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Date: August 21, 2007

ARCADIS Project No .: 2006 Annual Groundwater Monitoring Report NY001464.0407.00004

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2006 Annual Groundwater Monitoring Report

Operable Unit 2 Northrop Grumman Systems Corporation Bethpage, New York NYSDEC Site #s 1-30-0003A & B

August 20, 2007



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2006 Annual Groundwater Monitoring Report

Operable Unit 2 Northrop Grumman Systems Corporation, Bethpage, New York NYSDEC Site #s 1-30-0003A&B

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A Groundwater Sampling Logs and Chain of Custody Records

1. Introduction

This groundwater monitoring report was prepared to document the operation, maintenance, and monitoring (OM&M) activities for the Operable Unit 2 (OU2) groundwater remedy at the Northrop Grumman Systems Corporation (Northrop Grumman) Bethpage, New York facility. These activities are currently being conducted by Northrop Grumman, in accordance with the New York State Department of Environmental Conservation (NYSDEC)-approved OU2 Groundwater Monitoring Plan (ARCADIS Geraghty & Miller, Inc. 2001), as modified in June 2006 (ARCADIS G&M, Inc. 2006) and the Public Water Supply Contingency Plan (PWSCP) (ARCADIS G&M Inc. 2003b) collectively to meet the remedial objectives set forth in the March 2001 OU2 Record of Decision (ROD) (NYSDEC 2001).

This report describes the performance and effectiveness monitoring of the on-site portion of the OU2 groundwater remedy for the period from October 12, 2006 through December 28, 2006, which is referred to in this report as the Fourth Quarter 2006 report period, or the current period. This report also constitutes the 2006 Annual Report, and compares the current data to Year 2005 and to longer-term data trends, as applicable.

The monitoring program, as well as the findings, conclusions, and recommendations will be re-evaluated, as additional data become available. The complete description of the on-site portion of the OU2 groundwater remedy, the monitoring program, and rationale/basis for collection and evaluation of data can be found in the NYSDEC-approved OU2 Groundwater Monitoring Plan (ARCADIS Geraghty & Miller, Inc. 2001), as modified in June 2006 (ARCADIS G&M, Inc. 2006) and the PWSCP (ARCADIS G&M Inc. 2003b).

This report also includes the status of the annual update to the NYSDEC-accepted regional groundwater model, as required by the PWSCP.

2. Monitoring Program

1

The results obtained from monitoring activities conducted during this reporting period are provided in Tables 1 through 6 and are described and discussed in the following report sections: Remedial System Operational Performance (Section 3), Groundwater Flow (Section 4), and Groundwater Quality (Section 5).

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Except as described in Tables 1 through 6 and in Sections 3, 4, and 5 of this report, the procedures, methodologies, and monitoring network utilized for the subject period are consistent with procedures and methodologies used previously (ARCADIS Geraghty & Miller, Inc. 2001; ARCADIS G&M, Inc. 2003a). The complete description of the procedures to collect groundwater samples from outpost wells and evaluate and document the results is provided in the PWSCP (ARCADIS G&M, Inc. 2003b).

The locations of the Northrop Grumman site, the OU2 on-site groundwater remedy, the neighboring properties (i.e., the Naval Weapons Industrial Reserve Plant [NWIRP] and Occidental Chemical Corporation [OCC]/RUCO Polymer Corporation sites), and existing wells utilized in the monitoring programs are shown on Figure 1. Appendix A of this report contains the field documentation for monitoring activities performed by ARCADIS (i.e., groundwater sampling logs and chain-of-custody records).

3. Remedial System Performance Monitoring

This report section summarizes the routine performance monitoring conducted during the Fourth Quarter 2006 and Year 2006 for the on-site portion of the OU2 groundwater remedy, which included the following: (1) remedial well water quality monitoring, remedial treatment system effluent water quality monitoring, remedial treatment system efficiency monitoring, and determination of volatile organic compound (VOC) mass removal, and (2) monitoring of remedial well pumpage and remedial treatment system treated effluent discharge to on-site recharge basins.

Also summarized in this report section are the remedial treatment system and remedial well troubleshooting as well as non-routine maintenance activities performed by ARCADIS and Northrop Grumman during the Fourth Quarter 2006.

As stated in previous reports, the on-site remedial wells and remedial treatment systems will be referred to by names that are consistent with Northrop Grumman nomenclature, as summarized in the following table. All monitoring activities will utilize the revised nomenclature.

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Former Nomenclature	Revised
	Nomenclature
Remedi	al Wells
GP-1	Well 1
GP-3	Well 3
ONCT-1	Well 17
ONCT-2	Well 18
ONCT-3	Well 19
Remedial Trea	tment Systems
GP-1	Tower 96
ONCT	Tower 102

3.1 Water Quality, Treatment Efficiencies, and Mass Removal

Tables 1 and 4 provide the total VOC (TVOC) concentrations detected in the remedial wells. Table 1 provides TVOC concentrations and VOC mass removed by the remedial wells for the current period and Year 2006, and treatment efficiencies for the Tower 96 and Tower 102 remedial treatment system air strippers for the current period.

TVOC concentrations from the remedial wells ranged from 158 micrograms per liter (μ g/L) (Well 18) to 3,752 μ g/L (Well 3) this period. The discussion of water quality data and trends for the remedial wells is provided in Section 5.1.4 of this report.

A total of approximately 3,076 pounds of VOCs were removed from the aquifer by the remedial wells and treated during the current period. For Year 2006, approximately 14,764 lbs of VOC mass were removed from the aquifer and treated by the OU2 remedial systems. Since full-time remedial system startup in November 1998, approximately 107,041 lbs of VOCs have been removed from the aquifer and treated by the OU2 remedial system.

Northrop Grumman's State Pollutant Discharge Elimination System (SPDES) discharge monitoring results (Permit No. NY0096792) are representative of treated water quality and are used in calculating remedial system treatment efficiency and determining the quality of water returned to the aquifer. SPDES discharge monitoring data are documented on a monthly basis by Northrop Grumman to NYSDEC under separate cover in Discharge Monitoring Reports (DMRs). Northrop Grumman Outfalls

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005 and 006 represent the termini of the Tower 102 and Tower 96 systems effluent water (i.e., inlets to the South Recharge Basins and West Recharge Basins) respectively. Based on VOC concentrations in the remedial wells and the SPDES discharge this period, the efficiencies of the Tower 96 and Tower 102 remedial treatment systems for the current period were calculated to be 99.9 percent and 99.2 percent, respectively.

3.2 Remedial System Pumpage and Discharge

Table 1 summarizes the remedial well pumpage (with comparison to design criteria) for the current period and Year 2006. For the current period, Remedial Wells 1, 3, 17, 18, and 19 collectively pumped approximately 406 million gallons (MG) of groundwater, which is equivalent to approximately 95 percent of the design remedial well pumpage volume (427 MG) for the current period. For Year 2006, the remedial system pumped approximately 1,869 MG, equivalent to approximately 93 percent of the total design remedial well pumpage volume of 2,008 MG.

Based on measurements collected by ARCADIS, the South Recharge Basins collectively received the treated effluent discharge from the Tower 102 remedial treatment system along with incidental stormwater runoff and contribution from the Tower 96 remedial system for a total average of approximately 2,588 gpm, equivalent to 251 MG, during the current period.

As discussed in previous reports, a portion of the treated water from the Tower 96 remedial treatment system is provided on demand to the Calpine Energy facility for consumptive use. The demand rate is controlled by a "Cla-Val" located within a new subsurface transmission pipeline between Tower 96 and the Calpine Energy facility. Based on Raw Water Consumption information provided by Calpine Energy to ARCADIS in June 2007, the weighted average facility demand by Calpine for this period was 295 gpm, indicating that the West Recharge Basins received an average discharge rate from the Tower 96 remedial system of approximately 758 gpm this period, equivalent to 46 MG.

3.3 Troubleshooting/Maintenance Activities

1

Based on water-level and pumping data presented in prior reports, OU2 remedial well specific capacities remain above the minimum required to sustain the design pumping rates, as such no additional maintenance was needed on remedial wells this period (ARCADIS of New York, Inc. 2007a; b).

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During the Fourth Quarter 2006, the Tower 96 remedial system was shut down for 31.5 hours between October 25 and October 27 for the replacement of two sluice gates on the stormwater system which transmits treated water to the West Recharge Basins. Other, minor short-term repairs, testing of new component systems, and temporary power outages were also noted during this period.

4. Groundwater Flow

Hydraulic monitoring was performed semi-annually in the Year 2006, in March 22 and September 8. The hydraulic monitoring results are described in prior quarterly reports (ARCADIS of New York, Inc. 2007a; b).

In general, the hydraulic monitoring data collected in Year 2006 indicated that vertical hydraulic gradients in the shallow-intermediate wells pairs are oriented downward and are close to or greater than model predicted values. Mounding of the water table and potentiometric surface exists in the shallow and intermediate zones, respectively, extending beneath the South Recharge Basins and across the Northrop Grumman site southern boundary. Downward vertical gradients were also present in the intermediate-deep and deep-deep2 well pairs, supporting the conclusion that groundwater is flowing in a predominantly vertical direction in the deep zone along the Northrop Grumman site southern boundary. Data obtained in Year 2006 indicates that the combination of shallow recharge at the South Recharge Basins coupled with pumpage of the remedial wells in the D2 zone forms a hydraulic barrier to groundwater flow that is preventing the off-site migration of VOC-impacted groundwater. The capture zone formed by the combined pumpage of OU2 remedial wells extended approximately 800 feet down gradient of Well 17.

5. Groundwater Quality

This report section describes the analytical results of the various groundwater quality monitoring activities for the Fourth Quarter 2006 that are specified in the NYSDEC-approved Groundwater Monitoring Plan (ARCADIS G&M, Inc., 2001; ARCADIS G&M, Inc. 2006) and the PWSCP (ARCADIS G&M Inc., 2003b). Analytical results are summarized in Tables 2 through 6.

5.1 Volatile Organic Compounds

The evaluation of VOC concentrations is presented herein in consideration of the following factors: (1) proximity to the hydraulic barrier formed by the on-site portion of

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the OU2 groundwater remedy (i.e., upgradient, along the Northrop Grumman site southern boundary, and downgradient of the hydraulic barrier), (2) hydrogeologic zone (i.e., shallow, intermediate, deep, and D2 zones), and (3) NYSDEC Standards, Criteria, and Guidance Values.

Tables 2 through 6 provide the complete analytical results of samples collected for VOC analysis from monitoring wells, remedial wells, outpost wells, and remedial treatment systems for this period. Time-concentration graphs depicting the long-term VOC concentration trends are shown on Figures 2 through 9.

5.1.1 Shallow Zone

The detailed results of monitoring in the shallow zone are provided in prior reports (ARCADIS of New York, Inc. 2007a; b). In summary, few detections of VOCs in shallow monitoring wells were identified in wells located upgradient of the Northrop Grumman site southern boundary and no detections were identified in wells located immediately downgradient of the Northrop Grumman site southern boundary. These data collectively support the conclusion that the hydraulic barrier formed by the on-site portion of the OU2 Groundwater Remedy remains effective in preventing the off-site migration of VOC-impacted groundwater in the shallow zone.

5.1.2 Intermediate Zone

Analytical data for intermediate monitoring wells is provided in Table 2. Intermediate wells sampled during this period (GM-20I, GM-21I, and GM-79I) are located immediately downgradient of the Northrop Grumman site southern boundary.

Laboratory results indicated no exceedences of SCGs along the Northrop Grumman site southern boundary during this period or Year 2006. These analytical results are consistent with data obtained since the start-up of the OU2 Groundwater Remedy in November 1998 (or for the period of record, for wells monitored prior to November 1998), confirming that the operation of the on-site portion of the OU2 groundwater remedy has formed an effective hydraulic barrier that prevents the off-site migration of VOC-impacted groundwater in the intermediate zone.

5.1.3 Deep Zone

Groundwater monitoring data from the deep zone is summarized in Table 3 and data trends are selectively shown in Figures 3, 4, 5, 7 and 8. Attached data trend graphs

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include key wells with detectable concentrations of VOCs that were sampled this period.

Well GM-13D, located upgradient of the OU2 Groundwater Remedy, continued to exhibit a downward trend in TVOC concentrations, with recent results indicating a decrease in TVOC concentrations by more than 50 percent since 1999 (Figure 4).

Four deep wells (i.e., GM-18D, GM-39D_A, GM-39D_B, and GM-73D) located on-site, along the Northrop Grumman site southern boundary, and upgradient of the remedial wells (Figure 1), exhibited SCG exceedences in the Year 2006. These monitoring wells are within the capture zone of the remedial wells, therefore, groundwater in this area is hydraulically contained and over time will be extracted and treated.

Groundwater quality data from wells immediately downgradient of the Northrop Grumman site (Monitoring Wells GM-20D and GM-21D) exhibited no VOC detections or trace VOC detections during this period,

Wells located further downgradient of the hydraulic barrier exhibited TVOC concentrations consistent with the expected concentrations in the portions of the groundwater VOC plume not actively remediated. Of particular note, downgradient Well GM-34D historically exhibited several VOCs (primarily trichloroethene) exceeding SCGs at concentrations that have increased over time. This well is located south of the GM-75D2 Area (Figure 1 – see Section 5.1.4 for additional detail).

Groundwater quality data continues to support the conclusion that the expected bifurcation of the VOC plume is occurring along the Northrop Grumman site southern boundary, as shown by no detections in wells located within the capture zone and immediately downgradient of the site. SCG exceedences continue to persist in wells screened in the portion of the groundwater VOC plume not actively remediated.

In general, the water quality data from the deep wells sampled during the current period and Year 2006 continue to support the interpretation of the hydraulic data and confirm that the operation of the on-site portion of the OU2 groundwater remedy has formed an effective hydraulic barrier that prevents the off-site migration of VOC-impacted groundwater in the deep zone.



