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FINAL QUARTERLY OPERATIONS REPORT FIRST QUARTER 2011 GROUNDWATER TREATMENT PLANT GM-38 AREA GROUNDWATER REMEDIATION NWIRP BETHPAGE NY

06/13/2011

ECOR SOLUTIONS

FINAL

QUARTERLY OPERATIONS REPORT
FIRST QUARTER 2011

GROUNDWATER TREATMENT PLANT
GM-38 AREA GROUNDWATER REMEDIATION
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK

Contract No. N62472-05-D-0031
Contract Task Order #003

Prepared for:

Naval Facilities Engineering Command Mid-Atlantic
9742 Maryland Avenue
Norfolk, VA 23511

Prepared By:

ECOR Federal Services, LLC.
21 S. High St, 2nd Floor
West Chester, PA 19382

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1.0 INTRODUCTION

ECOR Federal Services, LLC (ECOR) has prepared this Quarterly Operations Report for the GM-38 Area Groundwater Treatment Plant (GWTP) at the Naval Weapons Industrial Reserve Plant (NWIRP) in Bethpage, New York, for the United States Department of the Navy (Navy), Naval Facilities Engineering Command (NAVFAC), Mid-Atlantic, under Contract No. N62472-05-D-0031, Contract Task Order No. 003.

1.1 Background

NWIRP Bethpage is located in east central Nassau County, Long Island, New York, approximately 30 miles east of New York City (**Figure 1**) and is currently listed by New York State Department of Environmental Conservation (NYSDEC) as an "inactive hazardous waste site" (#1-30-003B). Historically, the Navy's property totaled approximately 109.5 acres and was a Government Owned Contractor-Operated (GOCO) facility that was operated by the Northrop Grumman Corporation (NGC) until September 1998. NWIRP Bethpage is bordered on the north, west, and south by property owned, or formerly owned, by NGC that covered approximately 605 acres, and, on the east, by a residential neighborhood.

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

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

1.2 GWTP Overview

Groundwater is extracted from recovery wells RW-1 and RW-3 and treated in the GWTP. The treatment process consists of flow equalization, air stripping and vapor-phase carbon treatment, bag filtration, liquid-phase carbon treatment and pH adjustment (if needed). To this point, pH adjustment has not been necessary even though sodium hydroxide has been stored on site and the equipment remains in place. Since pH adjustment is not anticipated in the immediate future, the sodium hydroxide was sent off site for beneficial reuse. A process flow diagram is presented as **Figure 2**. The treated water is either re-injected into injection well IW-1 or discharged into the Nassau County Recharge Basin #495. Under CERCLA, the Navy is required to meet the effluent requirement in the NYSDEC's Storm Pollution Discharge Elimination System Permit as Applicable or Relevant and Appropriate Requirements (ARAR). The GWTP was designed to operate at an average flow rate of 1,100 gallons per minute (gpm) (800 gpm from RW-1 and 300 gpm from RW-3) with a maximum flow rate of 1,375 gpm, as measured by the

average discharge flow rate. It was determined that this flow rate would be necessary to effectively contain the higher concentration of contamination in the GM-38 Area groundwater. The average concentration of Volatile Organic Compounds (VOCs) in the influent groundwater consists of 3,400 µg/l of trichloroethene, 900 µg/l of tetrachloroethene, 300 µg/l of vinyl chloride, 1,100 µg/l of cis-1,2-dichloroethene, and smaller concentrations of 1,2-dichloroethane, benzene, toluene, and total xylenes.

The air stripper (AS) is a structural aluminum tower that is packed with 3.5 inch diameter polypropylene Jaeger Tripack. Groundwater is pumped to the air stripper distribution port and sprayed over the column of Jaeger Tripack at a flow rate of approximately 1,200 gpm. This includes approximately 1,100 gpm of raw groundwater and 100 gpm of recirculation water. An induced draft countercurrent flow of air enters the air stripper below the base of the packing material at a rate of 8,000 scfm. The large surface area of the packing material allows for a mass transfer of the VOCs from the groundwater into the air stream. All of the VOCs in the off-gas, except for vinyl chloride, are removed via two 20,000 lb vapor phase granular activated carbon (VGAC) units (VGAC-1 and VGAC-2). Vinyl chloride is oxidized by a 20,000 lb potassium permanganate vessel (VGAC-3) into potassium chloride and carbon dioxide. The potassium chloride remains in the pore structure of the zeolite substrate. The treated off-gas is discharged out of the stack.

Water treated by the air stripper is passed through three 8,000 liquid phase granular activated carbon (LGAC) units in parallel prior to discharge in the recovery basin (or injection well, if necessary).

The GWTP is controlled by a PLC-based digital and analog control system, with monitoring instrumentation, such as pH, pressure, tank level, and flow transmitters, differential pressure transmitters, and pump signals that communicate with a PLC. In turn, the information in the PLC is made available to an operator via a human-machine interface (HMI) program. By using this program, the status of the GWTP can be displayed in real time and adjusted, if necessary, by the operator.

2.0 GWTP OPERATION AND MAINTENANCE

While designed to run completely automated, the GWTP requires regular weekly visits by an operator to record and adjust operational parameters and to perform scheduled maintenance.

2.1 Routine Maintenance Activities

Routine maintenance activities at the GWTP during the quarter were performed during the operator's weekly visits (generally; Monday, Wednesday and Friday averaging 20 hours a week). These activities include general site inspections, collection of operational data (water and vapor flowrates, pressures, tank levels and totalizer readings), measurement of water depth in the recovery wells, adjustment of pump signal settings, collection of vapor and process water samples, changing out of bag filters, switching of lead/lag pump assignments, and preventive maintenance of system equipment.

2.2 Non-routine Maintenance Activities

The following non-routine activities were performed during the First Quarter 2011:

- On March 22, 2011 at 2030, there was an alarm for a high level in the air stripper tower. Upon arrival of the operator at 2130, the GWTP was shutdown, however, the air stripper pump, P-4A, was still operating. As a result, the heat from the motor damaged the PVC piping. Some of the piping and fittings needed to be replaced.

- An instrumentation vendor was subcontracted to troubleshoot the programming logic controller software and determine why the motor continued to operate following the alarm condition. However, to date, no cause has been determined.

