM-19I
MW-5
MW-4
MW-6
GM-15SR
GM-15I
GM-15D
GM-15D2
GM-73D3
GM-73D2
GM-73D
GM-74I
GM-74D
GM-74D2
GM-74D3
WELL 19
GM-33D2
10631
WELL 18
SOUTH BASINS
WELL 17
10600
GM-78S
GM-78I
GM-78D
GM-78D2
GM-20I
GM-20D
GM-21D2
10633
BLOOMINGDALE ROAD
CENTRAL AVENUE
9921
GM-21S
GM-21I
GM-21D
GM-75D2
10624
10627
GM-79I
GM-79D
10628
LONG ISLAND RAILROAD
GM-37D
GM-37D2
10634
GM-71D2
GM-70D2
GM-35D2
GM-36D
GM-36D2
N-10821
BWD 6915
6916
NORTH WANTAGH AVE.
HICKSVILLE ROAD
STEWART AVENUE
BETHPAGE STATE PARKWAY
SEAFORD - OYSTER BAY EXPRESSWAY
MALLARD ROAD
(GARDINER'S AVENUE)
LOWLAND ROAD
GM-34D
GM-34D2
BWD 8941
3876
GM-38D
GM-38D2
BWD 8004
TOH(LWD) 7076
PIKE
BPOW 1-4
BPOW 1-5
BPOW 1-6
BPOW 1-3
BPOW 1-1
BPOW 1-2
SFWD 7377
SFWD 5148
SFWD 4043
BOUNDARY AVENUE
BPOW 4-2R
BPOW 4-1R
TOH(LWD) 5303
BPOW 2-2
BPOW 2-3
BPOW 2-1
SFWD 6150
BPOW 3-3
BPOW 3-4
BPOW 3-2
BPOW 3-1
NYAW 9338
NYAW 8480
HICKSVILLE

EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- PROPERTY BOUNDARY OF THE FORMER OXY/RUCO SITE
- LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2009)
- DENOTES NAVY OWNED PROPERTY (AS OF 2014)
- DENOTES FORMER NAVY OWNED PROPERTY
- RECHARGE BASIN
- 10592 OBSERVATION/MONITORING/OUTPOST WELL (1)
- 9591 PUBLIC SUPPLY WELL (2)
- WELL-17 NORTHROP GRUMMAN REMEDIAL WELL
- PART OF ON-SITE REMEDY
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
- TOH (LWD) TOWN OF HEMPSTEAD LEVITOWN WATER DISTRICT
- HWD HICKSVILLE WATER DISTRICT
- SFWD SOUTH FARMINGDALE WATER DISTRICT
- BWD BETHPAGE WATER DISTRICT
- NYAW NEW YORK AMERICAN WATER

NOTE:

(1) THIS FIGURE DEPICTS OBSERVATION/MONITORING/OUTPOST WELLS INCLUDED IN THE OU-2 GROUNDWATER MONITORING PROGRAM.

(2) PUBLIC SUPPLY WELLS ARE NOT SAMPLED AS A PART OF THE OU2 GROUNDWATER MONITORING PROGRAM AND ARE ONLY FOR REFERENCE.

0 1000' 2000'
APPROXIMATE SCALE IN FEET

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
**OPERABLE UNIT 2**

# LOCATIONS OF WELLS AND ON-SITE GROUNDWATER REMEDY

ARCADIS Design & Consultancy for natural and built assets

FIGURE 1

CITY:(Reqd) DIV/GROUP:(Reqd) DB:(Reqd) LD:(Opt) PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
\\arcadis-us.com\officedata\Syracuse-NY\ENVCAD\SYRACUSE\ACTIVE\NY001496\315\IGWMI4\149613154F02.dwg LAYOUT: 2 SAVED: 5/23/2016 12:01 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 8/11/2016 3:12 PM BY: IAMICELI, KIMBERLY
XREFS: IMAGES: PROJECTNAME: ----
Xr1496X01
XrBDR-CP

FORMER RUCO POLYMER SITE

OU-3 GROUNDWATER/SOIL GAS TREATMENT SYSTEMS

BETHPAGE COMMUNITY PARK

NWIRP SITE (FORMER NAVY SITE)

OU3 OUTFALL 001

OU2 OUTFALL 006

OU2 OUTFALL 005

PLANT 5 BASINS

OU-2 ON-SITE GROUNDWATER REMEDY TREATMENT SYSTEMS

SOUTH BASINS

OU2 MAIN FACILITY REMEDIAL SYSTEM (TOWER 96)

OU2 MAIN FACILITY REMEDIAL SYSTEM (TOWER 102)

EXISTING OU2 TREATMENT SYSTEMS

WELL 3R

WELL 1

WELL-17

WELL-18

WELL-19

RW-1

RW-2

RW-3

RW-4

HAYPATH ROAD

FARMERS AVENUE

(PLAINVIEW ROAD)

BROADWAY

GRUMMAN ROAD

LONG ISLAND RAILROAD

CENTRAL AVENUE

BLOOMINGDALE ROAD

NORTH WANTAGH AVE.