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5.1.4 Deep2 Zone and Remedial Wells

Groundwater monitoring data from the D2 zone are summarized in Table 4 and data trends are presented on Figures 2, 3, 6, 7, and 8. Attached data trend graphs include key wells with detectable concentrations of VOCs that were sampled this period.

Monitoring Well GM-33D2, located along the southwestern boundary of the Northrop Grumman site, had several VOCs that exceeded SCGs in this period. Similar exceedances were detected in Well GM-33D2 the first three quarters of Year 2006. TVOC values in Well GM-33D2 were slightly higher in the Second and Third Quarters compared to the First and Fourth Quarters, but the overall trend in this well from November 1998 is a decreasing one. The overall decreasing trend in Well GM-33D2 is attributable to the pumping of the OU2 remedial wells. Well GM-33D2 is located within the capture zone of the remedial wells (which are screened in the D2 zone) and therefore groundwater in this area is hydraulically contained and over time will be extracted and treated by the on-site portion of the OU2 groundwater remedy.

For the GM-75D2 Area, off-site Wells GM-35D2 and GM-75D2 had several SCG exceedances during this period, with TVOC concentrations of 335 µg/L and 402 µg/L, respectively. These data are consistent with concentrations expected in the off-site portion of the VOC plume not actively remediated. TVOC concentrations in Well GM-75D2 have shown a decreasing trend since the Year 2002, while TVOC concentrations in Wells GM-34D2 and GM-35D2 increased in the Year 2002 with the latter having remained fairly constant since that time. Well GM-34D2 has exhibited an increasing trend for the period of record. Currently, the Department of the Navy is preparing a work plan for investigation of groundwater in the GM-75D2 Area.

The GM-38 Area monitoring results during Year 2006 were provided in prior reports (ARCADIS of New York, Inc. 200a; b). Well GM-38D2 continues to exhibit a stable VOC concentration trend that was first identified in Year 2002. Remediation of VOCs in the GM-38 Area will be performed by the Department of the Navy.

The other off-site D2 zone monitoring wells continue to exhibit stable to decreasing TVOC concentration trends.

For the remedial wells, TVOC concentrations ranged from 158 μ g/L (Well 18) to 3,751 μ g/L (Well 3). Wells 3 and 19 concentration trends continue to increase, while the remaining wells exhibit stable to decreasing trends. Well 3 continues to exhibit the highest TVOC concentrations.

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In general, the water quality data from the D2 wells sampled during the current period and Year 2006 continue to support the interpretation of the hydraulic data and confirm that the operation of the on-site portion of the OU2 groundwater remedy has formed an effective hydraulic barrier that prevents the off-site migration of VOC-impacted groundwater in the D2 zone.

5.2 Outpost Monitoring

The results of the current outpost well monitoring round are provided in Table 5 and data trends are presented in Figure 9. The complete description of the procedures to collect groundwater samples from the outpost wells and evaluate and document the results is provided in the PWSCP (ARCADIS G&M, Inc., 2003b).

VOCs were not detected in Outpost Wells OW1-2, OW3-1, OW3-2, OW4-1, and OW4-2 during this period and the period of record. Outpost Wells OW1-1, OW1-3, OW2-1 and OW2-2 exhibited detections of site-related VOCs below their respective SCGs, but above the TVOC outpost trigger (except Well OW2-1) values this period. Well OW2-1 has shown an increase in TVOC concentrations since Year 2003 (primarily due to the detection of benzene and methyl-tertiary butyl ether [MTBE], which are not site-related VOCs); the remaining wells exhibit stable VOC concentration trends.

As no new outpost trigger values were exceeded in Year 2006, the requirements for notification/reporting of the initial trigger value exceedances, as outlined in the PWSCP (ARCADIS G&M, Inc., 2003b), have already been met.

5.3 Vinyl Chloride Monomer

Vinyl chloride monomer (VCM) was detected in Well 3 during this period and the Year 2006, but was not detected in the other remedial wells or monitoring wells sampled this period. Implementation of off-site remediation of groundwater to address VCM upgradient (northwest) of Well 3 is currently underway by Occidental Chemical Corporation (OCC) under USEPA oversight.

5.4 Cadmium and Chromium

Cadmium and chromium analysis results for Year 2006 are provided in prior reports (ARCADIS of New York, Inc. 2007a;b).

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Based on data for the period of record, cadmium concentrations near former Northrop Grumman Plant 2 continue to persist above the SCG in Well MW-3R, however downgradient monitoring wells have remained below the SCG, with the exception of the most recent result from Well N-10631 (Figure 10).

Based on data for the period of record, chromium concentrations for the wells near former Northrop Grumman Plant 2 continued to be below the SCG (Figure 11). During Year 2006, the chromium concentration trends in the wells near former Northrop Grumman Plant 1 have been stable to decreasing over time (Figure 12).

5.5 Tentatively Identified Compounds

Tentatively Identified Compounds (TICs) were not detected during Year 2006. A review of the cumulative last five years of TIC data shows no discernable trends in concentrations or consistency in TIC detections.

5.6 QA/QC Samples and Data Validation

The results of analysis of QA/QC samples from the current period are provided in Table 6. Results for replicate samples from Wells GM-33D2 and OW1-1 are reported in Tables 4 and 5, respectively.

ARCADIS performed validation of all groundwater quality data collected (including TICs) by following the contract laboratory program national functional guidelines for organic and inorganic data review (USEPA 1999). The quality of the data is considered acceptable with the qualifications indicated on Tables 2 through 6.

6. Annual Groundwater Model Update Evaluation

In accordance with the provisions of the PWSCP, ARCADIS has conducted an evaluation of the supply well pumpage and water quality data provided by public water supply purveyors within the area of the model domain, as well as water quality data collected by ARCADIS and Northrop Grumman from the OU2 groundwater quality monitoring well network to assess the efficacy of the outpost well network in meeting the objectives set forth in the PWSCP.

The following discussions describe the mass and pumpage evaluations and updates performed in Year 2006.

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6.1 Purpose of the Evaluation

The purpose of conducting this comparison was to determine if the assigned initial TVOC concentrations in the Year 2000 Model are representative of conditions observed through groundwater sampling conducted between Year 2001 and Year 2004. Likewise a comparison of model-assigned pumping rates to records of remedial system operation and public supply well pumpage was made to ensure the model accurately represented present-day conditions.

6.2 Pumpage Update

A comparison of model-assigned pumping rates to records of both remedial system operation and public supply well pumpage was made to ensure the model accurately represented present-day conditions.

Specifically, average supply well pumping rates for public supply wells from Year 2001 through the end of Year 2004 were computed for each public supply and remedial well located within the model domain. The computed rates were then compared to the model assigned rates. If deviations from the model-assigned rates were greater than 10 percent then the model was updated using the new computed pumping rate. Note that most of the model pumping wells did not require updating.

Following an update of the model-assigned pumping rates, the flow model was re-run, and the model-generated flow field was reviewed. Results showed that the model accurately represented regional flow field conditions and the effect of the revised pumping rates was minimal.

6.3 Mass Update

Recent groundwater quality data (from the beginning of 2001 through the end of 2004) was compared to TVOC concentration distirubtions in the existing Grumman Regional Groundwater Model (Year 2000 Model). The water quality data was comprised of both data collected by ARCADIS for Northrop Grumman during routine groundwater sampling rounds, and analytical water quality results supplied by municipal water suppliers.

The evaluation process consisted of the following:

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- 1. Groundwater quality data from both monitoring and supply wells was compiled, based on sampling events between early Year 2001 and the end of Year 2004.
- 2. An updated average TVOC concentration for each monitoring well or supply well for the referenced period was calculated.
- 3. The 2001-2004 time-period Average TVOC Concentration (2001-2004 TVOC Average) was compared to the initial TVOC concentrations assigned in the 2000 Model at each of the monitoring well or supply well locations.

A comparison of the TVOC concentrations assigned as initial conditions in the Year 2000 Model to the 2001-2004 TVOC Average indicated that model-wide increases in assigned TVOC concentrations were not necessary. Rather, only local areas within the defined boundaries of the simulated plume required modification (based on a significant difference between the 2000 Model's initial conditions and the 2001-2004 TVOC Average).

In most cases, only moderate to significant local increases in assigned TVOC concentrations were necessary to update the model. Increases in assigned TVOC concentrations at specific model cells (model cells in which a well existed for which data was available) in turn necessitated additional changes to those model cells proximal to the cells undergoing the reassignment of initial conditions (i.e., changes in a single cell will likely require modifications to neighboring cells both within the layer initially modified, as well as layers above and below the cell initially modified to maintain a "smoothness" in the distribution of assigned TVOC concentrations). Following completion of the process, it was apparent that no significant changes were made to the extent of the model plume, nor to the concentration levels proximal to that extent.

6.4 Results

Based on the model update evaluation performed, a model re-run and an update to the outpost well monitoring program, per the provisions in the PWSCP, was determined to not be necessary at this time. The outpost well data and attendant evaluation/ update of the model will continue to be performed as additional data are generated.

7. Summary and Conclusions

- 1. The following data indicate that the OU2 groundwater remedy continues to meet remedial performance goals for Year 2006.
 - a. During the current period, the OU2 remedial wells pumped 406 MG, or approximately 95 percent of the design volume of groundwater, while the recharge basins received a collective total of 375.8 MG of treated groundwater. For the Year 2006, the OU2 remedial wells pumped 1,869 MG, or approximately 93 percent of the design volume of groundwater, while the recharge basins received approximately 1,611.1 MG of treated groundwater.
 - b. Based on data presented in prior reports, OU2 remedial well specific capacities remain above the minimum required to sustain the design pumping rates.
 - c. Approximately 3,076 lbs of VOCs were removed from the aquifer and treated by the on-site portion of the OU2 groundwater remedy during the current period. In Year 2006, approximately 14,764 lbs of VOCs were removed from the aquifer and treated, and approximately 107,041 lbs of VOCs were removed and treated since full-time system startup in November 1998.
 - d. The treatment efficiencies of both groundwater treatment systems remain above 99 percent for the current period.
- 2. The following data indicate that the OU2 groundwater remedy continues to meet remedial effectiveness goals for Year 2006.
 - a. The hydraulic data indicate hydraulic containment has been achieved in a manner consistent with previous years.
 - b. Wells immediately downgradient of the hydraulic barrier show no or trace VOC concentrations or decreasing VOC concentration trends. Groundwater quality data indicates that bifurcation of the VOC plume is occurring in the deep and D2 zones south of the hydraulic barrier.
- 3. Other significant findings and conclusions with respect to groundwater are summarized as follows:

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- a. Based on prior reports for Year 2006, in the shallow, intermediate, and deep zones, the majority of wells located along the Northrop Grumman site perimeter showed trace or non-detectable concentrations of VOCs.
- b. The majority of D2 wells located along and immediately downgradient of the Northrop Grumman site southern boundary exhibit stable or decreasing concentrations of VOCs. Such wells are located within the capture zone of the remedial wells. Wells located in areas not actively remediated (further downgradient of the Northrop Grumman site) exhibit concentrations indicative of expected VOC plume heterogeneity. Additional investigation of groundwater in the GM-75D2 Area and remediation of deep/D2 zone groundwater in the GM-38 Area will be performed by the Department of the Navy.
- c. Site-related VOCs were detected in Outpost Wells OW1-1, OW1-3, OW2-1 and OW2-2. The remaining outpost wells exhibited no VOC detections.
- d. Based on prior reports for Year 2006, Cd/Cr SCG exceedences are limited to on-site areas, with the exception of Cr in Well N-10631 in the most recent round.
- e. VCM in groundwater remains limited to the area near and upgradient of Remedial Well 3; additional groundwater remedial action currently being implemented by OCC.

8. Recommendation

The NYSDEC granted the request from ARCADIS to reduce the monitoring frequency for selected wells, as reflected in the limited number of wells sampled during the Fourth Quarter of 2006. ARCADIS makes no other recommendations to modify the groundwater monitoring program at this time.

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9. References

- ARCADIS of New York, Inc. 2007a. First Quarter 2007 Groundwater Monitoring Report, Operable Unit 2, Northrop Grumman Corporation, Bethpage, New York.
- ARCADIS of New York. 2007b. Second and Third Quarters 2007 Groundwater Monitoring Report, Operable Unit 2, Northrop Grumman Corporation, Bethpage, New York.
- ARCADIS G&M, Inc. 2006. Petition for Recommended Modifications to the Operable Unit 2 Groundwater Monitoring Plan, Northrop Grumman Corporation, Bethpage, New York. June 2006.
- ARCADIS G&M, Inc. 2005. Memo to J. Cofman Re: Calpine Water Supply Modeling Results for Simulation 2, 4, and 5. November 18, 2005.
- ARCADIS G&M, Inc. 2003a. 2002 Annual Groundwater Monitoring Report, Northrop Grumman Corporation, Bethpage, New York. August 14, 2003.
- ARCADIS G&M, Inc. 2003b. Public Water Supply Contingency Plan, Naval Facilities Engineering Command. July 22, 2003.
- ARCADIS Geraghty & Miller, Inc. 2001. Operable Unit 2 Groundwater Monitoring Plan. Northrop Grumman Corporation, Bethpage, New York. May 11, 2001.
- Naval Weapons Industrial Reserve Plant Site #130003B.
- NYSDEC 2005. Letter to Messrs. John Cofman and James Colter Re: Northrop Grumman and Naval, Weapons Industrial Reserve Plant Site. Town of Oyster Bay, Nassau County, Site Nos. 1-30-003A and B. July 13, 2005.
- New York State Department of Environmental Conservation (NYSDEC). 2001. Record of Decision Operable Unit 2 Groundwater Northrop Grumman and Naval Weapons Industrial Reserve Plant Sites, Nassau County Site Numbers 1-30-003A & B.
- New York State Department of Environmental Conservation (NYSDEC). 1998. Division of Water Technical and Operation Guidance Series (TOGS 1.1.1).