3.0 GWTP MONITORING

The GWTP is not intended to remediate groundwater contamination in the local aquifer to non-detectable levels. Rather, the intent of the system is to remove mass and reduce elevated VOC levels to levels similar to those in the surrounding aquifer. Doing so will minimize the impacts on water supply wells and currently unaffected portions of the aquifer. To monitor GWTP effectiveness and for compliance with Federal and State requirements, several process (water and vapor) samples are collected on a monthly basis. In addition, groundwater samples are collected quarterly to monitor water quality and hydraulic containment.

3.1 Process Water Quality Monitoring

Processed groundwater is tested to comply with calculations submitted by the Navy and approved by NYSDEC Water Division for the effluent limitations and monitoring requirements. These results are also submitted to the NYSDEC on a monthly basis in the form of a Discharge Monitoring Report (DMR). A copy of the approved NYSDEC effluent limitation and monitoring constituents and the reporting forms are included as **Appendix A.**

Samples are collected from each recovery well (RW-1 and RW-3), as well as, the effluent water discharge line. The analytical results of monthly process water sampling performed during the First Quarter 2011 are presented in **Table 1.** The data demonstrates that all permitted constituents were in compliance for the quarter. **Table 1** also summarizes the average monthly flowrates in gallons per minute along with the total volume of water processed.

3.2 Air Quality Monitoring

Treated off-gas discharged at the stack of the GWTP is subject to emissions limitations as described by the calculations submitted by the Navy and approved by the NYSDEC Division of Air Resources (DAR) in July 2009. A copy of the NYSDEC approved calculations are included as **Appendix B.**

While only sampling of the stack is required for NYSDEC compliance, vapor samples are also collected using 6L summa canisters at various locations to monitor for breakthrough of the VGAC units. The analytical results of monthly influent and effluent vapor samples collected during the First Quarter 2011 are presented in **Table 2.** Air emissions calculations using the stack vapor concentrations along with discharge flowrates are presented in **Table 3.** The calculations demonstrate that all permitted constituents were in compliance.

3.3 Groundwater Quality Monitoring

The groundwater monitoring well system at the GM-38 Groundwater Remediation Area consists of 14 monitoring wells (as summarized in **Table 4**), 3 recovery wells (RW-1, RW-2, RW-3) and 1 injection well (IW-1). All well locations are shown on **Figure 3**.

On a quarterly basis, depth to water (DTW) measurements are collected from 12 of the monitoring wells, while water quality samples are collected from seven of the monitoring wells (as shown on **Figure 4**). Two wells, GM-38D and GM-38D2, located at the corner of Aurthur Avenue and Broadway shown in **Figure 5**, are being monitored by others.

The monitoring system includes well clusters located near the recovery and injection wells as described below and shown on **Figure 3**.

Recovery Well 1(RW-1)
The RW-1 cluster consists of three monitoring wells screened between 395 and 435 feet below ground surface (bgs). RW-1 MW-1 is located approximately 140 feet northwest of RW-1 and RW-1 MW-2 is located approximately 50 feet north of RW-1. RW-1 MW-3 is located approximately 400 feet northeast of RW-1, on the eastern side of Seaford Oyster Bay Expressway. All three wells are hydraulically monitored while only RW-1MW1 and RW-1MW-3 are monitored for water quality.

Recovery Well 2(RW-2)
The RW-2 cluster consists of three monitoring wells screened between 470 and 510 feet bgs. RW-2 MW-1 is located approximately 60 feet northwest of RW-2, RW-2 MW-2 is located approximately 20 feet west of RW-2, and RW-2 MW-3 is located approximately 100 feet west of RW-2. All three wells are hydraulically monitored while only RW-2 MW1 is monitored for water quality.

Recovery Well 3(RW-3)
The RW-3 cluster consists of four monitoring wells RW-3 MW-1 and RW-3 MW-3 are screened between 320 and 340 ft bgs, RW-3 MW-2 and RW-3 MW-4 are screened between 475 and 495 feet bgs. RW-3 MW-1 and RW-3 MW-2 are located approximately 500 feet west of the GM-38 cluster, at the intersection of Arthur Avenue and Leroy Avenue. RW-3 MW-3 and RW-3 MW-4 are located approximately 400 feet north of the intersection of Arthur Avenue and Broadway. All four wells are both hydraulically monitored and monitored for water quality.

Injection Well 3(IW-1)
There is one monitoring well associated with injection well IW-1. IW-1 MW-1 is screened between 130 and 150 feet bgs and is located approximately 20 feet south of IW-1. It is only hydraulically monitored.

TP-1
TP-1 is screened between 450 and 470 feet bgs and is located approximately 25 feet north of the GWTP building, inside the fenced area. It is hydraulically monitored to observe the change in water levels due to the influence from the pumping rates at the neighboring public water supply well field near the hot spot area.

3.3.1 Groundwater Quality Results

ECOR collected groundwater samples from the seven (7) monitoring wells (RW1-MW1, RW1-MW3, RW2-MW1, RW3-MW1, RW3-MW2, RW3-MW3, RW3-MW4). Samples were collected using bladder pumps following the United States Environmental Protection Agency (USEPA) micropurge and low-flow sampling methodologies. Field parameters measured during well purging included pH, specific conductance (S.C.), temperature, oxidation-reduction potential (ORP) and dissolved oxygen (DO). The results are summarized in **Table 5**. Copies of the field notes are presented in **Appendix C**. Following stabilization of field parameters, samples were collected from the pump discharge.

Groundwater samples collected were submitted to a National Environmental Laboratory Accreditation Conference (NELAC) accredited laboratory (Accutest Laboratories located in Dayton, NJ) for the analysis of Target Compound List (TCL) VOCs using USEPA Method 624, Mercury using USEPA Method SW846 7470A, and TSS using USEPA Method SM20 2540D. Validated analytical results of samples collected during the monitoring event are summarized in **Table 6.** The data validation report is presented in **Appendix D.** Raw analytical data is presented on **Appendix E.**

3.3.2 Quality Assurance/Quality Control Sampling

Additionally, the following quality assurance/quality control (QA/QC) samples were also collected: blind field duplicate (collected from RW3-MW1), field blank (FB), trip blank (TB), and matrix spike/matrix spike duplicate (MS/MSD). The results of the FB and TB samples indicate that no constituents were detected above laboratory method detection limits (MDL).