HICKSVILLE ROAD

STEWART AVENUE

SEAFORD - OYSTER BAY EXPRESSWAY

BETHPAGE STATE PARKWAY

MALLARD ROAD

(GARDINER'S AVENUE)

LOWLAND ROAD

PIKE

BOUNDARY AVENUE

BETHPAGE HIGH SCHOOL

EXPLANATION

- PROPERTY BOUNDARY OF THE FORMER GRUMMAN AEROSPACE SITE
- PROPERTY BOUNDARY OF THE FORMER NAVY SITE
- PROPERTY BOUNDARY OF THE FORMER OXY/RUCO SITE
- LONG ISLAND RAILROAD
- DENOTES NORTHROP GRUMMAN OWNED PROPERTY (AS OF 2009)
- DENOTES NAVY OWNED PROPERTY (AS OF 2014)
- DENOTES FORMER NAVY OWNED PROPERTY
- RECHARGE BASIN
- 10592 OBSERVATION/MONITORING/OUTPOST WELL (1)
- 9591 PUBLIC SUPPLY WELL (2)
- WELL-17 NORTHROP GRUMMAN REMEDIAL WELL
- PART OF ON-SITE REMEDY
- NWIRP NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
- TOH (LWD) TOWN OF HEMPSTEAD LEVITOWN WATER DISTRICT
- HWD HICKSVILLE WATER DISTRICT
- SFWD SOUTH FARMINGDALE WATER DISTRICT
- BWD BETHPAGE WATER DISTRICT
- NYAW NEW YORK AMERICAN WATER

NOTE:

(1) THIS FIGURE DEPICTS OBSERVATION/MONITORING/OUTPOST WELLS INCLUDED IN THE OU-2 GROUNDWATER MONITORING PROGRAM.

(2) PUBLIC SUPPLY WELLS ARE NOT SAMPLED AS A PART OF THE OU2 GROUNDWATER MONITORING PROGRAM AND ARE ONLY FOR REFERENCE.

0 1000' 2000'

APPROXIMATE SCALE IN FEET

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
**OPERABLE UNITS 2 AND 3**

# LOCATIONS OF TREATMENT SYSTEMS AND DISCHARGES

ARCADIS Design & Consultancy for natural and built assets

FIGURE 2

PLANT 25

PLANT 23

PLANT 5

TOWER 102
TREATMENT
SYSTEM

WELL 3R

WEST RECHARGE BASINS
(OUTFALL 006)

WELL 3

TOWER 96
TREATMENT
SYSTEM

PLANT 2

ROUTE 107

WELL 1

HICKSVILLE RD

HICKSVILLE-MASSAPEQUA RD

AERATION BASIN

LIRR

WELL 17

WELL 18

SOUTH RECHARGE BASINS
(OUTFALL 005)

WELL 19

GRUMMAN ROAD WEST

LONG ISLAND RAILROAD

GRUMMAN ROAD EAST

PLANT 1

SUN-SITE

CENTRAL AVENUE

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:

DRAWING IS NOT TO BE USED FOR DESIGN PURPOSES. LAYOUT OF PIPING IS FOR REPRESENTATION ONLY (LOCATIONS ARE APPROXIMATE).

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
**OPERABLE UNIT 2**

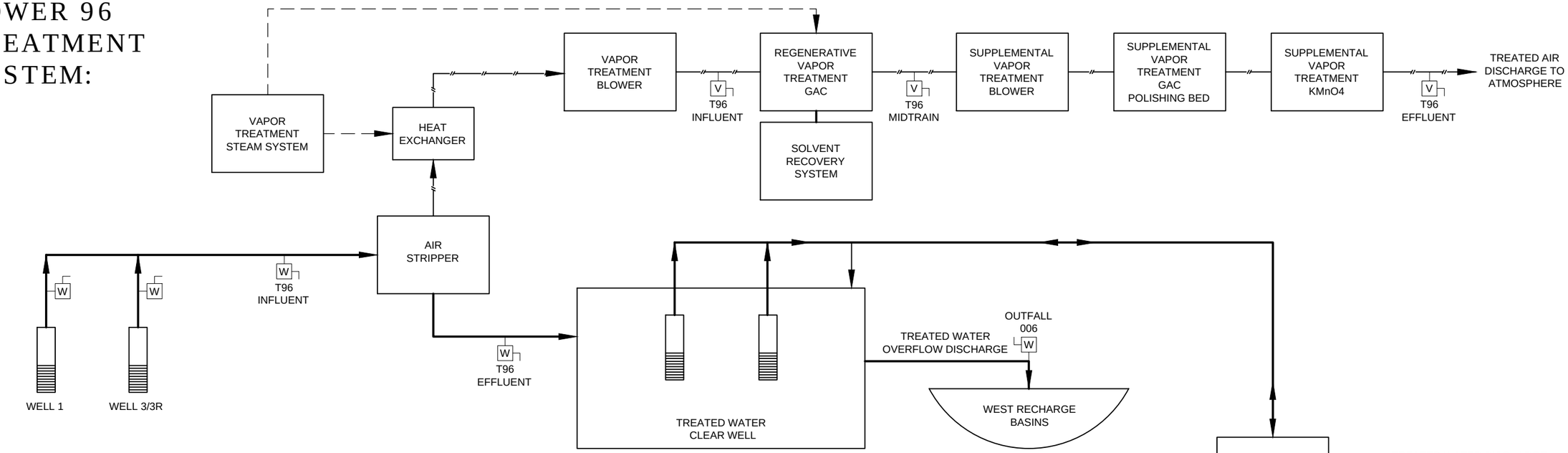
# ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SITE PLAN