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Operable Unit 2 Northrop Grumman Systems Corporation, Bethpage, New York NYSDEC Site #s 1-30-0003A & B

Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations. Promulgated October 22, 1993. Re-issued June 1998

U.S. Environmental Protection Agency (USEPA). 1999. Contract Laboratory Program National Functional Guidelines for Organic Data Review. October 1999.

Table 1. Summary of Operational Data and Water Balance for the On-Site Portion of the OU2 Groundwater Remedy, Fourth Quarter 2006 and Year 2006, Northrop Grumman Systems Corporation, Bethpage, New York.

(a)	Remedial well pumping rates based on computer modeling (AR on computer modeling (ARCADIS G&M, Inc. 2004b). Design p remedial well pumpage (minus pipe loss) and incidental runoff f	CADIS Geraghty & Miller, Inc. 2000). Acceptab umping and recharge rates were modified in Apr from precipitation.	e minimum recharge rates based I, 2005. Total recharge includes	
(b)	Actual Average Pumping Rates were calculated based on Actua (78 days) for the Fourth Quarter 2006, and hours of operation fr Current average recharge rates have been determined using th OU2 wells were operational during the Fourth Quarter 2006, at and Well 19 (100%). The Actual Average Pumping Rates are for	al Total Pumpage and hours of operation from C rom December 29, 2005, to December 28, 2006 e entire 78-day span of time for the Fourth Quar the following percentages: Well 1 (98%), Well 3 or when the wells are pumping. All readings acc	ctober 12 to December 28, 2006 367 days) for Year 2006. er 2006, as opposed to current average pumping rates, which account for varying amounts of dov 98%); Well 17 (100%), Well 18 (100%), irate to +/- 10% due to gauge limitations.	vntime, as indicated be
(c)	The TVOC concentration for each well was calculated based or	n Fourth Quarter 2006 groundwater monitoring d	ta (Table 4).	
(d)	VOC mass removed during the Fourth Quarter and Year 2006 v	was based on the TVOC data given on page 1 a	d the following formula:	
	(TVOC concentration in ug/L) X (gallons pumped) X (3.785	L/gal) X (1 x 10 ⁻⁶ g/ug) X (2.2 x 10 ⁻³ lb/g)		
(e)	Air Stripping Efficiency calculated from values above and in Tab	ble 4 using the following formula:		
	F	Average SPDES TVOC Concentration at Outfall	erage SPDES TVOC Concentration at Outfall	1
	1	[[VOC _{Well 1} X Q _{Well 1}) + (TVOC _{Well 2} X Q _{Well 2})]	
	L		(Q _{Well 1} + Q _{Well 2})	
	When non-detectable levels of VOCs are found in the effluent, a	a value of zero is used to estimate the efficiency	of the air stripper.	
(f)	Cumulative calculated Year-to-Date VOC Mass Removed inclue Cumulative calculated VOC Mass Removed includes mass rem	des the record from December 29, 2005, throug noved since start-up of the Toiwer 102 system in	December 28, 2006. November 1998.	
(g)	Current year to date and cumulative TVOC Mass Removed incl	udes Wells Well 1, Well 3, Well 17, Well 18 and	Nell 19.	
	Not Available or Not Applicable	lb/g	pounds per gram	
TVOC	Total Volatile Organic Compounds	lbs	pounds	
g/ug	grams per microgram	MG	Million Gallons	
gpm	gallons per minute	ug/L	micrograms per liter	
	Liters per gallon	002	Operable Unit 2	
SPDES	State Pollutant Discharge Elimination System	Q	Pumping Kate	

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owntime, as indicated below.

 Table 2. Concentrations of Volatile Organic Compounds Detected in Intermediate Wells,

 Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

s ⁽¹⁾ DATE:	11/21/2006 <5 <5 <5 <2 <5 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	11/20/2006 <5 <5 <5 <2 <5 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	11/21/2006 <5 <5 <2 <5 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	
<u>s' Dril.</u>	<pre></pre>	<pre></pre>	<pre></pre>	
	<5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <	<5 <5 <2 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	<5 <5 <2 <55 <10 <55 <55 <55 <55 <55 <510	
	5 2 5 5 0 5 5 5 5 5 5 5 0 5 5	<pre><5 <2 5 <10 <5 <5 5 <5 5 <5 5 <5 5 <5 5 <5 5</pre>	<5 <2 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	
	2 5 5 0 5 5 5 5 5 5 5 0 5 5	~2 5 5 10 5 5 5 5 5 5 5 5 5 5 5 5 10 5	<2 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	
	<pre><5 5 0 5 5 5 5 5 5 5 0 5 5</pre>	- 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	<5 <5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	
	<5 <10 <55 <55 <55 <55 <50 <155 <50 <55 <55 <55 <55 <55 <55 <55 <55 <	<5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <10 <5	<5 <10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	
	<10 < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5 < 5	<10 <5 <5 <5 <5 <5 <5 <5 <10 <5	<10 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	
	<pre><5</pre> <5<5<5<5<5<5<5<5<10	<5 <5 <5 <5 <5 <5 <5 <10 <5	<5 <5 <5 <5 <5 <5 <5 <10	
	<5 <5 <5 <5 <5 <5 <5 <5 <10 <5	<5 <5 <5 <5 <5 <5 <10 <5	<5 <5 <5 <5 <5 <5 <5 <10	
	<5 <5 <5 <5 <5 <10 <5 <10 <5	<5 <5 <5 <5 <5 <10 <5	<5 <5 <5 <5 <5 <5 <10	
	<5 <5 <5 <5 <10 <5	<5 <5 <5 <5 <10 <5	<5 <5 <5 <5 <5 <10	
	<5 <5 <5 <10 <5	<5 <5 <5 <10 <5	<5 <5 <5 <10	
	<5 <5 <10 <5	<5 <5 <10 <5	<5 <5 <10	
	<5 <10 <5	<5 <10 <5	<5 <10	
	<10 <5	<10 <5	<10	
	<5	<5	< F	
	~5	-	SD	
	NO 1	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<07	<0.7	<0.7	
	<5	<5	<5	
	<5	<5	<5	
	<10	<10	<10	
	<10	<10	<10	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	0.62.J	<5	<5	
	<5	<5	<5	
	2.7J	1.1J	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
	<5	<5	<5	
		11	0	
		0.62J <5 2.7J <5 <5 <5 <5 <5	0.62J <5 <5 <5 2.7J 1.1J <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <1.1	0.62J <5

Bold Constituent detected

 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 value listed.

VOCs Volatile organic compounds

NYSDEC New York State Department of Environmental Conservation

* Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.

NE No SCG established

TOGS Technical and Operational Guidance Series

Table 3. Concentrations of Volatile Organic Compounds Detected in Deep Wells, Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

	NYSDEC Standards	WELL:	GM-20D	GM-21D	GM-34D	GM-79D
CONSTITUENT	Criteria and	SAMPLE ID:	GM-20D	GM-21D	GM-34D	GM-79D
(Units in ug/L)	Guidance Values ⁽¹⁾	DATE:	11/21/2006	11/20/2006	11/30/2006	11/21/2006
· · · · · · · · · · · · · · · · · · ·						
Chloromethane	5		<5	<5	<5	<5
Bromomethane	5		<5	<5	<5	<5
Vinyl chloride	2		<2	<2	<2	<2
Chloroethane	5		<5	<5	<5	<5
Methylene chloride	5		<5	<5	<5	<5
Acetone	50		<10	<10	<10	<10
Carbon disulfide	50		<5	<5	<5	<5
1,1-Dichloroethene	5		<5	<5	19	<5
1,1-Dichloroethane	5		<5	<5	1.5J	<5
cis-1,2-Dichloroethene	5		<5	<5	12	<5
trans-1,2-Dichloroethene	5		<5	<5	<5	<5
Chloroform	7		<5	<5	0.65J	<5
1,2-Dichloroethane	5		<5	<5	<5	<5
2-Butanone	50		<10	<10	<10	<10
1,1,1-Trichloroethane	5		<5	<5	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5
Bromodichloromethane	50		<5	<5	<5	<5
1,2-Dichloropropane	5		<5	<5	<5	<5
cis-1,3-Dichloropropene	5		<5	<5	<5	<5
Trichloroethene	5		<5	2J	1100D	47
Dibromochloromethane	5		<5	<5	<5	<5
1,1,2-Trichloroethane	5		<5	<5	<5	<5
Benzene	0.7		<0.7	<0.7	<0.7	<0.7
trans-1,3-Dichloropropene	5		<5	<5	<5	<5
Bromoform	50		<5	<5	<5	<5
4-Methyl-2-pentanone	50		<10	<10	<10	<10
2-Hexanone	50		<10	<10	<10	<10
Tetrachloroethene	5		<5	<5	15B	1.4J
1,1,2,2-Tetrachloroethane	5		<5	<5	<5	<5
Toluene	5		<5	<5	<5	<5
Chlorobenzene	5		<5	<5	<5	<5
Ethylbenzene	5		<5	<5	<5	<5
Styrene	5		<5	<5	<5	<5
Xylene (total)	5		<5	<5	<5	<5
Vinyl Acetate	NE		<5	<5	<5	<5
Freon 113	5		<5	<5	22	0.68J
Chlorodifluoromethane	5		<5	<5	1.3J	<5
Dichlorodifluoromethane	5		<5	<5	0.57J	<5
			0		1 172	40.4

ug/L	Micrograms per liter	
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B Detected in an associated blank.

D Constituent identified at a secondary dilution.

J Estimated value

Bold Constituent detected

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 value listed.

VOCs Volatile organic compounds

NYSDE New York State Department of Environmental Conservation

Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.

Value exceeds associated SCG value.

NE No SCG established

TOGS Technical and Operational Guidance Series

ug/L Micrograms per liter

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 Table 4. Concentrations of Volatile Organic Compounds Detected in Deep2 Monitoring Wells and Groundwater Remedial Wells and Treatment Systems

 Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTTUENT Criteria and Guidance Values ⁽¹⁾ SAMPLE ID: DATE: GLM 33D-2 REP-11-23-0E GLM 35D-2		NYSDEC Standards	WELL:	GM-33D2	GM-33D2	GM-35D2	GM-75D2
(Units in ug/L) Guidance Values ⁽¹⁾ DATE: 11/29/2006 11/29/2016 <	CONSTITUENT	Criteria and	SAMPLE ID:	GM-33D-2	REP-11-29-06	GM-35D-2	GM-75D-2
Chloromethane 5 <5	(Units in ug/L)	Guidance Values ⁽¹⁾	DATE:	11/29/2006	11/29/2006	11/29/2006	11/27/2006
Chloromethane 5 <6 <5 <5 <6 Vinyl chloride 2 <2 <2 <2 <2 Chloromethane 5 <5 <5 <5 Vinyl chloride 2 <2 <2 <2 <2 Chloromethane 5 <5 <5 <5 Methylene chloride 5 <5 <5 <5 Acetone 50 <10 <10 <10 Carbon disulfde 50 <5 <5 <5 1.1-Dichloroethene 5 1.1 0.94J 1.9.J 7.5 1.1-Dichloroethane 5 1.9.J 1.9.J 3.5.J 1.6.J cish.2.Dichloroethane 5 <5 <5 <5 cish.2.Dichloropropane 5 <5 <5 <5 cish.3.Dichloropropane 5 <5 <5 <5 cish.3.Dichloropropane 5 <5 <							
Bromomethane 5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5<	Chloromethane	5		<5	<5	<5	<5
Viny chloride 2 -2	Bromomethane	5		<5	<5	<5	<5
Chloroethane 5 < <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5	Vinyl chloride	2		<2	<2	<2	<2
Methylere chloride 5 <5	Chloroethane	5		<5	<5	<5	<5
Acetone 50 <10	Methylene chloride	5		<5	<5	<5	<5
Carbon disulfide 50	Acetone	50		<10	<10	<10	<10
1,1-Dichloroethene 5 1,1 0.94,J 1.9,J 7.5 1,1-Dichloroethane 5 <5	Carbon disulfide	50		<5	<5	<5	<5
1,1-Dichloroethene 5 <5	1,1-Dichloroethene	5		1J	0.94J	1.9J	7.5
cis-1,2-Dichloroethene 5 1,9,J 1,9,J 3,5,J 1,6,J trans-1,2-Dichloroethene 5 <5	1,1-Dichloroethane	5		<5	<5	<5	<5
trans-1,2-Dichloroethene 5 <5	cis-1,2-Dichloroethene	5		1.9J	1.9J	3.5J	1.6J
Chloroform 7 <5 <5 <5 <5 1,2-Dichloroethane 5 <5	trans-1,2-Dichloroethene	5		<5	<5	<5	<5
1,2-Dichloroethane 5 <5	Chloroform	7		<5	<5	<5	<5
2-Butanone 50 <10	1,2-Dichloroethane	5		<5	<5	<5	<5
1,1,1-Trichloroethane 5 <5	2-Butanone	50		<10	<10	<10	<10
Carbon tetrachloride 5 <5	1,1,1-Trichloroethane	5		<5	<5	<5	<5
Bromodichloromethane 50 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5< </td <td>Carbon tetrachloride</td> <td>5</td> <td></td> <td><5</td> <td><5</td> <td><5</td> <td><5</td>	Carbon tetrachloride	5		<5	<5	<5	<5
1,2-Dichloropropane 5 <5	Bromodichloromethane	50		<5	<5	<5	<5
cis-1,3-Dichloropropene 5 <5	1,2-Dichloropropane	5		<5	<5	<5	<5
Trichloroethene 5 120J 120J 310DJ 380DJ Dibromochloromethane 5 <5	cis-1,3-Dichloropropene	5		<5	<5	<5	<5
Dibromochloromethane 5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <5 <td>Trichloroethene</td> <td>5</td> <td> [</td> <td>120J</td> <td>120J</td> <td>310DJ</td> <td>380DJ</td>	Trichloroethene	5	[120J	120J	310DJ	380DJ
1,1,2-Trichloroethane 5 <5	Dibromochloromethane	5		<5	<5	<5	<5
Benzene 0.7 <0.7	1,1,2-Trichloroethane	5		<5	<5	<5	<5
trans-1,3-Dichloropropene 5 <5	Benzene	0.7		<0.7	<0.7	<0.7	<0.7
Bromoform 50 <5 <5 <5 <5 4-Methyl-2-pentanone 50 <10	trans-1,3-Dichloropropene	5		<5	<5	<5	<5
4-Methyl-2-pentanone 50 <10	Bromoform	50		<5	<5	<5	<5
2-Hexanone 50 <10	4-Methyl-2-pentanone	50		<10	<10	<10	<10
Tetrachloroethene 5 22B 24B 12B 9.8B 1,1,2,2-Tetrachloroethane 5 <5	2-Hexanone	50		<10	<10	<10	<10
1,1,2,2-Tetrachloroethane 5 <5	Tetrachloroethene	5	Г	22B	24B	12B	9.8B
Toluene 5 <5 <5 <5 <5 <5 <5 Chlorobenzene 5 <5	1,1,2,2-Tetrachloroethane	5		<5	<5	<5	<5
Chlorobenzene 5 <5	Toluene	5		<5	<5	<5	<5
Ethylbenzene 5 <5	Chlorobenzene	5		<5	<5	<5	<5
Styrene 5 <5 <5 <5 <5 <5 <5 Xylene (total) 5 <5	Ethylbenzene	5		<5	<5	<5	<5
Xylene (total) 5 <5	Styrene	5		<5	<5	<5	<5
Vinyl Acetate NE <5 <5 <5 Freon 113 5 69 70 6.6 3.3J Chlorodifluoromethane 5 <5	Xylene (total)	5		<5	<5	<5	<5
Freen 113 5 69 70 6.6 3.3J Chlorodifluoromethane 5 <5	Vinyl Acetate	NE		<5	<5	<5	<5
Chlorodifluoromethane 5 <5	Freon 113	5	Г	69	70	6.6	3.3J
Dichlorodifluoromethane 5 <5 <5 <5 <5	Chlorodifluoromethane	5		<5	<5	1.1J	<5
	Dichlorodifluoromethane	5		<5	<5	<5	<5
						0054	