For duplicate (DUP) samples, the precision between the original sample and its duplicate is evaluated by calculating the relative percent difference (RPD). ECOR has evaluated DUP samples using an acceptance criterion of twenty percent (20%) for detected primary COC. **Table 7** presents the RPDs for the groundwater. If the sample results are below MDLs a RPD cannot be calculated for that sample. As shown on **Table 7**, none of the calculated RPDs were above the 20% criteria. The overall consistency between the samples indicates that proper sample collection methods were followed.

TABLES

GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Discharge Monitoring Results
First Quarter 2011

SPDES Parameters	Daily Maximum Goal	Units	January 2011				February 2011				March 2011			
Process Stream			RW-1	RW-3	Influent	Effluent	RW-1	RW-3	Influent	Effluent	RW-1	RW-3	Influent	Effluent
Well Depth		ft	500	500	N/A	N/A	500	500	N/A	N/A	500	500	N/A	N/A
Screened Interval		ft	470-500	470-500	N/A	N/A	470-500	470-500	N/A	N/A	470-500	470-500	N/A	N/A
Sampling Date			1/19/11				2/28/11				3/21/11			
Average Flowrate	1100	GPM	814	297	1111	1142	800	258	1059	1100	401	129	530	551
Total Flow		gallons	NR	NR	49,595,040	50,978,880	NR	NR	42,680,960	44,360,960	NR	NR	23,670,360	24,591,060
pH	5.5 - 8.5	SU	NR	NR	6.06	6.98	NR	NR	5.73	6.86	NR	NR	6.06	6.97
1,1-Dichloroethane	5	µg/l	3.1	1.8	2.8	ND	2.9	2.5	2.8	ND	2.8	2.0	2.6	ND
1,2-Dichloroethane	0.6	µg/l	0.66 J	ND	ND	ND	0.66 J	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethene	5	µg/l	6.6	1.3	5.2	ND	6.4	1.6	5.2	ND	6.8	2.0	5.6	ND
Carbon Tetrachloride	N/A	µg/l	0.7 J	0.18 J	0.56 J	ND	0.51 J	ND J	0.39 J	ND	0.62 J	ND J	0.47 J	ND
cis 1,2-Dichloroethene	5	µg/l	64.1	2.1	47.5	ND	57.2	2.0	43.7	ND	61.5	1.9	47.0	ND
trans 1,2-Dichloroethene	5	µg/l	1.1	ND	0.8	ND	1.1	ND	0.8	ND	1.1	ND	0.8	ND
Tetrachloroethene	5	µg/l	115	ND	84	ND	118	ND	89	ND	100	ND	76	ND
1,1,1-Trichloroethene	5	µg/l	8.8	1.1	6.7	ND	7.7	1.2	6.1	ND	7.5	1.2	6.0	ND
Trichloroethene	5	µg/l	442	343	416	0.4 J	418	331	397	0.4 J	330	285	319	0.28 J
Vinyl Chloride	2	µg/l	7.0	ND	5.1	ND	5.7	ND	4.3	ND	6.9	ND	5.2	ND
Mercruy	0.25	µg/l	< 0.20	<0.20	<0.20	<0.20	< 0.20	<0.20	<0.20	<0.20	< 0.20	<0.20	<0.20	<0.20

Notes:
J, B - Estimated result less than reporting limit
ND - Not Detected
NR - Not Recorded
SU - standard units
µg/l - micrograms per liter
gpm - gallons per minute

Table 2
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Air Sampling Results
First Quarter 2011

DAR Parameters	SGC	Units	January 2011		February 2010		March 2010	
Process Stream			Influent	Effluent	Influent	Effluent	Influent	Effluent
Sampling Date			1/28/11		2/14/11		3/11/11	
Average Flowrate		CFM		9265		8714		4388
Trichloroethene	14000	$\mu g/m^3$	6800	9.3	3400	6	10000	28
Tetrachloroethene	1000	$\mu g/m^3$	6800	ND	1300	ND	2300	5.8
Vinyl Chloride	180000	$\mu g/m^3$	56	ND	71	ND	76	ND
trans 1,2-Dichloroethene	-	$\mu g/m^3$	ND	ND	ND	ND	ND	ND
cis 1,2-Dichloroethene	-	$\mu g/m^3$	440	ND	630	ND	750	ND
1,2-Dichloroethene (total)	-	$\mu g/m^3$	440	ND	630	ND	750	ND
1,2-Dichloroethane	-	$\mu g/m^3$	ND	ND	ND	ND	ND	ND
Toluene	37000	$\mu g/m^3$	ND	ND	ND	ND	ND	ND
Xylene	4300	$\mu g/m^3$	ND	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	-	$\mu g/m^3$	ND	ND	ND	ND	ND	ND

Notes:
ND - Not detected
NR - Not recorded
SGC - Short-term Guideline Concentration
$\mu g/m^3$ - micrograms per cubic meter
CFM - cubic feet per minute
DAR - Division of Air Rescources

Table 3
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Stack Emissions
First Quarter 2011

DAR Parameters	Discharge Goal	Units	January 2011	February 2011	March 2011
Sampling Date			1/28/11	2/14/11	3/11/11
Average Flowrate		CFM	9265	8714	4388
Total Flow		ft^3	413,589,600	351,366,400	195,888,690
Total Flow		m^3	11,704,586	9,943,669	5,543,650
Trichloroethene	0.09	lb/hr	0.00	0.000	0.0005
Tetrachloroethene	0.02	lb/hr	0.00	0.00	0.0001
Vinyl Chloride	0.01	lb/hr	0.0000	0.00	0.00
1,2 Dichloroethene	0.03	lb/hr	0.0000	0.0000	0.0000
1,2-Dichloroethane	BRT	lb/hr	0.00	0.00	0.00
Toluene	BRT	lb/hr	0.00	0.00	0.00
Xylene	BRT	lb/hr	0.00	0.00	0.00
1,1,2-Trichloroethane	BRT	lb/hr	0.00	0.00	0.00

Notes:
BRT - Below reporting thresholds
lb/hr - pounds per hour
DAR - Divison of Air Resources
CFM - Cubic feet per minute

Table 4
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Groundwater Level Measurements
First Quarter 2011