ARCADIS Design & Consultancy for natural and built assets

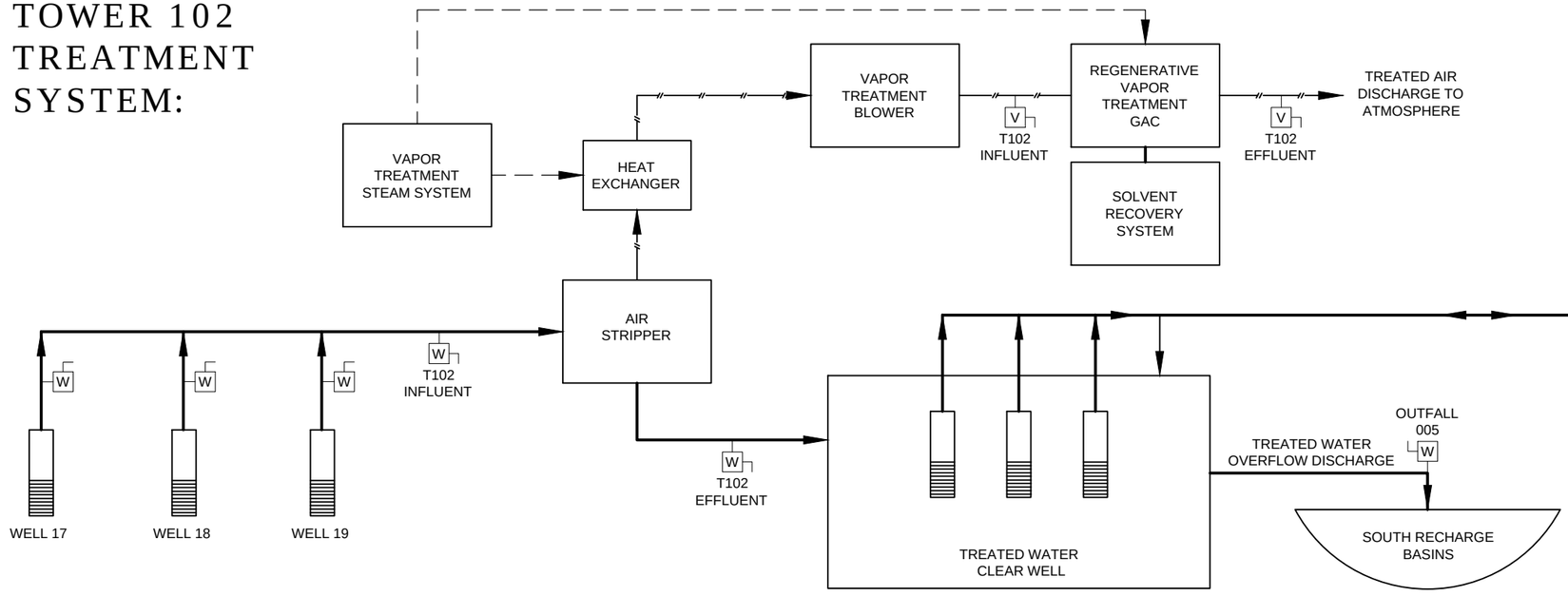
FIGURE
3

CITY:SYRACUSE-NY DIV/GROUP:ENV DB:A.SANCHEZ LD:ALS PIC:(Opt) PM:(Reqd) TM:(Opt) LYR:(Opt)ON=*;OFF=*REF*
\\arcadis-us.com\offcedata\Syracuse-NY\ENVCAD\SYRACUSE\ACTNY001496\31SIGWM\41496131SIGWM03.dwg LAYOUT: 3 SAVED: 3/18/2016 2:32 PM ACADVER: 19.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: ---- PLOTTED: 8/11/2016 3:16 PM BY: IAMICELI, KIMBERLY
XREFS: IMAGES: PROJECTNAME: ----
NG_GW PIPE
X-BDR-BL

## TOWER 96 TREATMENT SYSTEM:




## TOWER 102 TREATMENT SYSTEM:




LEGEND:

| | |
|---|---|
| | PROCESS WATER |
| | PROCESS AIR |
| | STEAM |
| | SAMPLE LOCATION |
| W | WATER SAMPLE |
| V | VAPOR SAMPLE |
| ONCT | ON-SITE CONTAMINANT |

NORTHROP GRUMMAN SYSTEMS CORPORATION
BETHPAGE, NEW YORK
**OPERABLE UNIT 2**

# ONCT GROUNDWATER EXTRACTION AND TREATMENT SYSTEM SCHEMATIC

ARCADIS Design & Consultancy for natural and built assets

FIGURE 4