Total VOCs

ug/L	Micrograms per liter
В	Detected in an associated blank.
D	Constituent identified at a secondary dilution.
J	Estimated value
Bold	Constituent detected
(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 value listed.
VOCs	Volatile organic compounds
NYSDEC	New York State Department of Environmental Conservation
	Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.
	Value exceeds associated SCG value.
NE	No SCG established
TOGS	Technical and Operational Guidance Series

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 Table 4. Concentrations of Volatile Organic Compounds Detected in Deep2 Monitoring Wells and Groundwater Remedial Wells and Treatment Systems

 Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT	NYSDEC Standards Criteria and	WELL: SAMPLE ID:	WELL 1 WELL1	WELL 3 WELL3	T-96-INFL T96INF	T-96-EFFL T96EFF
(Units in ug/L)	Guidance Values ⁽¹⁾	DATE:	12/14/2006	12/14/2006	12/14/2006	12/14/2006
	_		_	_	_	_
Chloromethane	5		<5	<5	<5	<5
Bromomethane	5		<5	<5	<5	<5
Vinyl chloride	2		<2	160	76	<2
Chloroethane	5		<5	4.3J	2J	<5
Methylene chloride	5		<5	<5	<5	<5
Acetone	50		<10	<10	<10	<10
Carbon disulfide	50		<5	<5	<5	<5
1,1-Dichloroethene	5		4.6J	21	12	<5
1,1-Dichloroethane	5		1.8J	3.9J	2.9J	<5
cis-1,2-Dichloroethene	5		8.6	17	12	<5
trans-1.2-Dichloroethene	5		<5	<5	<5	<5
Chloroform	7		<5	0.5J	<5	<5
1.2-Dichloroethane	5		<5	<5	<5	<5
2-Butanone	50		<10	<10	<10	<10
1.1.1-Trichloroethane	5		<5	<200	<5	<5
Carbon tetrachloride	5		<5	<5	<5	<5
Bromodichloromethane	50		<5	<5	<5	<5
1.2-Dichloropropane	5		1.5J	<5	<5	<5
cis-1.3-Dichloropropene	5		<5	<5	<5	<5
Trichloroethene	5		540D	3200D	2000D	1.4J
Dibromochloromethane	5	ì	<5	<5	<5	<5
1.1.2-Trichloroethane	5		<5	210	<5	<5
Benzene	07		<0.7	53	10	<0.7
trans-1.3-Dichloropropene	5		<5	<5	<5	<5
Bromoform	50		<5	<5	<5	<5
4-Methyl-2-pentanone	50		<10	<10	<10	<10
2-Hexanone	50		<10	<10	<10	<10
Tetrachloroethene	5		140	60	100	<5
1 1 2 2-Tetrachloroethane	5	ł	<5	<5	<5	<5
	5		<5	<5	<5	<5
Chlorobenzene	5		<5	<5	<5	<5
Ethylbenzene	5		<5	<5	<5	<5
Styrene	5		<5	<5	<5	<5
Yvlene (total)	5		<5	<5	<5	<5
Vinyl Acetate	NE		<5	<5	<5	<5
Freen 113	5	1	82	22	14	
Chloradifluoramathana	5		0.38	66	0 27 1	1 ³⁰ 25
Dichlorodifluoromethane	5		<5	<5 <5	<5	<5
Total VOCs			705.1	3,751.7	2,229.2	1.4

ug/L	Micrograms per liter
В	Detected in an associated blank.
D	Constituent identified at a secondary dilution.
J	Estimated value
Bold	Constituent detected
(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);
VOCa	Notest sumgent value instea.
VUUS	Volatile organic compounds
NYSDEC	New York State Department of Environmental Conservation
	Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.
	Value exceeds associated SCG value.
NE	No SCG established
TOGS	Technical and Operational Guidance Series

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Table 4. Concentrations of Volatile Organic Compounds Detected in Deep2 Monitoring Wells and Groundwater Remedial Wells and Treatment Systems, Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT	NYSDEC Standards Criteria and	WELL: SAMPLE ID:	WELL 17 WELL17	WELL 18 WELL18	WELL 19 WELL19	T-102-INFL T102INF	T-102-EFFL T102EFF
(Units in ug/L)	Guidance Values ⁽¹⁾	DATE:	12/15/2006	12/15/2006	12/15/2006	12/15/2006	12/15/2006
Chloromethane	5		<5	~ 5	~ 5	~ 5	<5
Bromomethane	5		<5	<5	<5	<5	<5
Vinyl chloride	5		<2	<2	<2	<2	<2
Chloroethane	5		-5	-5	<5	-5	-5
Methylene chloride	5		<5	<5	<5	<5	<5
Acetone	5		<10	<10	<10	<10	<10
Carbon disulfide	50		<5	<5	<5	<5	<5
1 1-Dichloroethene	50		27.1	461	151	231	<5
1 1-Dichloroethane	5		<5	<5	<5	<5	<5
cis-1 2-Dichloroethene	5		371	171	22	8.8	<5
trans-1.2-Dichloroothono	5		5.75	-5	<u> </u>	6.0	<5
Chloroform	5		<5	<5	0.041	<5	<5
1.2 Disblorostbana	5		<5	<5	0.945	<5	<5
2-Butanone	5		<10	<10	<10	<10	<10
1 1 1-Trichloroethane	50		0.531	<5	<5	0 77 1	<5
Carbon tetrachloride	5		<5	<5	<5	<5	<5
Bromodichloromethane	50		<5	<5	<5	<5	<5
1 2-Dichloropropane	5		<5	<5	<5	<5	<5
cis-1.3-Dichloropropene	5		<5	<5	<5	<5	<5
Trichloroethene	5		410D	140	180	270D	17.1
Dibromochloromethane	5		<5	<5	<5	<5	<5
1 1 2-Trichloroethane	5		<5	<5	<5	<5	<5
Ronzono	5		<0.7	<0.7	<0.7	<0.7	<0.7
	0.7		<0.7	<0.7	<0.7	<0.7	<0.7
Bramefarm	5		<5	<5	<5	<5	<5
4 Methyl 2 pentenene	50		<10	<10	<10	<10	<10
2-Hexanone	50		<10	<10	<10	<10	<10
Tetrachloroethene	50		24	10	9.6	17	<5
	5		24	10	9.0 		-5
Toluopo	5		<5	<5	<5	<5	<5
Chlorobonzono	5		<5	<5	<5	<5	<5
Ethylbenzene	5		<5	<5	<5	<5	<5
Styrene	5		<5	<5	<5	<5	<5
Xylene (total)	5		<5	<5	<5	<5	<5
Vinvl Acetate	NE		<5	<5	<5	<5	<5
Freon 113	5		10	1.6.1	0.9.1	5.6	<5
Chlorodifluoromethane	5		<5	0.37.1	0.29.1	0.26.1	<5
Dichlorodifluoromethane	5		<5	<5	<5	<5	<5
Total VOCs			450.9	158.3	215.2	304.7	1.7

ug/L Micrograms per liter

B Detected in an associated blank.

D Constituent identified at a secondary dilution.

J Estimated value

Bold Constituent detected

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 value listed.

VOCs Volatile organic compounds

NYSDE New York State Department of Environmental Conservation

Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.

Value exceeds associated SCG value.

NE No SCG established

TOGS Technical and Operational Guidance Series

Table 5. Concentrations of Site-Related Volatile Organic Compounds Detected in Outpost Wells, Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.⁽¹⁾

CONSTITUENT (Units in ug/L)	NYS DEC Standards Criteria and Guidance Values	WELL: SAMPLE ID: DATE:	OW1-1 BPOW1-1 12/1/2006	OW1-1 REP 12-6-06 12/1/2006	OW1-2 BPOW1-2 12/1/2006	OW1-3 BPOW 1-3 12/1/2006	OW 2-1 ⁽⁵⁾ BPOW 2-1 12/1/2006	OW2-2 BPOW 2-2 12/1/2006	OW3-1 BPOW 3-1 12/8/2006	OW3-2 BPOW 3-2 12/8/2006	OW4-1 BPOW 4-1 12/1/2006	OW4-2 BPOW 4-2 12/1/2006
Chlorobenzene	5		<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethene	5		1.8	1.8	<0.50	3.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethane	5		1.5	1.4	<0.50	1.4	<0.50	0.67	<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
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
Chloroform	7		<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	2.2	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1-Trichloroethane	5		3.1J	3.1J	<0.50	4.7J	0.62J	<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
Trichloroethene	5		2	2	<0.50	0.93	1.4	0.77	<0.50	<0.50	<0.50	<0.50
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
Tetrachloroethene	5		<0.50	<0.50	<0.50	<0.50	0.93	<0.50	<0.50	<0.50	<0.50	<0.50
Freon-113 *	5		<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
Total Site-Related VOCs (1):			8.4(3)	8.3(3)	0	10.13 ⁽³⁾	4.97(*)	1.44	0	0	0	0
TVOC Trigger Value (2):			0.6	0.6	0.6	0.6	NE	NE	1.5	1.5	1.5	1.5

⁽¹⁾ Site-related VOCs were established in the Public Water Supply Contingency Plan (PWSCP) (ARCADIS G&M, Inc. 2003).

(2) TVOC Trigger Values were established in the PWSCP (ARCADIS G&M, Inc. 2003).

⁽³⁾ The TVOC Trigger Value for Cluster 1 was initially exceeded on April 23, 2004; confirmatory sampling and reporting was conducted as per the PWSCP (ARCADIS G&M, Inc. 2003)

(4) VOCs were initially detected in Cluster 2 on May 3, 2004; confirmatory sampling and reporting was conducted as per the PWSCP (ARCADIS G&M, Inc. 2003).

(a) Benzene and Methyl tert-butyl ether (MTBE), which are not site-related VOCs, were detected in Outpost Well OW 2-1 on 12/01/06 at 130 ug/L and 10 ug/L, respectively.

ug/L. Micrograms per liter

Bold Constituent detected

TVOC Total Volatile Organic Compounds

NE Not Established

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Table 6. Concentrations of Volatile Organic Compounds Detected in Blank Samples,

Fourth Quarter 2006, Operable Unit 2, Northrop Grumman Systems Corporation, Bethpage, New York.