Monitoring Well ID	Date	Time	Total Depth (ft)	Screen Interval (ft)	Depth to Water (ft)
RW1-MW1	03/24/11	1000	435	395-435	33.20
RW1-MW2	03/24/11	1010	435	395-435	32.28
RW1-MW3	03/24/11	1015	435	395-435	27.08
RW2-MW1	03/24/11	1020	510	470-510	37.31
RW2-MW2	03/24/11	1025	510	470-510	33.61
RW2-MW3	03/24/11	1040	510	470-510	33.05
RW3-MW1	03/24/11	900	350	330-350	36.18
RW3-MW2	03/24/11	910	495	475-795	37.52
RW3-MW3	03/24/11	1030	340	320-340	37.46
RW3-MW4	03/24/11	1035	495	475-495	38.51
TP-1	03/24/11	930	470	450-470	36.55
IW1-MW1	03/24/11	945	NA	NA	35.07
GM38D	NA	NA	340	320-340	NA
GM382D	NA	NA	495	475-495	NA

Notes:
ft - Feet
NA - Not Available

Table 5
Summary of Final Groundwater Chemistry Data
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Summary of Groundwater Chemistry Data
First Quarter 2011

Location	pH (SU)	S.C. (mS/cm)	Turbidity (NTU)	DO (mg/L)	Temp (ºC)	ORP (MV)	Color (Visual)
RW1-MW1	4.86	161	N/A	6.22	11.74	520	clear
RW1-MW3	4.39	147	N/A	1.46	13.14	348	clear
RW2-MW1	10.73	0.101	N/A	0.53	12.78	-100	clear
RW3-MW1	3.54	106	N/A	5.29	11.71	398	clear
RW3-MW2	4.14	0.850	N/A	8.32	12.65	352	clear
RW3-MW3	8.42	0.135	N/A	3.03	14.12	8.1	clear
RW3-MW4	8.68	0.092	N/A	4.09	14.48	2.8	clear

Notes:
S.C. = Specific Conductance
mS/cm = milliSiemens per centimeter
NTU = nephelometric turbidity units
mg/L = milligrams per liter
ºC = degrees celsius
MV = millivolts
SU = standard units
ORP = oxidation/reduction potential
NWIRP = Naval Weapons Industrial Reserve Plant
N/A = Not Available due to equipment failure

Table 6
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Summary of Groundwater Data - March 2011

Sample ID	RW1-MW1	RW1-MW3	RW2-MW1	RW2-MW3	RW3-MW1		RW3-MW2	RW3-MW3	RW3-MW4
Sample Date	3/25/2011	3/25/2011	3/24/2011	5/28/2009	3/25/2011	3/25/2011	3/25/2011	3/25/2011	3/24/2011
Comments						duplicate			
Well Depth (Ft)	435	435	510	510	350		495	340	495
Screened Interval (Ft)	395-435	395-435	470-510	470-510	330-350		475-495	320-340	475-495
TCL VOC (8260B/624) ug/L									
acetone	ND	ND	ND	ND	ND	ND	ND	ND	ND
benzene	ND	ND	0.30J	ND	ND	ND	ND	ND	ND
bromodichloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromoform	ND	ND	ND	ND	ND	ND	ND	ND	ND
bromomethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-butanone	ND	ND	ND	ND	ND	ND	ND	ND	ND
carbon disulfide	ND	ND	ND	ND	ND	ND	ND	ND	ND
carbon tetrachloride	ND	ND	ND	ND	ND	ND	ND	ND	ND
chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
chloroethane	ND	ND	ND	ND	ND	ND	ND	NR	NR
chloroform	0.55J	0.73J	ND	ND	ND	ND	ND	0.33J	ND
chloromethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
cyclohexane	NR	NR	NR	ND	NR	NR	NR	NR	NR
dibromochloromethane	ND	NR	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethane	3.6	2.4	ND	1.4	1.3	1.3	ND	1.5	0.81
1,2-dichloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-dichloroethene	1.9	ND	ND	0.42J	1.2	1.1	ND	0.96J	ND
cis-1,2-dichloroethene	121	0.58J	0.43J	2.3	0.47J	0.45J	1.6	2.3	ND
trans-1,2-dichloroethene	4.2	ND	ND	ND	ND	ND	ND	ND	ND
1,2-dichloropropane	ND	ND	ND	ND	ND	ND	ND	ND	ND
cis-1,3-dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND
trans-1,3-dichloropropene	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,4-dioxane	NR	NR	NR	NR	NR	NR	NR	NR	NR
ethylbenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND
2-hexanone	ND	ND	ND	ND	ND	ND	ND	ND	ND
methylene chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND
4-methyl-2-pentanone	ND	NR	ND	ND	ND	ND	ND	ND	ND
methyl-tert-butyl-ether	NR	NR	NR	ND	NR	NR	NR	NR	NR
styrene	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,4-trichlorobenzene	NR	NR	ND	ND	NR	NR	NR	NR	NR
tetrachloroethene	ND	ND	ND	ND	1.4	1.6	ND	ND	ND
1,1,1-trichloroethane	0.79J	0.33J	ND	ND	1.1	1.1	ND	0.62J	ND
1,1,2-trichloroethane	ND	0.41J	ND	ND	ND	ND	ND	ND	ND
trichloroethene	97.6	1.0	1.7	18.0	76.2	77.9	110	288	7.7
trichlorofluoromethane	NR	NR	NR	ND	NR	NR	NR	NR	NR
toluene	ND	ND	ND	0.39J	ND	ND	ND	ND	ND
vinyl chloride	ND	ND	ND	ND	ND	ND	ND	ND	ND
xylenes (total)	ND	ND	ND	ND	ND	ND	ND	ND	ND
Mercury (SW846-7470A) ug/L	<0.20	<0.20	<0.20	ND	<0.20	<0.20	<0.20	<0.20	<0.20
TSS (SM20 2540D) mg/L	4.0	<4.0	<4.0	14.8	<4.0	<4.0	10.0	<4.0	<4.0

Note:
VOC analysis changed to EPA Method 624 in January 2010
D-dilution
J-estimated value
ND-not detected
NR-not requested
R-Rejected
mg/L - milligrams per liter
µg/l - micrograms per liter

Table 7
GM-38 Area Groundwater Remediation
Groundwater Treatment Plant
Naval Weapons Industrial Reserve Plant - Bethpage, NY
Calculated Relative Percent Difference
First Quarter 2011

Well ID RW3-MW1

Blind Duplicate Sample ID DUP

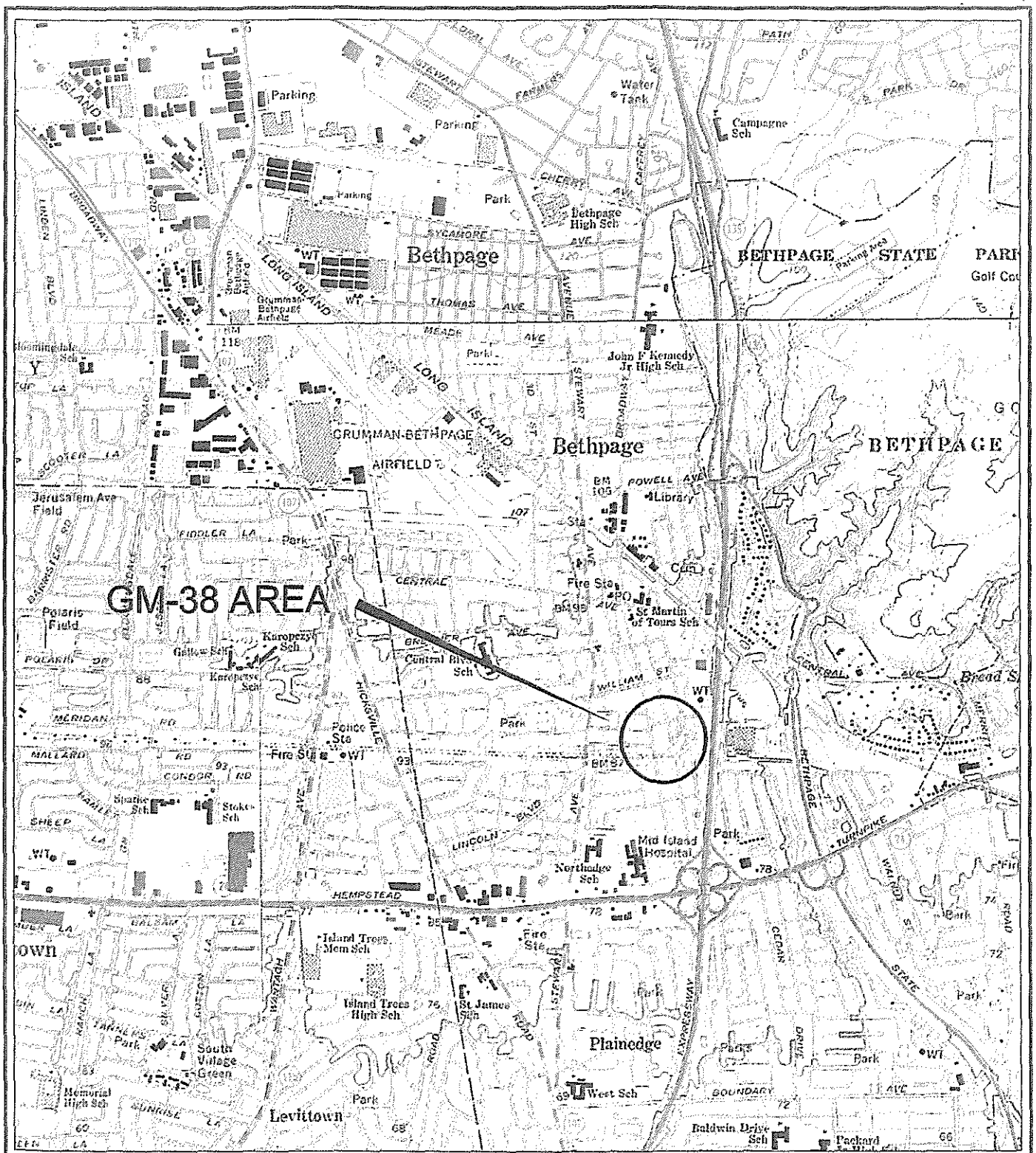
Constituent	Concentration (µg/L)		RPD
	Original	Duplicate	
Carbon Tetrachloride	ND	ND	NC
Chloroform	ND	ND	NC
1,1-Dichloroethane	1.3	1.3	0.0%
1,2-Dichloroethane	ND	ND	NC
1,1-Dichloroethene	1.2	1.1	8.7%
cis-1,2-Dichloroethene	0.47 J	0.45 J	4.3%
trans-1,2-Dichloroethene	ND	ND	NC
Tetrachloroethene	1.4	1.6	13%
1,1,1-Trichloroethane	1.1	1.1	0.0%
1,1,2-Trichloroethane	ND	ND	NC
Trichloroethene	76.2	77.9	2.2%
Toluene	ND	ND	NC
Vinyl Chloride	ND	ND	NC

Notes:

J = Estimated value
NC = not calculated
ND = not detected above laboratory detection limit
mg/L = micrograms per liter

$$\text{RPD} = \text{Relative Percent Difference} = \frac{(\text{Original Concentration} - \text{Duplicate Concentration})}{(\text{Original Concentration} + \text{Duplicate Concentration})/2} \times 100$$