CONSTITUENT (Units in ug/L)	NYSDEC Standards Criteria and Guidance Values ^(*)	WELL: SAMPLE ID: DATE:	TRIP BLANK TB-11-20-06 11/20/2006	TRIP BLANK TB11-21-06 11/21/2006	TRIP BLANK TB-11-27-06 11/27/2006	TRIP BLANK TB-11-29-06 11/29/2006	TRIP BLANK TB11-30-06 11/30/2006	TRIP BLANK TB12141506 12/14/2006	
Chloromethane	5		<5	<5	<5	<5	<5	<5	
Bromomethane	5		<5	<5	<5	<5	<5	<5	
Vinyl chloride	2		<2	<2	<2	<2	<2	<2	
Chloroethane	5		<5	<5	<5	<5	<5	<5	
Methylene chloride	5		3.8JB	3.9JB	4.6JB	4.2JB	4.7JB	5.2B	
Acetone	50		<10	4.3J	3.3JB	3.3JB	2.4J	3.1JB	
Carbon disulfide	50		<5	<5	<5	<5	<5	<5	
1,1-Dichloroethene	5		<5	<5	<5	<5	<5	<5	
1,1-Dichloroethane	5		<5	<5	<5	<5	<5	<5	
cis-1,2-Dichloroethene	5		<5	<5	<5	<5	<5	<5	
trans-1,2-Dichloroethene	5		<5	<5	<5	<5	<5	<5	
Chloroform	7		<5	<5	<5	<5	<5	<5	
1,2-Dichloroethane	5		<5	<5	<5	<5	<5	<5	
2-Butanone	50		<10	<10	<10	<10	<10	<10	
1,1,1-Trichloroethane	5		<5	<5	<5	<5	<5	<5	
Carbon tetrachloride	5		<5	<5	<5	<5	<5	<5	
Bromodichloromethane	50		<5	<5	<5	<5	<5	<5	
1,2-Dichloropropane	5		<5	<5	<5	<5	<5	<5	
cis-1,3-Dichloropropene	5		<5	<5	<5	<5	<5	<5	
Irichloroethene	5		<5	<5	<5	<5	<5	<5	
Dibromochloromethane	5		<5	<5	<5	<5	<5	<5	
1,1,2-Trichloroethane	5		<07	<07	<07	<0.7	<0.7	<0.7	
Benzene	0.7		<0.7	<0.7	<0.7	<0.7	<0.7	<0.7	
trans-1,3-Dicnioropropene	5		<5	<5	<5	<5	<5	<5	
Bromotorm	50		<10	<10	<10	<10	<10	<10	
4-Methyl-2-pentanone	50		<10	<10	<10	<10	<10	<10	
Zenexalione	50		<5	<5	1318	1018	<5	<5	
1 1 2 2-Tetrachloroethage	5		<5	<5	<5	<5	<5	<5	
Toluene	5		<5	<5	<5	<5	<5	<5	
Chlorobenzene	5		<5	<5	<5	<5	<5	<5	
Ethylbenzene	5		<5	<5	<5	<5	<5	<5	
Styrene	5		<5	<5	<5	<5	<5	<5	
Xvlene (total)	5		<5	<5	<5	<5	<5	<5	
Vinvl Acetate	NE		<5	<5	<5	<5	<5	<5	
Freon 113	5		<5	<5	<5	<5	<5	<5	
Chlorodifluoromethane	5		<5	<5	<5	<5	<5	<5	
Dichlorodifluoromethane	5		<5	<5	<5	<5	<5	<5	
Total VOCs			3.8	8.2	9.2	9.4	7.1	8.3	

ug/L Micrograms per liter

B D Detected in an associated blank.

Constituent identified at a secondary dilution.

J Estimated value

Bold Constituent detected

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 value listed.

VOCs Volatile organic compounds

New York State Department of Environmental Conservation NYSDEC

Freon 113 also known as 1,1,1-Trichloro-2,2,2-trifluoroethane.

NE No SCG established

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TOGS Technical and Operational Guidance Series Page 1 of 1



Current Protayle : ByColor IAIDEMER :Capit Tap: REMEDIAL

Acad Version : R17.0s (LMS TBaby/Time : G:\APR0JECT/Northrop Grumman/Cadd/OU2/2007/OU2SYS_LOCATION_REV7.cwg User Name : alsanchez Path/Name : G:\APR0JECT/Northrop Grumman/Cadd/OU2/2007/OU2SYS_LOCATION_REV7.cwg












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Appendix A

Groundwater Sampling Logs and Chain of Custody Records

Project NORDHRSP. Site Location BETHERA	BRUMMAN	Project No. NY	001348-0406	<u>- ООО</u> ОС ра D	age <u>1</u> of ate [[-70.06
Site/Well No. 6M-25	T	Replicate No.		 C(ode No.
Weather CLEA	R 450	Sampling Time:	Begin	En	d
Evacuation Data			Field Parameters	I	10 20 30
Measuring Point	JOC		Color		OUDRIE
MP Elevation (ft)			Odor		NONE
Land Surface Elevation (ft)			Appearance		CUEAN
Sounded Well Depth (ft bmp)	140		pH (s.u.)	9,54	156 9,75 9,70
Depth to Water (ft bmp)	129		Conductivity		1.1.1.1.1.1
Motor Level Flowstice (#)	8-		(mS/cm)	115711	1.011781178
					13.7
	4"(1)(2)			128 13	9 13.7 13.6
	7.15		Dissolved Onviron	(mol)	5/1 5/1 10/6
Sallons Rummed/Railed	¥3		Calinity (94)		
Prior to Sampling	21.45			Preve	2.51/
Sample Pump Intake			Bemarks Q-T	- Cu	
	perin 2/30 end	150	Ons -	35.20	the second second
			129-39	SRAV.	13+51=2916
Pumping Rate (gpm)					1- 00 00
Pumping Rate (gpm)			56AU	on PALL	s []
Pumping Rate (gpm)	Containe	⁷ Description	<u>56Au</u> Num	ou PAta	<u>§ (</u>
Pumping Rate (gpm) Evacuation Method	Containe	Description	<u>56Au</u> Num	ou PAt	<u> </u>
Pumping Rate (gpm) Evacuation Method	Container	Description	<u>56Au</u> Num	ou PAEL	<u> Preservative </u>
ampling Personnel Well Casing Volu	Container GW	Description		on PAEL	<u> Preservative </u>
ampling Personnel Well Casing Volu al./Ft. 1-½ = 0.06 1-½ = 0.09	Container Container Container 2° = 0.16 3° 2-½° = 0.26 3-½	Description	<u>56Au</u> Num	a PAE	<u> Preservative </u>
Pumping Rate (gpm) Evacuation Method Constituents Sampled ampling Personnel Well Casing Volu ial./Ft. 1-¼ = 0.06 1-½ = 0.09 mp below measuring point C Degrees Celsius	Container Container GW imes 2° = 0.16 3° 2-½° = 0.26 3-½ m! mililiter mS/cm Milisiemens	Description = 0.37 4" = (2" = 0.50 6" = per centimeter	0.65 1.47	Nephelometric Polyvinyl chlorie	S // Preservative
Pumping Rate (gpm) Evacuation Method Constituents Sampled ampling Personnel Well Casing Volu ial./Ft. 1-¼ " = 0.06 1-½ " = 0.09 mp below measuring point C Degrees Celsius feet	Container Container GUJ Imes 2° = 0.16 3° 2-½° = 0.26 3-½ ml mililiter mS/cm Milisiemens msl mean sea-le	Description = 0.37 4" = 0 z* = 0.50 6" = per centimeter vel	D.65 1.47 NTU PVC s.u.	Nephelometric Polyvinyl chlorid Standard units	S // Preservative

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Low-Flow Groundwater Sampling Log

Sampling Weather:	Time:	CL	ean	420	_ Record _ Coded	led By: Replicate No.:	_ <u>_</u> &~W				
n strume Nater Qua	nt Identif i ality Meter	ication (s):	OAKT	w Y	ST DI	OBKAN	Acora	Serial #:			
Purging I	nformatio	on		,		,		C	•		
Casing Ma	terial:	-			_	Purge Method	l: _	COUt	<u>wa</u>		
Casing Dia	meter:				_	Screen Interva	l (ft bmp):	Тор		Bottom	
ounded I	Depth (ft b	mp):			_	Pump Intake [Depth (ft bm	ıp):			
Depth to \	Nater (ft b	mp): .	41,52	-	- (1	Purge time	Start:			_ Finish:	
ield Para	meter Me	easureme	nts Taken	During	Purging						
Time	Minutes	Rate	Volume	Temp	pH	Spec. Cond.	ORP	DO	Turbidity	Depth to Water	÷.
16	Elapsed	(mL/min)	Purged	(°C)	(SI Units)	(mb/cm)	(mV)	(mg/L)	(NTU)	(ft bmp)	Comments
1:15		450	1482 1		5.05	140.6	-58	5.17		41.52	
1:20	1.2 1.4	1			5.04	126.5	-57	4.40			
1125	S. 10. 33		1. A.		5.04	114.5	-33	4.13			
1:30					6.02	101.5	25	4.06			
125	1000		1.5		5,02	98.5	30	4.51		41.9	
1140	19 10 10 10 10 10 10 10 10 10 10 10 10 10				5.05	962	47	457			
1 IL	10				5.03	953	50	457	2		
1.0					SAL	03.7	77	11.4A		41.57	
1:00					SAL	021	67	4.63	· ·	- tise	
1:150					507	924	61	(173			
200					002	077	61	1112			
2.00	19. 19. 19. 19. 19. 19. 19. 19. 19. 19.				ON2	90.9	1	4.63		1	
2500					SIUL	and	170	4.15	12.2	41.60	
2115	-	d			SIDE	9018	10	4/80	1312	11.00	
							1			-	
	1.1.1.1										
iample C	ondition		Color:	hine	525	Odor:	NONE	Appearan	ce: CL	EXAR	
iample C	ollection		C	<u>Olar</u>							
arameter	:			Containe	r:			No.		P	reservative:
SE	EQ	9C					-				
							-			-	
	à		0.0						•		

ARCADIS

Project <u>NORTHON</u> Site Location BIETH	<u>D-bRumman</u> Darge NH	Project No. N	001348.0416	00002	Page Date	<u>1</u> of //-2	21-06
Site/Well No. Nati 61	M-200	Replicate No.			Code No).	
Weather		Sampling Time:	Begin		End		_
Evacuation Data			Field Parameter	s II	11	20	31
Measuring Point			Color			1962	COLORIA
MP Elevation (ft)			Odor				NOWE
Land Surface Elevation (ft)			Appearance		18/16		CUERA
Sounded Well Depth (ft bmp)	226		pH (s.u.)	7.21	6.65	6,62	6.32
Depth to Water (ft bmp)	215		Conductivity (mS/em)				
Water-Level Elevation (ft)	~		(µmhos/cm)	376	113.	1 106	3 105.7
Water Column in Well (ft)			Turbidity (NTU)				19,76
- Casing Diameter/Type	4 (0,65)		Temperature (°C	146	12	7 131	412.6
Gallons in Well	81457,	15	Dissolved Oxyger	n (mg/L)			
– Gallons Pumped/Bailed Prior to Sampling	× 3 21.45		Salinity (%)		-		
Sample Pump Intake Setting (ft bmp)			Sampling Metho Remarks	τω 3°	1.96		
Purge Time b	egin <u>9:00</u> end						
Pumping Rate (gpm)			215-3	57.960	43+	50=2	130051
Evacuation Method			56A	uon t	Ans	111/2	
Constituents Sampled	Containe	r Description	Nur	nber	ſ	Preservat	ive
					-		
					-		
ampling Personnel	GW						
Well Casing Volu Sal./Ft. 1-¼ " = 0.06 1-½ " = 0.09 1-½ " = 0.09	mes 2" = 0.16 3" 2-½" = 0.26 3-½	= 0.37 4"= 2"= 0.50 6"=	D.65 1.47				
mo below measuring point	ml mililiter		NTU	Nephelome	tric Turbidi	ty Units	
C Degrees Celsius	mS/cm Milisiemens	per centimeter	PVC	Polyvinyl ch	loride	.,	
	mel maan son la	vol	e 11	Standard ur	nits		
t feet om Galloot per minute	M/A Not Applied	hie	umbos/cm	Micromhoe	nor contim	ator	

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Project NDRD4R08- Site Location <u>BETHE</u>	GRUMMAN AGE NY-	Project No. N V	1.001348.04	<u>[06.00</u> 00]	∑Page Date	1of /2_	1-06
Site/Well No. 6M-2)I	Replicate No.			Code No)	
Weather		Sampling Time:	Begin		End		
Evacuation Data			Field Parameters	5 I	11	20	31
Measuring Point	TOC		Color				Grove
MP Elevation (ft)	-		Odor				NOWE
Land Surface Elevation (ft)			Appearance			1.1	CLOX
Sounded Well Depth (ft bmp)	105		pH (s.u.)	9.59	10.55	12.65	9.Fi
Depth to Weter (ft bmp)	94		Conductivity				
Water-Level Flevation (ft)			(umbos/cm)	123.7	1367	136.8	139.6
Water Colume in Mail 164	11		Turbiclity (NITLIN	1 mil	1040	10	10,51
Casing Diameter/Type	4"10.67		Temperature (°C	14.8	15.4	15.7	1/03
Gallons in Well	715		Dissolved Oxyger	(ma/L)		101	101-
Salloos Pumped/Bailed	x3		Salinity (%)				
Prior to Sampling	21.45		Sampling Metho				
Sample Pump Intake			Remarke M	11 34	RT		
	eain 12:55 end 1	2:35	QU_ 2L	$\frac{1}{2}$	43+2	50=>	ORT
Pumping Rate (apm)		<u></u>	14-0	UIA'			
Evacuation Method			56A1	ION PI	AIS	1111 4	2
	Containe	Description	Nur	nher		Preservat	tive
SEE COC.							
DEF CUC					~ -		
					-		
					-		
					-		
					-		
ampling Personnel	<u>6.</u> W,						
Well Casing Volu	mes	= 0.37 /*-	0.65				
1-½° = 0.09	2-1/2" = 0.26 3-1/	2 [°] = 0.50 6 [°] = 1	1.47				
mp below measuring point	ml mililiter		NTU	Nephelome	tric Turbidi	ty Units	
Degrees Celsius	mS/cm Milisiemens	per centimeter	PVC	Polyvinyt chi	oride		
ופכו			.u.		1113 		
om Gallons per minute	N/A NOT Applica	DIE	umnos/cm	MICTOMINOS	per cenum	eter	