FIGURES



Quadrangle Location Map

0 2000 4000 Feet

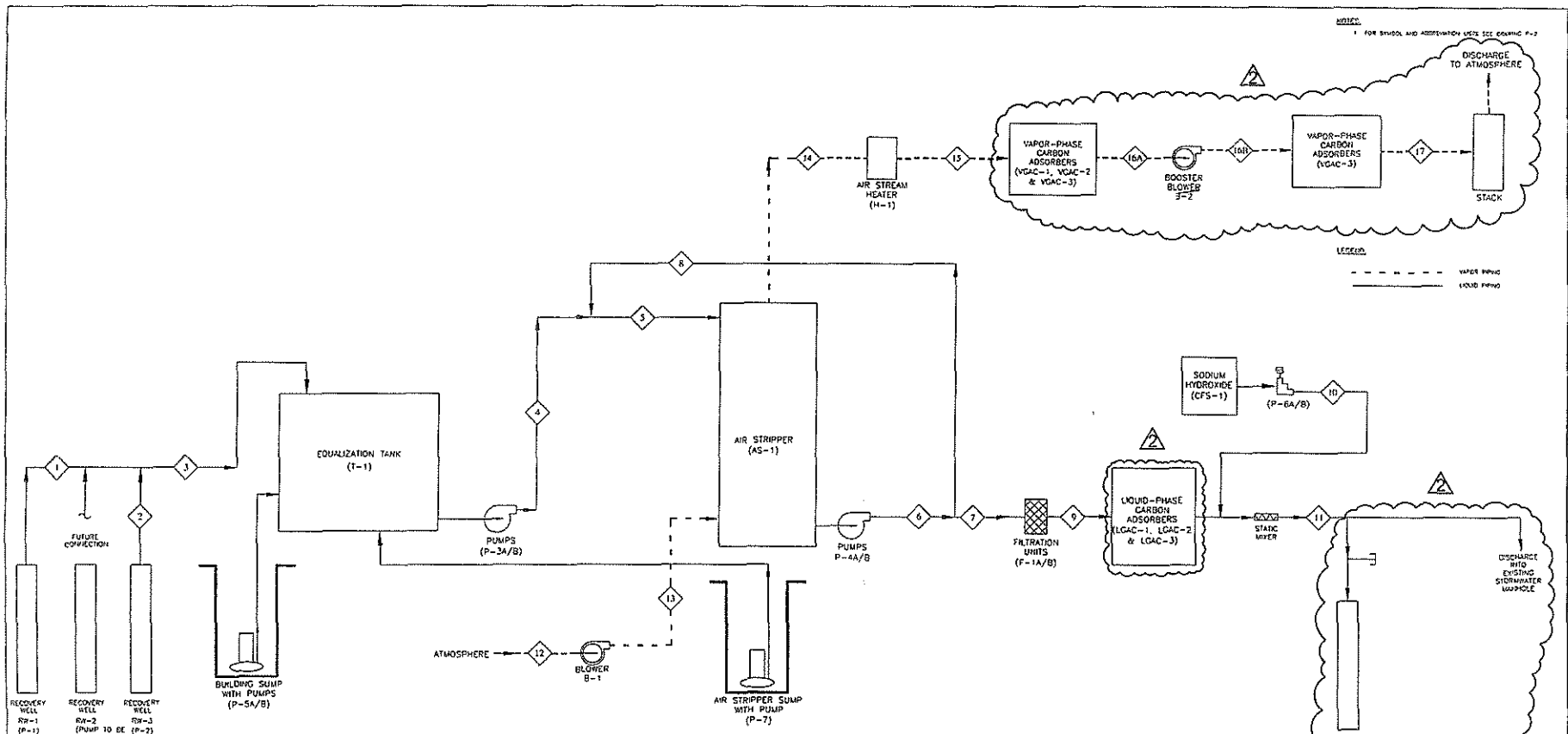
N

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

U.S. Navy RAC
Engineering Field Activity, Northeast

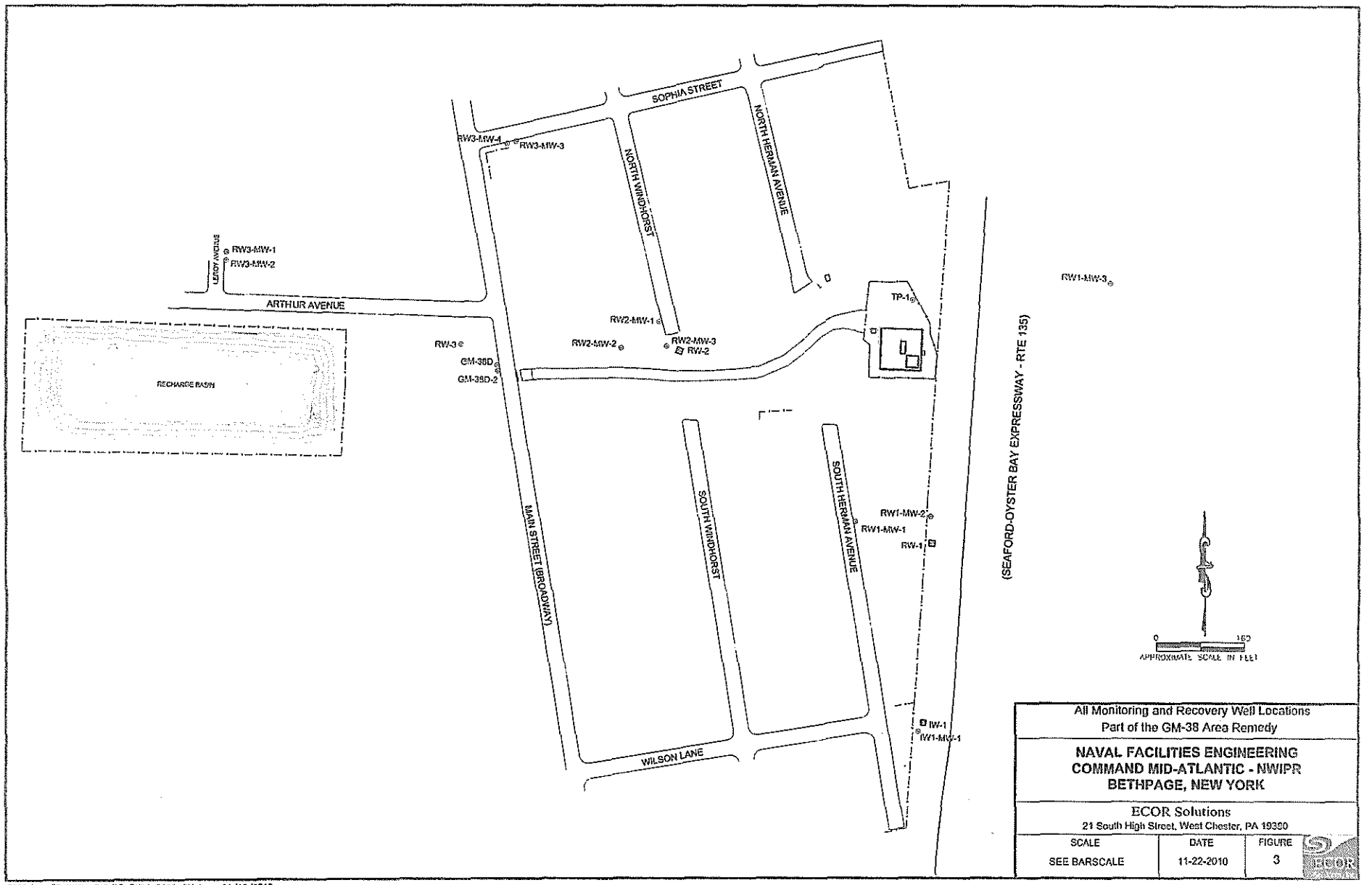
GM-38 Area (Offsite)
NWIRP Bethpage
Bethpage, NY