Low-Flow Groundwater Sampling Log

ampling 1 Veather:	lime:		1701	50	Record Coded	ed By: led By: l Replicate No.:	G	<u><u></u></u>			
nstrumer Vater Qua	n t Identifi ality Meter	cation (s):	Se	ECA	n Lo	6	-	Serial #:			
urging li	n formatio	n						/	<u> </u>		
asing Ma	iterial:	-			-	Purge Method	l: _	LOW t	<u>20W</u>		
asing Dia	meter:				_	Screen Interva	l (ft bmp):	Тор		Bottom_	
ounded D	Depth (ft b	mp):	<u> </u>	7 6	_	Pump Intake D	Depth (ft brr	ıp):			
epth to V	Vater (ft b	mp):	_39.	36		Purge time	Start:			Finish:	
ield Para	meter Me	asureme	nts Take	n Durina I	Puraina						
Time	Minutes	Rate	Volume	Temp	рн	Spec. Cond.	ORP	DO	Turbidity	Depth to Water	
	Elapsed	(mL/min)	Purged	(°C)	(SI Units)	(mS/cm)	(mV)	(mg/L)	(NTU)	(ft bmp)	Comments
:25	Sile In	450	211 9	13.1	5.68	109,2	-88	6.31		32.36	
:30	E. C. Pro	1		13.0	5.6	1095	-93	6,29		36,40	12.4
1:35	2 1 1 2			13.0	5.16	108.9	-76	6.30			
1:40	Sec. 1			13.0	5.54	1080	-60	6.01		Sec. and a second	19 a.
1:45			1	12.2	5.53	108.0	38	6.14		39.40	highly of the
1:0D				12.9	551	102.0	-1	6.17			·
icc	1. 14			127	651	1017	35	6.14			104-11-11-11-11-11-11-11-11-11-11-11-11-11
2:00			Sec. 5	12.7	50	107.9	64	6.12		39.40	
2:05	2 1 1 2	1	5420	12.1	550	5.01	25	6.19	1.1	- O IIIO	34 × 10
2110	10 C 2 C 2	V		12.1	650	107.6	67	617	9,47		
210				101	pilo	10.00	101	- cont	1011		
1	1										
	1.1.1										
									1.1.1.1		
											C.L. States
					-			1.2		-	6.5
-											2 11 12
ample ()	ondition		Color	CALM	27415	Odor: 4	NONF	Appeara		NAR	
ample C	offection			$\overline{\mathbf{u}}$	<u></u>	, 0001. [<u></u>	- Abbearai			
arameter	:			Containe	r:			No.		P	reservative:
							-			_	
							-			-	
ID Readin	à		0.0								
	צי			00				0			

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Low-Flow Groundwater Sampling Log

Instrume	nt Identifi	cation		<u> </u>	-				-		
Water Qu	ality Meter	(s):		SEE	CAL	LOG		Serial #:			
Purging I Casing Ma	i nformatic aterial:	n.			_	Purge Method	: _	Low	tion		
Casing Dia	ameter:				-	Screen Interval	(ft bmp):	Тор		Bottom	
Sounded	Depth (ft b	mp):		1-7	-	Pump Intake D	epth (ft bm	p):			
Depth to '	Water (ft b	mp):	401	b	-	Purge time	Start:	••••••••••••••••••••••••••••••••••••••		- Finish:	
Field Para	ameter Me	easureme	nts Taker	During P	urging						
Time	Minutes	Rate	Volume	Temp	pH .	Spec. Cond.	ORP	DO	Turbidity	Depth to Water	1.1.1
- /	Elapsed	(mL/min)	Purged	· (°C)	(SI Units)	(mS/cm)	(mV)	(mg/L)	(NTU)	(ft bmp)	Comment
2:15	Land S. C.	450	190	12.2	5,56	1061	11	2.84	4961	40,61	you that I want
2:20	1.1.1			11.6	5.55	106.90	89	2.92	1. 128	3	1.11
2:25		1		11.7	531	1067	94	4,66		Section States in the	Section Street
2:30				11.7	5.37	10617	98	5.04		40.63	hard the second
2:25		34		11.2	5.27	106.8	101	5.34		1.	
21.0	1			11:8	530	107.4	106	5,37			
2:45				1.V	54	1077	IDX	5:35			New York
2:00				112	679	107.7	482	540		40,67	1. S. V.
2.4	1.1			11:0	679	1015	116	5.54		1-01	1.54
200	1.1.1.1.1		1	14,5	5.28	1073	lie	552		1.	a fair a state
200	1.1			112	625	1015	112	257		416.61	11 () () () () () () () () () (
2110				HP.	671	107.4	119	Ser		70101	
210	1000			119	025	107.1	14-	6.57	6.67		- Argented
SiD		4		1110	200	10 m		5151	giec		
	the second										
										1	
								-		100	
Sample C	Condition		Color:	Coras	UBS	Odor:	NOWE	Appearan	ce:	CLEAR	1- 13-
Sample C	Collection									-	
Paramete	r: ·			Container	:			NO.		P	reservative:
								L			
¥			0 0								
··	·		(1 ())								

Low-Flow Groundwater Sampling Log

Project Nur Date: Sampling T Weather:	nber: ïme:	Ny ôr H	-27-0	56	Task: Sample Record Coded	ed By: led By: Replicate No.:	64 64 88	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	/ell ID: 	<u>6/m~13</u>	
nstrume n Vater Qua	n t Identif lity Meter	ication (s):					REP	6 M-3/ Serial #:			
urging in Casing Ma	n formatic terial:	on -			_	Purge Method:		Lowf	row		
asing Dia	meter:				-	Screen Interval	(ft bmp):	Тор		- Bottom	
ounded D	epth (ft b	mp):		20	-	Pump Intake D	epth (ft bmj	o):			
Depth to V	Vater (ft b	mp):		.80	-	Purge time	Start:			- Finish:	
ield Para	meter Me	easureme	nts Take	n During F	Purging				1		
Time	Minutes	Rate	Volume	Temp	pН	Spec. Cond.	ORP	DO	Turbidity	Depth to Water	5.
-	Elapsed	(mL/min)	Purged	(°C)	(SI Units)	(mS/cm)	(WM)	(mg/L)	(NTU)	(ft bmp)	Comments
3:00	1 million of	450		14,0	4994	(33.0	139	4.96		33,80	
3:05	The second			13.9	4.94	132.4	135	4.90			
310				13.8	4:24	13018	135	4.28			Sector and the sector of the s
3:15	أساد سابها			13:1	4.80	10811	136	3.95	17.	33,30	
3:20	la martine			13:1	4.86	12915	136	3.92			
3:25	La constante			13,6	4.81	128.9	131	3.87			
3:30	Prove 1			13.6	4.89	129.5	1.57	3.79		02.0-	A starting to
3.35				13.6	14.90	129,3	139	32575	·	35,80	
3:40				133	4.90	125.3	140	3.64			
3:us	Marine Marine			13.5	491	121.2	144	3,61			
1.20				13.4	4.91	129.5	147,	5:10		22.00	
355	1.14	W		133	49	IEIS	146	3,62	000	35.80	
1:00	_	V		13:3	4.91	1293	148	3.60	(0,8X		
iample Co	ondition		Color:			Odor:		Appearar	nce:	a.,	
ampie Co 'arameter:	Dilection			Container	r:			No.		-	Preservative:
										-	
'ID Readin	g										
ommonte											

Project Site Location Site/Well No.	NORTHRO BETH GM-3	<u>р-621мм</u> А-1 РАБЕ NY. AT 5D-2	Project No. (Replicate No.	И <u>цоо 1348. оч</u>	<u>106.0000</u> Da	$\log \frac{1}{\sqrt{-2}}$	of 29-04
Weather	OPAU	451 55	Sampling Time	: Begin	En	d	1
Evacuation Da	ta			Field Parameters	T	15/20	30
Measuring Poir	nt	TOC		Color			COLORI
MP Elevation (f	't)			Odor			Nowe
Land Surface El	levation (ft)			Appearance	de la	6.2	CLERA
Sounded Well I Paril Depth to	Depth (ft bmp) ମୁନ୍ଦି r (ft bmp)	530		pH (s.u.) Conductivity	6.60	6.60 4.67	6,52
Water-Level Ele	vation (ft)	07		(m5/cm) 7 (µmhos/cm)	104.4	104,186.4	87,1
Water Column	in Well (ft)	111/01-	<u>}</u>	Turbidity (NTU)	102	C2 1/2	0.2
Casing Diamete	г/Туре	4 (0:65		Temperature (°C)	10.01	013 100	16:0
Gallons in Well Gallons Pumped Prior to 2	t/Bailed Sampling			Salinity (%)			
Sample Pump In Setting (itake (ft bmp)			Sampling Method Remarks	TW - 37	41	
Purge Time		begin end _		5GAL	PAULS	THE	
Pumping Rate (g	jpm) .			507-3	8,41 ×.	43+4)= 2531
vacuation Meth	hod .						
	ampled	Contain	er Description	Num	iber	Preserva	ative
Constituents S							
Constituents S SEE	<u>C</u> 8C						
Constituents S	<u>C</u> 8C						
SEE ampling Person	nel		Aus				
ampling Person	CORE Inel Well Casing Volution 1-¼ * = 0.06 1-½ * = 0.09	<u>G</u> <u>w</u> ∑ <u>u</u> umes 2* = 0.16 3 2-½* = 0.26 3	AULS * = 0.37 4* : -½* = 0.50 6* :	= 0.65 = 1.47			

2.34

Project Nu			A M	ר				_			
	mber:	<u>N400</u>	>1342	8.040	6 _{Task:}		00220	$\sum_{i=1}^{i} w_{i}$	ell ID:	_6M-3:	30-2_
one:	T ime a .				Sampi	ed By:		$\frac{v}{v}$			
Veather:	rime:				. Record	deo by: 1 Replicate No.:	REP	1-19-0	2		
nstrume	nt Identif	ication				·					
Vater Qu	ality Meter	(s):					-	Serial #:			
urging I	nformatio	n						L- C	N. N		
asing Ma	iterial:					Purge Method	:	LOWTO	54		
asing Dia	meter:				•	Screen Interva	l (ft bmp):	Тор		Bottom	
ounded I	Depth (ft b	mp):	บาา	<u>ل</u> م	•	Pump Intake D	epth (ft bmp):		PT 1.1.	
epth to \	water (ft b	mp):	7 (1)	00		rurge time	Start:			Finish:	
ield Para	meter M	easureme	nts Take	n During P	urging						
Time	Minutes	Rate	Volume	Temp	pН	Spec. Cond.	ORP	DO	Turbidity	Depth to Water	
100	Elapsed	(mL/min)	Purged	(°C)	(SI Units)	(melicini)	(mV)	(mg/L)	(NTU)	(ft bmp)	Comments
130	Sec. in	450		16.16	5,21	101	1401	186		41,60	
1:35	-		mine	16.01	Sill	102	14515	6.21			and the second second
1:40	Sec. 1		day and	12.11	SIL	44	1200	PAL			the second s
414)		1.1		12:58	265	1 23	1313	9:201		4157	and the second
1.00	Printer.			15108	6111	on	1250	624		קכיוד	to have a
500	10		1	167	6000	00	1244	620			the second
5.00	and they			1570	GAL	ap	1256	634			and the second second
5:10	100 C		77	18.10	6AS	32	127.2	Ght		and the second	and the second
5.5	12		·	15,14	217	82	1227	6.45		4757	10 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
5:20				IS U	54	\$3	191421	6.38			1.
5-25	DALC 1			15.4	5.40	88	1454	6.42			12
630	and the second	V	5	10.0		00	1				- 1 A
	Ser. Sh										1
		2								1 C. 1	13.12
								an a			
n.e.											1.5.1
				5.4) 9							
amnie C	ondition		Color	Cord	18%	Odor	ADON-	Appearance	e:	MEAN	S
ample C	ollection		00011			-					
arameter	:			Container	:			No.		Pr	eservative:
266	- 00	\mathcal{L}									
										-0	
	<u>.</u>		Asic								
ID Readir	ģ		020								
	_										

		dien	ລ.20	ו גיז א	.ow-Fl	ow Grour	ndwater	Sampling	Log	A. 91	
Project Nu	mber:	<u>vy y</u>	V129	$\frac{10.01}{10}$	O Task:	1.5		<u> </u>	/ell ID:	CMr JY	<u>D</u>
Date: Commilia a ⁻	Fi	<u> </u>	1-36-	ec_	Sampl	ed By:	GW				
Meather	i une.	- 01	MRCA	5 575	necon و Coder	leu by. I Renlicate No '					
weather.				51 230					-		
Instrume Water Qua	n t Ident ifi ality Meter	cation (s):					_	Serial #:			
Purging I	nformatio	n							()		
Casing Ma	terial:					Purge Method	d: _	LOWT	au		
Casing Dia	meter:				-	Screen Interva	l (ft bmp):	Тор		Bottom	1
Sounded [Depth (ft b	mp):			-	Pump Intake I	Depth (ft bmp	o):			
Depth to \	Vater (ft b	mp):	13.0	/		Purge time	Start:			- Finish	
Field Para	meter Me	asureme	ents Taker	n During P	urging						
Time	Minutes	Rate	Volume	Temp	pН	Spec. Cond.	ORP	DO	Turbidity	Depth to Water	
0100	Elapsed .	(mL/min)	Purged	(°C)	(SI Units)	(mS/cm)	(mV)	(mg/L)	(NTU)	(ft bmp)	Comment
200		450		15.66	6,00	77	7212	4172		1001	
2:05				15.00	101	40	81.6	4.57		13.13	
2115	la residente del			15.50	6.89	45	68.6	4.67		10.P	
2:20	1.00			15.5	6.51	45	59.1	4.47		Sand and	14 Y.
2:25				15.51	6.49	45	50,5	4.68		13,10	
2:30	Card Star			15.51	6.42	45	501	4.57			
2135	الأربي الم			15.71	6.22	45	46.1	4.58	•	1.2.11	
2190	55-2 m		· · · · ·	15:14	6.36	45	4614	4.69		13:14	
210				150	6.00	45	45.1	4:54	9.31		
7:05		17- A		15.64	211	45	459	4.00	1101	13.14	
3:00		V		15.77	GIY	45	445	4.50		1-1-1	
2000										1	
		10								1	
											-
Sample (ondition		Color:	Cour	1625	Odor:	ATAJY	Appearat	l	CLEAR	
Sample C	ollection			<u></u>		•					
Parameter				Container	•			No.			Preservative:
SPE	COC	-					-			-	
							_				
PID Readir	ġ		O,D				·				
Comment	s										