Figure 1
Site Location Map



STREAM NO.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
COMPOSITION (UG/L, UNLESS OTHERWISE NOTED)																
BENZENE	4	4	4	4	3	-	-	-	-		-					
TOLUENE	15	15	15	15	12	-	-	-	-		-					
XYLENES, TOTAL	16	16	16	16	12	-	-	-	-		-					
1,2-DICHLOROETHANE	3	3	3	3	2.8						2.2 ppb					
cis 1,2-DICHLOROETHENE	1100	1100	1100	1100	1000	0.10	0.10	0.10	0.10		1.0 ppb					
VINYL CHLORIDE	300	300	300	300	275	0.03	0.03	0.03	0.03		2.7 ppb					
TETRACHLOROETHENE (PCE)	900	900	900	900	825	0.08	0.08	0.08	0.08		4.2 ppb					
TRICHLOROETHENE (TCE)	3400	3400	3400	3400	3117	3.12	3.12	3.12	3.12		3.1 ppb					
WATER FLOW RATE (GPM)	800	300	1100	1100	1200	1200	1100	800	1100	3.1 gpd	1100					
TEMPERATURE (°F)	55	55	55	55	55	55	55	55	55	60	55					
PRESSURE (PSIG)												-0.27	1.50	1.36	1.18	0.83
DENSITY (lb/ft³)										55.5		0.077	0.085	0.084	0.082	0.079
MASS FLOW RATE (lb/hr)	400361	150136	550500	550500	600515	600515	550500	50,045	550500	0.56	550500	36,960	40,800	30,320	39,360	37,920
RELATIVE HUMIDITY (%)												50	50	100	50	50
STATIC PRESSURE (PSIA)												0.214	0.214	0.214	0.275	0.275
pH (S.U.)	5.5	5.5	5.5	5.5	5.5	6.0	6.0	6.0	6.0	12	7.0					
VAPOR FLOW RATE (CFM)												8000	8000	8000	8000	8000
TOTAL VAPOR VOC (PPMV)												-	-	25.5	25.5	1.2
TOTAL VAPOR VOC (LB/HR)												-	-	5.18	5.18	0.35

TETRA TECH ENGINEERING CORPORATION PC
APPROVED
DATE
PREP BY
DESCRIPTION
REV
0 FINAL SUBMITTAL
1
2
NAVAL FACILITIES ENGINEERING COMMAND
CONTRACT NO. N62472-93-D-0032
ENGINEERING FIELD ACTIVITY - NORTHEAST
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
GM-38 AREA
GROUNDWATER TREATMENT PLANT
PROCESS FLOW DIAGRAM - GROUNDWATER AND OFF-GAS TREATMENT
DEPARTMENT OF THE NAVY
LOCATION
SCALE: NO SCALE
DESIGNED
DRAWN
CHECKED
APPROVED
JOB NO.
DATE 05/29/98
CODE ID. NO. 80091
SPEC. NO.
DRAWING TENDER NO. N62472-93-D-0032
WORK DRAWING NO. FIGURE 3
SHEET 1 OF 1
REV. NO. 0
DRAWING NO. 1-4



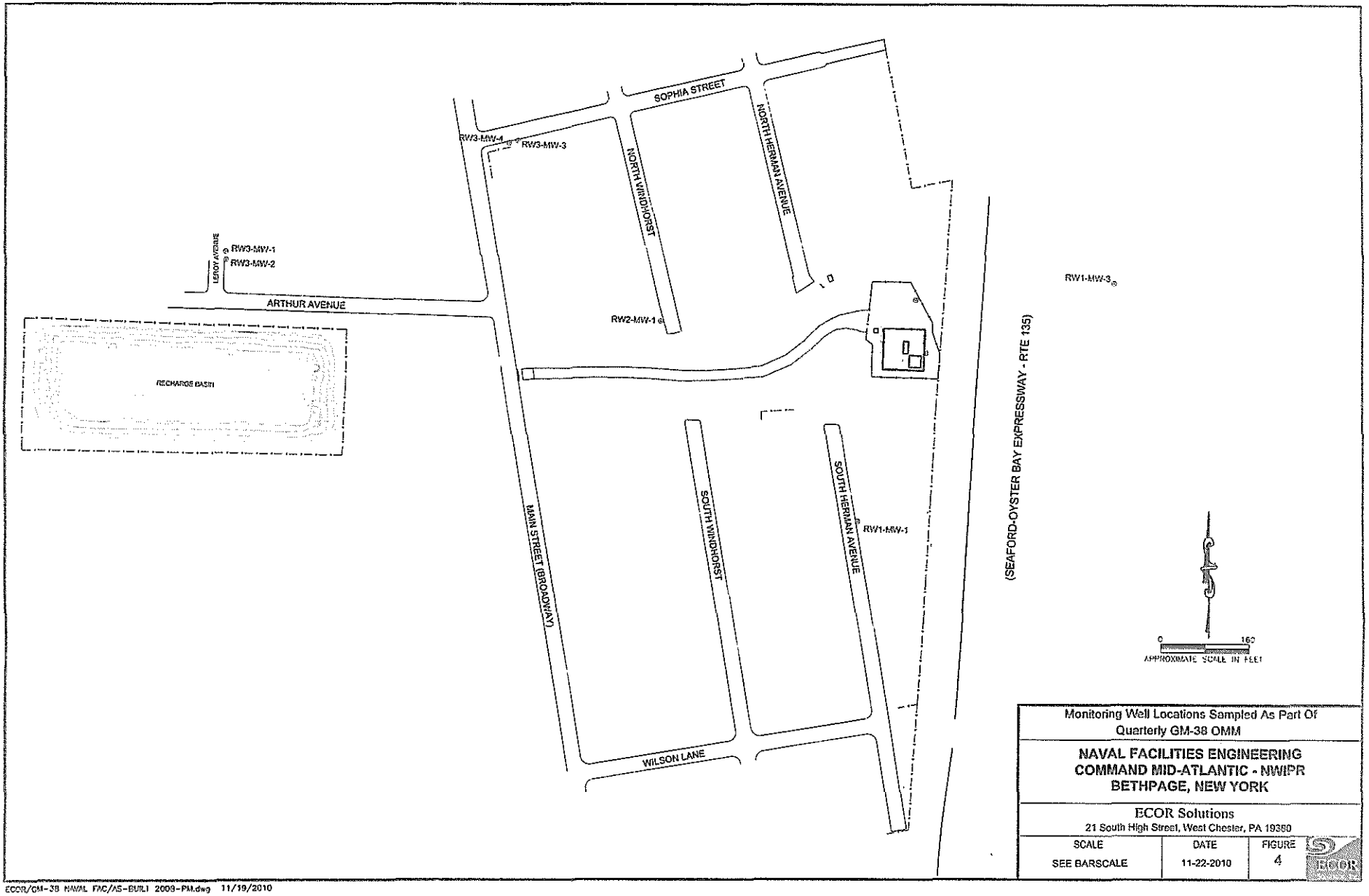
All Monitoring and Recovery Well Locations
Part of the GM-38 Area Remedy

NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC - NWIPR BETHPAGE, NEW YORK

ECOR Solutions
21 South High Street, West Chester, PA 19380

SCALE	DATE	FIGURE
SEE BARSCALE	11-22-2010	3

ECOR/GM-38 NAVAL FAC/AS-BUILT 2008-PM.dwg 11/19/2010



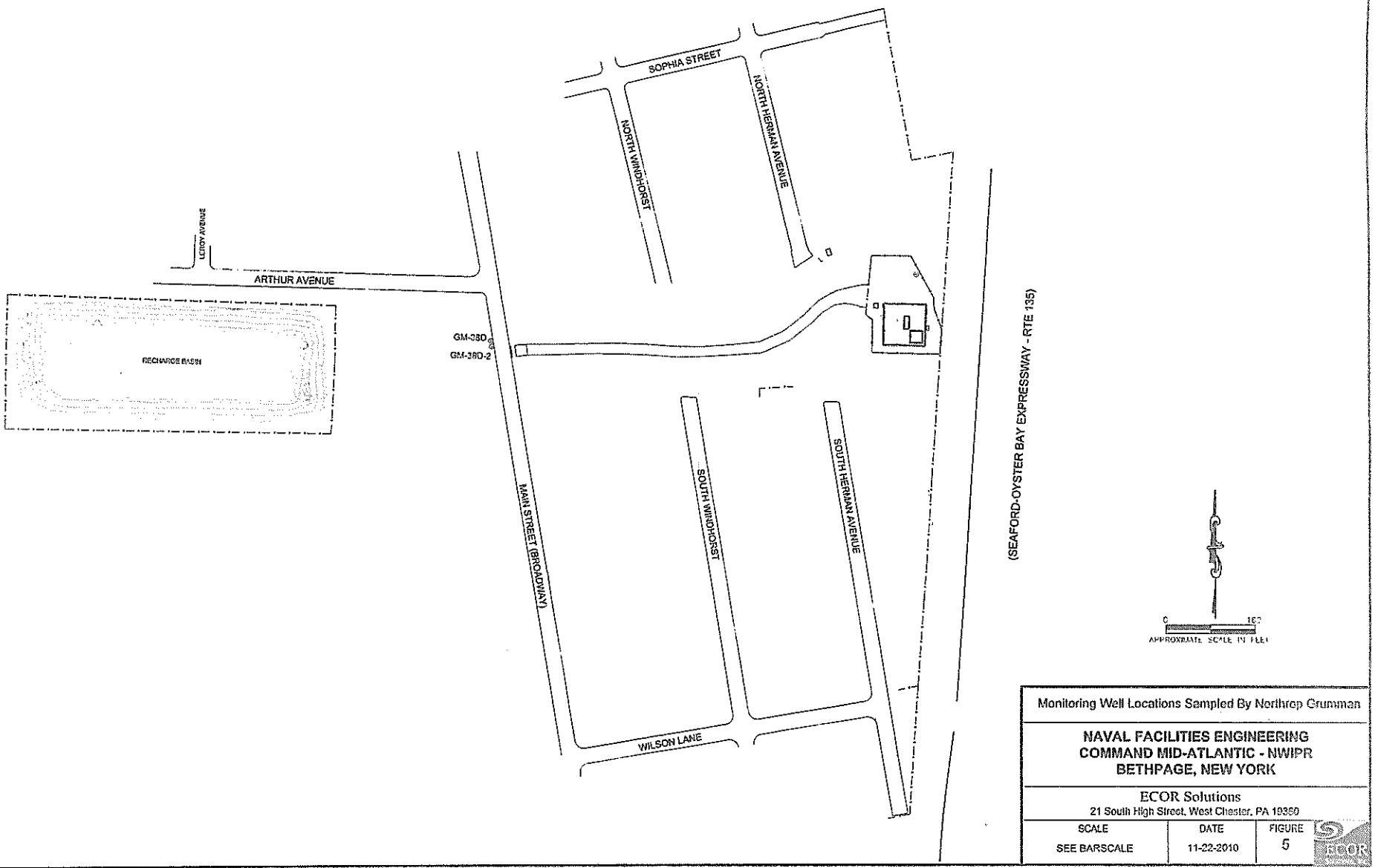
Monitoring Well Locations Sampled As Part Of Quarterly GM-38 OMM

NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC - NWIPR BETHPAGE, NEW YORK

ECOR Solutions
21 South High Street, West Chester, PA 19380

SCALE	DATE	FIGURE
SEE BARSCALE	11-22-2010	4

ECOR/GM-38 NAVAL FAC/AS-BUILT 2009-PM.dwg 11/19/2010



Monitoring Well Locations Sampled By Northrop Grumman

NAVAL FACILITIES ENGINEERING COMMAND MID-ATLANTIC - NWIPR BETHPAGE, NEW YORK

ECOR Solutions
21 South High Street, West Chester, PA 19380

SCALE	DATE	FIGURE
SEE BARSCALE	11-22-2010	5

ECOR/CM-38 NAVAL FAC/AS-BUILT 2009-PM.dwg 11/19/2010