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Project NORTHLOP	BUMMBE HEENY	Project No.	ypo1348.	0406 "	Page <u>1</u> Date	of [2-] -	.əb
Site/Well No. Br Dw - ' Weather Rasy	<u>50°</u>	Replicate No. Sampling Time:	Begin		Code No.		
Evacuation Data			Field Parameter	s —	tul	2 =	2.1
Measuring Point	TOC		Color	1	10	20	coro
MP Elevation (ft)	-		Odor				NON
Land Surface Elevation (ft)	-		Appearance			1. 13	CUP
Sounded Well Depth (ft bmp)	495		pH (s.u.)	4.35	14.62	4.62	4.04
Depth to Water (ft bmp)	419		Conductivity				
	7		(mS/cm) ' (µmhos/cm)	64.8	8 65.0	64,1	79.7
Water Column in Well (ft)	76		Turbidity (NTU)				
Casing Diameter/Type	4" (0.65)		Temperature (°C	$\overline{14.}$	512.5	36	13,4
Gallons in Well	49.48		Dissolved Oxyger	n (mg/L)	-		
	×3 148,20		OTTA Salimity (%)	13,67	1223	0 22.7	5 20.5
Sample Pump Intake			Sampling Metho	d	117		
Setting (ft bmp)			Remarks U	10-13) 0, (
Setting (ft bmp) Purge Time bu	egin 730 end		Remarks <u>U</u> 4(9-1	$\frac{ \omega - y }{3x.4}$	3+50	=27	25PS
Setting (ft bmp) Purge Time bu Pumping Rate (gpm)	egin <u>730</u> end		Remarks <u>U</u> 4(9-1	<u>10 - 19</u> 3 x . 4	3+50	1=27	ZSPS
Setting (ft bmp) Purge Time be Pumping Rate (gpm) Evacuation Method	egin_ <u>730</u> end		Remarks <u>U</u> <u>4(9-1</u>	<u>10-19</u> 3x,4	3+50	1=27	25Ps
Setting (ft bmp) Purge Time be Pumping Rate (gpm) Evacuation Method Constituents Sampled	egin <u>730</u> end Container	r Description	Remarks <u>U</u> <u>4(9-1</u> Nur	1 () ~ 1 (3 y , 4 nber	2.0 1 3 + 5 0 Pre) = 27	2593
Setting (ft bmp) Purge Time b Pumping Rate (gpm) Evacuation Method Constituents Sampled	egin <u>230</u> end Container	r Description	Remarks <u>U</u> <u><u><u><u></u><u></u><u></u><u><u></u><u></u><u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u></u></u>	1 <u>() - 1</u> 3 <u>y</u> , 4	Pre	eservativ	25Ps
Setting (ft bmp) Purge Time b Pumping Rate (gpm) Evacuation Method Constituents Sampled jampling Personnel	egin <u>730</u> end Container	Description	Remarks <u>U</u> <u><u><u><u>U</u></u>(<u><u>9</u>-<u>1</u></u> <u><u><u>U</u></u> <u><u>N</u>ur</u></u></u></u>	(() ~ \ 3 \ y , 4	Pre	eservativ	25Ps
Setting (ft bmp) Purge Time b Pumping Rate (gpm) Evacuation: Method Constituents Sampled Sampling Personnel Well Casing Volur Sal./Ft. 1-½* = 0.06	egin <u>730</u> end Container	= 0.37 4" =	Remarks <u>U</u> <u><u><u>U</u>(<u><u>9</u> <u>1</u>)</u> <u><u>Nur</u> <u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u><u></u></u></u></u></u>	(() ~ (3 y , 4	Pre	eservativ	25Ps
Setting (ft bmp)	egin <u>730</u> end Container	Description = 0.37 4" = = 0.50 6" =	Remarks <u>U</u> <u><u><u><u>U</u></u>(<u><u>9</u> <u>1</u>)</u> <u><u><u>N</u>ur</u> <u><u><u>N</u>ur</u> <u><u><u>N</u>ur</u> <u><u></u><u></u> 0.65 1.47</u></u></u></u></u></u>	(() ~ (3 y , 4	Pre	eservativ	25Ps
Setting (ft bmp) Purge Time b Pumping Rate (gpm) Evacuation: Method Constituents Sampled Sampling Personnel Sampling Personnel Well Casing Volur Sal./Ft. 1-½ * = 0.06 1-½ * = 0.09 mp below measuring point C Degrees Celsius	egin <u>730</u> end Container 	Description = 0.37 4" = = 0.50 6" = per centimeter	Remarks <u>U</u> <u>4(9-1</u> Nur 0.65 1.47 NTU PVC	Nephelomet	Pre Pre Pre	eservativ Units	25Ps
Setting (ft bmp)	egin <u>230</u> end Container mes 2° = 0.16 3° 2-½° = 0.26 3-½ m! mililiter mS/cm Milisiemens mean sea-ler	Description = 0.37 4" = = 0.50 6" = per centimeter vel	Remarks <u>U</u> <u>4(9-1</u> <u>Nur</u> 0.65 1.47 NTU PVC s.u.	Nephelomet Polyvinyl chl Standard un	Pre Pre Pre Pre Pre Pre Pre Pre	eservative Units	25F

ARCADIS GERAGHTY & MILLER			
Water Sampling Lo	og		rogor
Project NORTHE	P-6RSMMAD Proje	ect No. Ny 50 1348.	0400' Page <u>1</u> of
Site Location	Abr. M		Date 12-1-86
Site/Well No. BPDU	Repli	icate No.	Code No.
Weather RAW	1 4JOT Sam	pling Time: Begin	End
Evacuation Data	-1	Field Parameters	I 10 20 50
Measuring Point		_ Cołor	Cource
MP Elevation (ft)		Odor	Now
Land Surface Elevation (ft)		Appearance	Cleve
Sounded Well Depth (ft bmp)	400	- pH (s.u.)	5.76 5.13 5.81 3.88
Depth to Weier (ft bmp)	310	Conductivity	
Mater toyol Elevation (ft)		(ms/cm)	821 1212 8/1 990
	Cut	· · · · · · · · · · · · · · · · · · ·	000 00 001 100
water Column in well (11)	4" () . 3		112 11/126 122
	575	Distributed Occurrent	
salions in well -	* 3	Dissolved Oxygen (D(W)	18 5 1925 425 19 NO
Prior to Sampling	175.5	Saunity (70)	1001163 F12311.00
- iample Pump Intake		Sampling Method	170
Setting (ft bmp)	1:0 1:0-1	Remarks DT	$\frac{10}{10} = \frac{10}{10} \frac{10}{10} \frac{10}{10}$
Purge Time	begin DX end 1:5	310-24	(x,43+50=15PS4
umping Rate (gpm)		(930)	NO 181 100001
vacuation Method			
Constituents Sampled	Container Descri	ption Numi	per Preservative
SALE CDC.			
	GIN		
		E Hand Contraction	
vven Casing Volt al./Ft. 1-¼ = 0.06	2" = 0.16 3" = 0.37	4" = 0.65	
1-½" = 0.09	2-1/2" = 0.26 3-1/2" = 0.50) 6" = 1.47	
np below measuring point	ml mililiter	NTU M	lephelometric Turbidity Units
Degrees Celsius	mS/cm Milisiemens per centi msl mean sea level	meter PVC F	olyvinyl chloride
m Gallons per minute	N/A Not Applicable	umhos/cm	Aicromhos per centimeter
g/L Miligrams per liter	NR Not Recorded	VOC N	/olatile Organic Compounds

ARCADIS GERAGHTY & MILLER					
Water Sampling L	.og				
Project NODILLA	PERDAMAD	Project No. Ny	x1212D406	NOEDZ Page	1 of
Site Location BERLIP	LE ALL			Date	12-6-06
Sile Location DOW			Q15P 12.6	ab cad	No
Site/Well No. DPOW		керікате мо.	KP1 10-0	Code	2 NO.
Weather	<u>1(45°</u>	Sampling Time:	Begin	End	
Evacuation Data			Field Parameter	S I W	20 33
Measuring Point	TOC		Color		Cororie
MP Elevation (ft)			Odor		NOWF
Land Surface Elevation (ft)			Appearance		CLOPN
Sounded Well Depth (ft bmp)	241		pH (s.u.)	6,78 5,61	541 5:41
PAULER Depth to Water (ft bmp)	169		Conductivity	1 1 1 1 1 1 1	
			(m5/cm)		
Water-Level Elevation (ft)			(µmhos/cm)	104.5 105.5	1056 10421
Water Column in Well (ft)			Turbidity (NTU)		9.33
Casing Diameter/Type	4 (0.65)		Temperature (°C	15.3 13.6	17.9 12.8
Gallons in Well	46.8		Dissolved Oxyge	-(mg/L) 28	6 28.75 2853
Gallons Pumped/Bailed	1/10		Salinity (%)	CEIGH	
Prior to Sampling			Sampling Metho	d <u>3 WH</u>	L Vormer
Sample Pump Intake Setting (ft bmp)			Remarks	_	
Purge Time	begin end		169-	28,69 x.4	13+50 = 110PS
- Pumping Rate (gpm)					_
Evacuation Method					
Constituents Sampled	Containe		Nu	nher	Preservative
CATOR					
OTE CE -		· · · · · · · · · · · · · · · · · · ·			
	6.1.5.15	Dur			
Sampling Personnel	0.0.DU	3.4.4			
vveii Casing Vo Gal./Ft. 1-¼ " = 0.06	2" = 0.16 3"	= 0.37 4" = 0	.65		
1-½" = 0.09	2-1/2" = 0.26 3-1	2" = 0.50 6" = 1	.47		
mp below measuring point	ml mililiter		NTU	Nephelometric Tu	rbidity Units
C Degrees Celsius	mS/cm Milisiemens	per centimeter	PVC	Polyvinyl chloride	
r reer innute Gallons per minute	msi∞ mean sea-le N/A Not Applica	ble	s.u. umhos/cm	Standard Units Micromhos per ce	ntimeter
ng/L Miligrams per liter	NR Not Record	ed	VOC	Volatile Organic C	ompounds

Project Site Loo Site/We	cation <u>BDAPA</u> ell No. <u>BPDU</u>	6.Romman 165 - 1-2	Project No. NI Replicate No.	4881349.0426.1	Date Date Code N	1_of <u>12-6-06</u> o
Weathe	er <u>CLOPM</u>	400	Sampling Time:	Begin	End	
Evacua	tion Data			Field Parameters	IIV	2035
Measur	ring Point _			Color		Coron
MP Elev	vation (ft)			Odor		Nor
Land Su	urface Elevation (ft)			Appearance		Clor
Sounde	d Well Depth (ft bmp)	335		рН (s.u.)	5170 5,3	5:10 4.91
Depth t	o Water (ft bmp)	294		Conductivity	T I	
Mator 1	oval Flavation (ft)			(umbos/cm)	19/201	3220408
Waler-L		<u> </u>				7.7
water C		(0.65)411			117137	12.4 0.7
Galloos	in Well	26.65		Dissolved Onvien (mo	A)	
Galloos	Pumped/Bailed	¥.3_		Salinity (%) 7	7.45 30.21	3.41 30
F	Prior to Sampling	80.00			312000	point pos.
Sample I S	Pump Intake Setting (ft bmp)			Remarks	o weit i	
Purge Ti	me be	gin end		294-28.4	5x,43+5	50=165
Pumping	j Rate (gpm)		1:			
Evacuatio	on Method					
Constitu	ients Sampled	Containe	er Description	Number		Preservative
Sampling	Personnel				·	
Sampling	Personnel Well Casing Volum				·	
Sampling Sal./Ft.	Personnel Well Casing Volum 1-¼ " = 0.06 1-½ " = 0.09	les 2° = 0.16 3° 2-½° = 0.26 3-3	= 0.37 4" = 0 ½" = 0.50 6" = 1	0.65	·	
Sampling Gal./Ft.	Personnel Well Casing Volum 1-¼ " = 0.06 1-½ " = 0.09 210w measuring point	es 2" = 0.16 3" 2-½" = 0.26 3-3 m1 mililiter	= 0.37 4" = 0 ½" = 0.50 6" = 1	0.65 1.47 NTU Nep	nelometric Turbid	lity Units
Sampling Sal./Ft. xmp be	Personnel Weil Casing Volum 1-¼" = 0.06 1-½" = 0.09 How measuring point egrees Celsius	es 2° = 0.16 3° 2-½° = 0.26 3-3 m! mililiter mS/cm Milisiemens	= 0.37 4" = 0 1/2" = 0.50 6" = 1 15 per centimeter	0.65 0.47 NTU Nept PVC Potyo	nelometric Turbid	lity Units
Sampling Sal./Ft. xmp be 'C Do t' fe ypm Ga	Personnel Well Casing Volum 1-¼" = 0.06 1-½" = 0.09 elow measuring point egrees Celsius et allons per minute	les 2° = 0.16 3° 2-½° = 0.26 3-3 m! mililiter mS/cm Milisiemens msl mean sea-k N/A Not Applica	= 0.37 4" = 0 1/2" = 0.50 6" = 1 5 per centimeter evel 1ble	0.65 0.47 NTU Nepl PVC Polya s.u. Stan umhos/cm Micr	nelometric Turbid rinyt chloride dard units omhos per centin	lity Units

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Project NOCTOR	<u>P-6RUM</u> MAU HAGK - 1-3	Project No. NY D	DPUS DVOC-	Date	<u>1</u> of <u>12-7-06</u> No.
Weather <u>CLPAN</u>		Sampling Time:	Begin 10:4	D End	11:30
Evacuation Data		Fi	eld Parameters	II	1 20 30
Measuring Point	TOL	C	olor		Kow
MP Elevation (ft)			dor		No
Land Surface Elevation (ft)		A	ppearance		CU
Sounded Well Depth (ft bmp)	419	pł	1 (s.u.)	5,19 4.8	54.81 3.
PACLER Depth to Wate r (ft bmp)	344	Co	onductivity	,	
			(mS/cm) -	-	11162 1182
	75	· _	(µmnos/cm)	10. 15%	011124140
Water Column in Well (ft)	UN CALE	Iu	irbidity (NTU)	ICH IV U	129 2
asing Diameter/Type	<u> </u>	Ie	mperature (°C)	13.7 (.7	
Sallons Pumped/Bailed Prior to Sampling	14675	D	Tul Inity (%)	3010 324	3256 32.
ample Pump Intake Setting (ft bmp)		Sa Re	mpling Method marks	13010	
lurge Time t	egin end		344-30	10x.43.	+50 = 185 P
umping Rate (gpm)	· · · · · · · · · · · · · · · · · · ·				
vacuation Method					
Constituents Sampled	Container	Description	Numbe	r	Preservative
SEE COC					
Well Casing Volu	mes				
The comy for	2" = 0.16 3" =	$= 0.37$ $4^{\circ} = 0.65$ $= 0.50$ $6^{\circ} = 1.47$	5		
al./Ft. 1-¼" = 0.06 1-½" = 0.09	2-72 = 0.20 3-72				
al./Ft. 1-¼" = 0.06 1-½" = 0.09 mp below measuring point Degrees Celsius feet	ml mililiter mS/cm Milisiemens p msl mean sea-leve	er centimeter	NTU Nej PVC Pol s.u. Sta	phelometric Turbi yvinyl chloride ndard units	dity Units

192.00

Project <u>NORTHER</u> Site Location <u>SPTHE</u> Site/Well No. <u>BPD (J)</u> Weather <u>CLLPAR</u>	$\frac{SP-6RUMMAH}{4615}$ $\frac{4615}{14}$ $\frac{4}{50}$ $\frac{50^{\circ}}{50}$ $\frac{50^{\circ}}{14}$ $\frac{1}{50}$ $\frac{1}{50}$ $\frac{1}{50}$ $\frac{1}{50}$ $\frac{1}{50}$ $\frac{1}{50}$ $\frac{1}{50}$ $\frac{1}{50}$	NY <u>601343.0416.67</u> 200 	Page <u>1</u> of Date <u>12-7-05</u> Code No End
Evacuation Data		Field Parameters	10 20 35
Measuring Point	Toc	Color	SILM COLM
MP Elevation (ft)		Odor	Sibol
Land Surface Elevation (ft)	STANAFE SCREPHU	Appearance	SLEAT
Sounded Well Depth (ft bmp)	6 692	pH (s.u.) 58	15.82 5.97 3.59
Depth to Water (ft bmp)	503 652	Conductivity	
Water-Level Elevation (ft)		(ms/cm)- (µmhos/cm) 44.	76.3 57.9 71.6
Water Column in Well (ft)	149 40	Turbidity (NTU)	
Casing Diameter/Type	4"(0.15) 2(0.16)	Temperature (°C) 14.4	142 135 137
Gallons in Well	96.51 64	Dissolved Oxygen (mg/L)	
Gallons Pumped/Bailed Prior to Sampling	290 + 19,2 = 310	Satisticy (%) 26.8	26.65 26.58 26,68
Sample Pump Intake Setting (ft bmp)		Sampling Method Remarks	
Purge Time	begin end	SI = 6	92-26-25-25
Pumping Rate (gpm)			n prest
Evacuation Method			
Constituents Sampled	Container Description	Number	Preservative
ampling Personnel			
ampling Personnel Well Casing Vo			
ampling Personnel Well Casing Vo ial./Ft. 1-½ * = 0.06 1-½ * = 0.09	Humes $2^* = 0.16$ $3^* = 0.37$ 4 $2 - \frac{1}{2}^* = 0.26$ $3 - \frac{1}{2}^* = 0.50$ 6	• = 0.65 • = 1.47	
ampling Personnel Well Casing Vo ial./Ft. 1-¼" = 0.06 1-½" = 0.09 mp below measuring point C Degrees Celsius t feet	Numes $2^{*} = 0.16$ $3^{*} = 0.37$ 4 $2^{-1/2^{*}} = 0.26$ $3^{-1/2^{*}} = 0.50$ 6 m! milliter mS/cm Millistemens per centimeter ms! mean sea-level	* = 0.65 * = 1.47 NTU Nephelome PVC Polyvinyl ch s.u. Standard u	etric Turbidity Units

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Project N <u>DVDARS</u>	S. Rum MAN)	Project No. NG	001348.0406.	00001	-Page	1of ົ	
Site Location <u>PEYAP</u>	UD		MELMED			<u> </u>	
	170	Repirate No.	<u>nomon</u>	15	coue no.		
Weather <u>CLETT</u>		Sampling Time:	Begin			-	
Evacuation Data			Field Parameters	\mathcal{I}	10	20	37
Measuring Point	TUC		Color				Cow
MP Elevation (ft)			Odor				No
Land Surface Elevation (ft)			Appearance		1.	ad in	Cit
Sounded Well Depth (ft bmp)	764		pH (s.u.)	4.40	5165	4.43	4.45
Depth to Water (ft bmp)			Conductivity		1		
Water-Level Flevation (ft)	_		(umhos/cm)	68.3	1717	861	70
Water Column in Well (ff)	261		Turbidity (NTLI)		1	Unep	131
Casino Diameter/Type	4/11=		Temperature (°C)	14.1	13.4	13.0	13,1
Gallons in Well	169.65	2	Dissolved Oxygen	(mg/L)			1
Gallons Pumped/Bailed	*3		Salinity (%)	23,66	23.45	D3.VR	
Prior to Sampling	509.		Sampling Method				1
Sample Pump Intake Setting (ft bmp)			Remarks	3wer	(UD	come	,
Purge Time	begin end			nh í			
Pumping Rate (gpm)			503-3	Dr. 4	13-55	b = 2	33
Evacuation Method				1.15.1			
Constituents Sampled	Containe	r Description	Num	ber	Pi	reservativ	e
SEF COC							
Sampling Personnel	GARY G	ω					
Well Casing Volu	Jmes						
5al./Ft. $1-\frac{1}{2} = 0.06$ $1-\frac{1}{2} = 0.09$	2" = 0.16 3" 2-1/2" = 0.26 3-1	= 0.37 4" = 0 ½" = 0.50 6" =	0.65 1.47				
mp below measuring point	ml mililiter		NTU	Nephelome	tric Turbidit h	r Units	
mp below measuring point C Degrees Celsius	ml mililiter mS/cm Milisiemens	; per centimeter	NTU PVC	Nephelome Polyvinyl ch	tric Turbidity Iloride	y Units	
mp below measuring point C Degrees Celsius t feet pm Gallons per minute	ml mililiter mS/cm Milisiemens msl mean sea-le N/A Not Applica	s per centimeter svel ible	NTU PVC s.u. umhos/cm	Nephelome Polyvinyt ch Standard ur Micromhos	stric Turbidity sloride nits per centime	r Units ter	

Project <u>NERTHKOF</u> Site Location <u>BETHERM</u> Site/Well No. BPOW	<u>6260m m</u> Ad 58 NY 3-1	Project No. N 	14 <u>001348-04</u>	<u></u>) Page Date Code No	1_0 _12-1	+ 8-02
Weather <u>CURR</u>	180	Sampling Time:	Begin		End		
Evacuation Data			Field Parameter	s I	110	20	30
Measuring Point	TOC		Color			1.1.16	
MP Elevation (ft)	<u> </u>		Odor		12 3		
Land Surface Elevation (ft)	~		Appearance		1.182	Re la contra	
Sounded Well Depth (ft bmp)	516		pH (s.u.)	5.24	4,26	4.26	
Depth to Water (ft bmp)	414		Conductivity				
Water-Level Elevation (ft)	/		(µmhos/cm)	102.2	1073	10/1	20
Water Column in Well (ft)	102		Turbidity (NTU)	999			
Casing Diameter/Type	4"(0,65)		Temperature (°C) 127	13.01	2,7	E.
Gallons in Well	66.3		Dissolved Oxyge	n (mg/L)			
Gallons Pumped/Bailed Prior to Sampling	192.9		Salinity (%)	24	30.70	3220	
Sample Pump Intake Setting (ft bmp)			Remarks	P		- 1. 5.	
Purge Time be	gin end						
Pumping Rate (gpm)			414-2	4 x. 43	+50	= 222	OPSE
Evacuation Method				an a			
Constituents Sampled SCFCDC	Container I	Description	Nu	nber		Preserva	tive
					-		
ampling Personnel	C.W.				-		
Well Casing Volun	1es	0.27	0.65				
$1-\frac{1}{2}^{\circ} = 0.09$	2 = 0.16 3° = 2-½° = 0.26 3-½°	= 0.50 6" =	1.47				
mp below measuring point C Degrees Celsius t feet Galloos per minute	ml mililiter mS/cm Milisiemens p msl mean sea-leve N/A Not Applicable	er centimeter	NTU PVC s.u.	Nephelome Polyvinyl ch Standard u Micromhor	tric Turbid loride nits	ity Units	
ng/L Miligrams per liter	NR Not Recorded	-	VOC	Volatile Org	anic Com	pounds	

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Project	NoRTHRA	6. COMMA)	Project No. ႔	MOOBYR	0106		ge <u>1</u>	of	
Site Location	Bent	PAGEN	1				Da	ite		
Site/Well No.	flow	3-2	_	Replicate No.			Co	de No.		
Weather	CLEAR	200	_	Sampling Time	e: Begin	12	<u>i00</u> Enc	t t		
Evacuation Data)		- (Field Param	eters	Ŧ	110	25	31
Measuring Point		7	DC		Color		-h			
MP Elevation (ft)	l		-		Odor		MODELATE		3	
Land Surface Ele	vation (ft)	-			Appearance		0	12.04	1.3.3	
Sounded Well De	epth (ft bmp)	6	547		pH (s.u.)		4.86	513	497	3.18
Depth to Water ((ft hmn)	<	03		Conductivity	,	(1	The second	P	1.
	, rempy)			(mS/cm)	-				
Water-Level Eleva	ation (ft)				(µmhos/	/cm)	96.4	127,5	73,5	100.
Water Column in	Well (ft)	1	14.		Turbidity (NT	υ)			Star Salar	
Casing Diameter/	Туре	4(5,65)		Temperature	e (°C)	13.4	13,2	. 111.1	
Gallons in Well	~	C	13.6		Dissolved Ox	vaen (n	na/L)			
Gallons Pumped/I	Bailed		x 3		DTW Salielty (%)	,	25,81	26.4	226.2	1260
Prior to Sa	ampling	7	30		Comeling Ma	ف _ ــام.	0.0	-	-	140
Sample Pump Inta Setting (ft	ske bmp)				Remarks	etnoa				
Purge Time		begin <u>125</u> 05	end		503-	25	x.43+50	5 = 2	SPS	T
Pumping Rate (gp	m)							2.5		
Evacuation Metho	d _									
			Cantaina	- Decemintion				1000		14 N.
Constituents San	npled		Containe	rDescription	l	Numbe	61	Pres	ervative	
Constituents San SEF O	npled DC		Containe	r Description		Numbe	er	Pres	ervative	
Constituents San SEF O	npled DC					Numbe	H"	Pres	ervative	
Constituents San SEF C	npled DC					Numbe	er 	Pres	ervativ e	
Constituents San SEF C	mpled DC					Numbe	br 	Pres	ervative	
Constituents San	el	 				Numbe	er 	Pres		
Constituents Sar SEF C ampling Personne	el	 				Numbe	br	Pres		
Constituents Sar SEF C ampling Personne ial./Ft. 1	mpled DC el Veli Casing Volu -¼ " = 0.06 -½ " = 0.09	G-W umes 2' = 0.1 2-½' = 0	6 3* 	= 0.37 4" 2" = 0.50 6"	= 0.65 = 1.47	Numbe	er 	Pres		
Constituents Sar SEF C ampling Personne al./Ft. 1 1 1	mpled DC el 	G-W Jmes 2' = 0.1 2-½' = 0	6 3°).26 3-Y	= 0.37 4" 2" = 0.50 6"	= 0.65 = 1.47	Numbe	er 	Pres	ervative	
Constituents Sar SEF C ampling Personne ial./Ft. 1 mp below measu C Degrees Cels	mpled DC el Vell Casing Volu -¼ * = 0.06 -½ * = 0.09 uring point sius	G-W umes 2" = 0.1 2-½" = 0 ml mS/cm	6 3* .26 3-y mililiter Milisiemens	= 0.37 4" 2" = 0.50 6" per centimeter	= 0.65 = 1.47 NTU PVC	Numbe	er	Pres	nits	
Constituents Sar SEF C ampling Personne ial./Ft. 1 mp below measu C Degrees Cels feet	mpled DC el Veli Casing Volu -½* = 0.06 -½* = 0.09 uring point sius	 _	6 3°).26 3-Y mililiter Milisiemens mean sea-le	= 0.37 4" 2" = 0.50 6" per centimeter vel	= 0.65 = 1.47 NTU PVC s.u.	Numbe	er 	Pres	nits	

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ARCADIS GERAGHTY & MILLER

SPECIFY AG 05-12/01	□Ofher	urier	oD daJ 🗆]	SPECIFY	ay .	airne) no	ວພພ໐ງ	b: yó	ln Pers	Delivery Method:	1
				70	METH	455	27W	04	VEHOU	ης iχ	Special Instructions/Remarks:	- , 5
Seal Intact? A\N oN s9Y			- <u></u>	ed De			etion: 	Ó [†] ganiza Organiza	7		Relinquished by:	
Seal Intact? A\N oN 29Y	miT <u>(کر ک</u> عmit) miT عmit	70'0	11e // 12	ed	170	12 174	ation:	Organiza Organiza		-nH	Relinquished by:	n.,
Bottles/	Total No. of Cor			K	2.01		r.	Air	= A ;bilo2	= s :p	ppi = L :xintsM slqms	;
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2			2. 1965 		*	*	2		K	N	90-02-11-91	1
2			e.	1. 			2		90-0-011	1		
lstoT	Remarks				/		231	DI deJ	9miT\9tsQ b9lqms2	Matrix	Sample ID/Location	
			. /		10		B		÷	.M-Ð	oitsilittA\(2)	;
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